KEMET Organic Capacitor (KO-CAP®)

T52X/T530 Polymer Electrolytic Capacitors

Overview

The KEMET Organic Capacitor (KO-CAP) is a solid electrolytic capacitor with a conductive polymer cathode capable of delivering very low ESR and improved capacitance retention at high frequencies. KO-CAP combines the low ESR of multilayer ceramic, the high capacitance of aluminum electrolytic, and the volumetric efficiency of tantalum into a single surface mount package. Unlike liquid electrolyte-based capacitors, KO-CAP has a very long operational life and high ripple current capabilities.

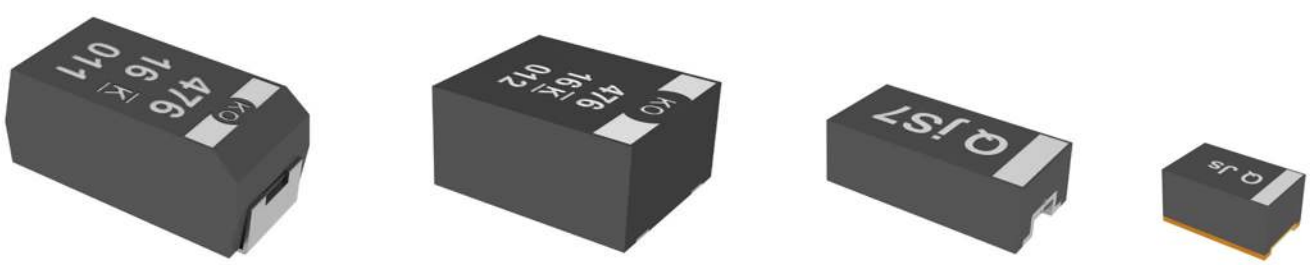
The T52X/T530 provides the widest range of voltages, capacitance and case size options in the KO-CAP family and is suitable for general purpose DC applications for up to 48 volt DC voltage rails.

Benefits

- ESR values down to 4 mΩ
- Stable capacitance across temperature and voltage
- No aging effects
- High ripple handling
- Volumetrically efficient
- High frequency capacitance retention
- 100% accelerated steady state aging
- 100% surge current tested
- Halogen-free epoxy and RoHS compliant

Applications

Typical applications include DC/DC converters, audio/sound circuits (mobile phone and base stations, smart phones, MP3 players), power supply inputs, portable electronics (notebook PCs, displays, SSDs, HDDs and USBs, digital cameras, GPS navigation systems, WiFi modules), telecommunications, consumer electronics (analytical and test equipment, high speed servers), high voltage applications such as 12 V to 48 V power input rails, densely populated circuits with space restrictions, microprocessor decoupling, and high ripple current applications.



Environmental Compliance

- RoHS compliant when ordered with 100% Sn, Ni-Pd-Au or non-magnetic 100% Sn solder
- Halogen-free
- Epoxy compliant with UL94 V-0

Series Reference Selection

Series		Voltage Range		Maximum Operating Temperature			Special Features		
		< 1 V to 9 V Applications	12 V to 48 V Applications	85°C Rated	105°C Rated	125°C Rated	Miniature Size	Low ESL	Low DC Leakage
T520	Standard	X	*	X**	X				
T521	High Voltage		X		X	X			X
T523	Facedown Terminal	X	X**	X	X**			X	
T525	High Temperature	X	*			X			
T527	Small Size	X	X		X		X		
T529	Miniature	X	X		X		X		
T530	High Cap/ Low ESR	X	X			X			
TF08	Ultrathin-Facedown	X	*		X		X		

** Not recommended for new design.*
*** Selected values.*

Ordering Information

T52X/T530

T	520	V	157	M	006	A	T	E045	
Capacitor Class	Series	Case Size[1]	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR & DC Leakage Code	Packaging (C-Spec)
T = Tantalum	520 = Polymer 521 = High voltage 523 = Facedown terminal 525 = 125°C rated 527 = Facedown terminal 529 = Substrate terminal 530 = 125°C High capacitance	A B C D H I J K L M P Q S T U V W X Y	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	002 = 2 2R5 = 2.5 003 = 3 004 = 4 006 = 6.3 008 = 8 010 = 10 011 = 11 12R = 12.5 016 = 16 020 = 20 025 = 25 035 = 35 050 = 50 063 = 63 075 = 75	A = N/A	T = 100% Matte tin (Sn)-plated H*** = Tin/lead (SnPb) solder coated (5% Pb minimum) P* = Ni-Pd-Au-plated A** = Ni-Au	E = ESR last three digits specify ESR in mΩ (045 = 45 mΩ). DC Leakage max 0.1 CV K = ESR last three digits specify ESR in mΩ. DC Leakage max 0.05 CV I = ESR last three digits specify ESR in mΩ. DC Leakage max 0.03 CV	Blank = 7" reel 7280**** = 13" reel

Gold termination available upon request
Non-magnetic terminations available for customized solutions. For availability and technical information, please contact your KEMET sales representative.
** P termination only available on select part numbers*
*** A termination only available on T529 part numbers*
**** H termination not available for T527/T529 part numbers*
***** 13" reel not available for T520A case and some other part numbers*

Ordering Information cont.

TF08

T	F	08A	226	M	016	A	P	E200
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR Code
T = Tantalum	F= Ultrathin polymer solution-Facedown construction	08A = 3216/0.8 max height	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	006 = 6.3 016 = 16	A = N/A	P = Ni-Pd-Au-plated	E = ESR Last three digits specify ESR in mΩ (200 = 200mΩ)

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to 85°C/105°C/125°C (refer to part number for maximum temperature rating)
Rated Capacitance Range	4.7 – 1,500 µF at 120 Hz/25°C
Capacitance Tolerance	K tolerance (10%), M tolerance (20%)
Rated Voltage Range	2 – 75 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table*
ESR (100 kHz)	Refer to Part Number Electrical Specification Table**
Leakage Current	Refer to Part Number Electrical Specification Table

** For T527 and T529 Series DF measurement apply 1.5 V DC*
*** For PN T520B477M2R5ATE014 the ESR measurement should be taken at 300 to 500kHz*

Qualification

<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">Temperature: 85°C, 105°C, 125°C[*2]
Voltage: 1.0 Rated Voltage
2/3 Rated Voltage for 125°C rating PN
Time: 2,000 Hours[*5]</td><td>Δ C/C</td><td colspan="3">Within −20%/+10% of initial value or ±20[*1]</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits or 1.5 x initial limit[*1]</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit for T ≤ 105°C
Within 2.0 x initial limit for > 105°C
Within initial limit[*1]
TF08A: Within 1.5 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit or N/A[*1]</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">Temperature: 105°C, 125°C[*2]
Voltage: 0 Voltage
Time: 2,000 Hours
(This test is N/A for [*1])</td><td>Δ C/C</td><td colspan="3">Within −20%/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit
T521: 1.25 x IL at 105°C, 2x IL at 125°C
T525/T530: Within 2.0 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Humidity</td><td colspan="2" rowspan="4">Temperature: 60°C
Voltage: No Load
Humidity: 90% RH
Time: 500 Hours, 1,000 Hours (T525, T530)</td><td>Δ C/C</td><td colspan="3">Within −5%/+35% of initial value or −20%, +30% of initial DC/C limit[*1]
T520B477M2R5ATE014: −20% to +50% of initial DC/C limit</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits
T527/T529/TF08A: Within 1.5 x initial limits[*3]</td></tr>
<tr><td>DCL</td><td colspan="3">Within 5.0 x initial limit
T521/T525/T529/T530: Within 3.0 x initial limit[*3]
T527/TF08A: Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit
T525/T527/T529/T530/TF08A: N/A[*3]</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at +25°C, −55°C, +25°C, +85°C, +105°/125°C[*2], +25°C</td><td></td><td>+25°C</td><td>−55°C</td><td>+85°C (N/A T527/T529/ TF08A)[*6]</td><td>+105°C</td></tr>
<tr><td>Δ C/C</td><td>IL[*3]</td><td>±20%
0% to −20% of DC/C[*1]</td><td>±20%
+50% to 0% of DC/C[*7]</td><td>±30%
+50% to 0% of DC/C[*1*7]</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>1.2 x IL
1.5 x IL[*8]</td><td>1.5 x IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>10 x IL</td><td>10 x IL</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">Temperature: 105°C, 85°C[*1, *2, *4]
Voltage: 1.32 x Rated voltage[*4]
1.0 x Rated voltage[*1]
Time: 1,000 cycles</td><td>Δ C/C</td><td colspan="3">Within −20%/+10% of initial value or ±20%[*1]</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within initial limits or N/A[*1]</td></tr>
<tr><td rowspan="3">Mechanical Shock/Vibration</td><td colspan="2" rowspan="3">MIL–STD–202, Method 213, Condition I, 100 G Peak.

MIL–STD–202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value or initial DC/C limits[*1]</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
</table>

*[*1] For case code 3528-21 and lower identified with ^ at the part number table (except the T520A, T527T226M025ATE100)*
*[*2] Please refer to part number specifications for individual temperature classification.*
*[*3] IL = Initial limit*
*[*4] For T527/T529 > 20 V test temperature is at + 15 to +35°C, test voltage at 1.16 x V_R (except T527T226M025ATE100 test temperature is +105°C)*
For T527/T529/TF , 6 V test voltage is 1.27 x rated voltage
For TFA08226M016 test voltage is 1.15 x rated voltage
*[*5] Test time is 1,000 hours for the below:*
Parts with case code 3528-21 and lower identified with ^ at the part number table (except the T520A part numbers T527T156M025ATE100, T527T226M025ATE100 and T521B156M025ATE090)
*[*6] +85°C measurement is applicable to: T527T226M025ATE100*
*[*7] Delta cap condition of +50/ 0% is applicable to: T527T226M025APE100*
*[*8] DF at 1.5 X IL is applicable to: T527T226M025APE100*

Reliability

KO-CAP capacitors have an average failure rate of 0.5 %/1,000 hours at category voltage, U_C, and category temperature, T_C. These capacitors are qualified using industry test standards at U_C and T_C. The minimum test time (1,000 hours or 2,000 hours) is dependent on the product.

The actual life expectancy of KO-CAP capacitors increases when application voltage, U_A, and application temperature, T_A, are lower than U_C and T_C. As a general guideline, when $U_A < 0.9 * U_C$ and $T_A < 85°C$, the life expectancy will typically exceed the useful lifetime of most hardware (> 10 years).

The lifetime of a KO-CAP capacitor at a specific application voltage and temperature can be modeled using the equations below. A failure is defined as passing enough current to blow a 1-amp fuse. The calculation is an estimation based on empirical results and is not a guarantee.

$$VAF = \left(\frac{U_C}{U_A}\right)^n$$

where:

VAF = acceleration factor due to voltage, unitless

U_C = category voltage, volt

U_A = application voltage, volt

n = exponent, 16

$$TAF = e^{\left[\frac{E_a}{k}\left(\frac{1}{273+T_A} - \frac{1}{273+T_C}\right)\right]}$$

where:

TAF = acceleration factor due to temperature, unitless

E_a = activation energy, 1.4 eV

k = Boltzmann's constant, 8.617E-5 eV/K

T_A = application temperature, °C

T_C = category temperature, °C

$$AF = VAF * TAF$$

where:

AF = acceleration factor, unitless

TAF = accerlation factor due to temperature, unitless

VAF = acceleration factor due to voltage, unitless

$$Life_{U_A,T_A} = Life_{U_C,T_C} * AF$$

where:

$Life_{UA,\,TA}$ = estimated life application voltage and temperature, years

$Life_{UC,\,TC}$ = guaranteed life category voltage and temperature, years

AF = acceleration factor, unitless

Terms:
Category voltage, U_C : maximum recommended peak DC operating voltage for continuous operation at the category temperature, T_C
Rated voltage, U_R : maximum recommended peak DC operating voltage for continuous operation up to the rated temperature, T_R
Category temperature, T_C : maximum recommended operating temperature. Voltage derating may be required at T_C
Rated temperature, T_R : maximum recommended operating temperature without voltage derating. T_R is equal to or lower than T_C

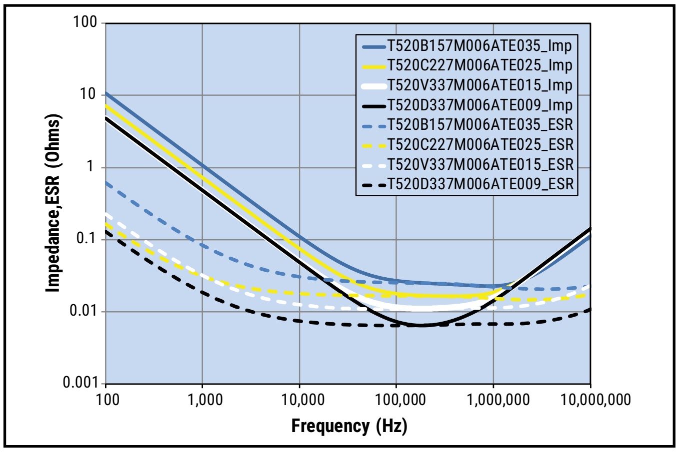
Reliability Table 1 – Common temperature range classifications

85°C (T_R) / 85°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 105°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 125°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	1.7	2.7	4.2	5.4	6.7	8.4	10.7	13.4	16.8	23.5	33.5	42.2	50.3

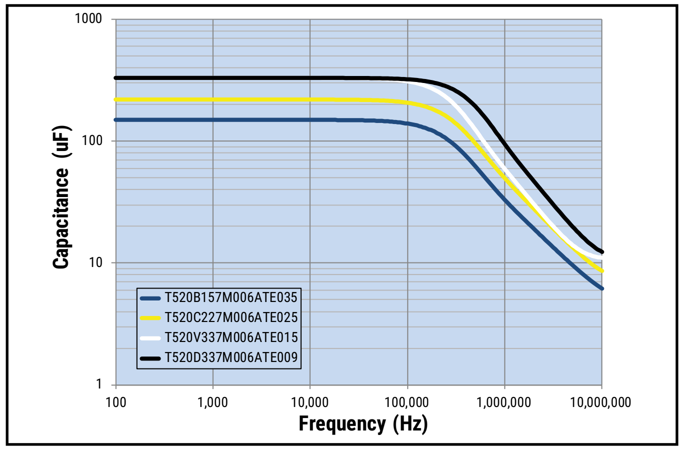
Electrical Characteristics

T520 Standard (2 V – 10 V)

ESR vs. Frequency

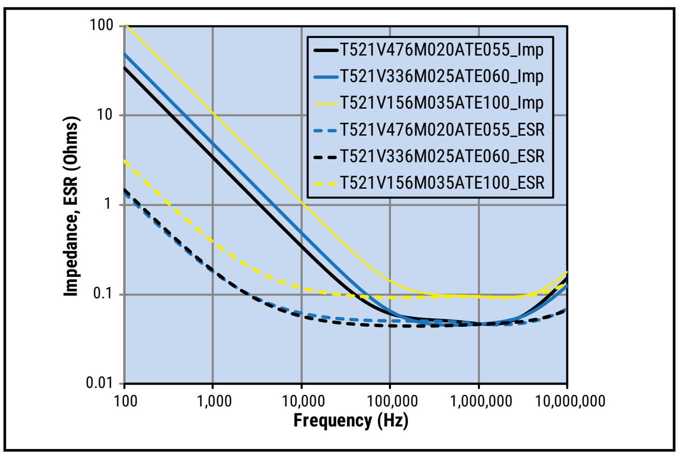


Capacitance vs. Frequency

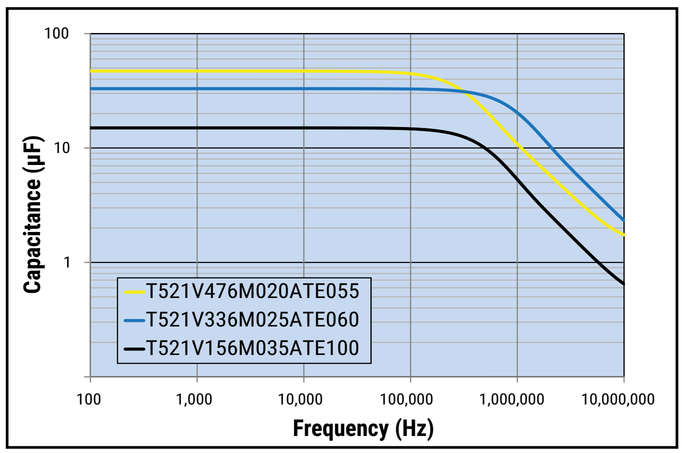


T521 High Voltage (12 V – 75 V)

ESR vs. Frequency

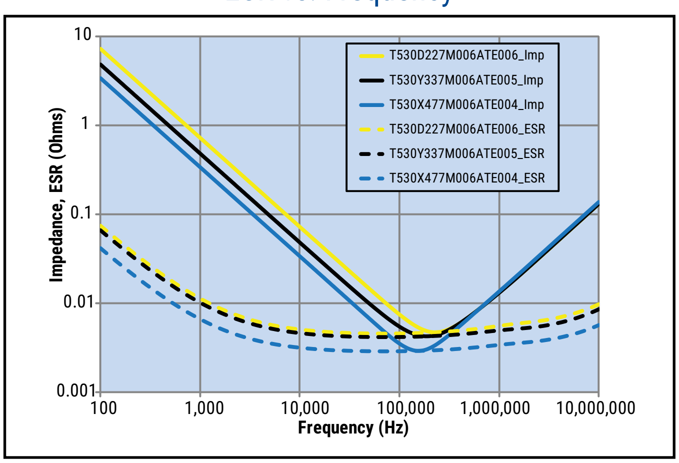


Capacitance vs. Frequency

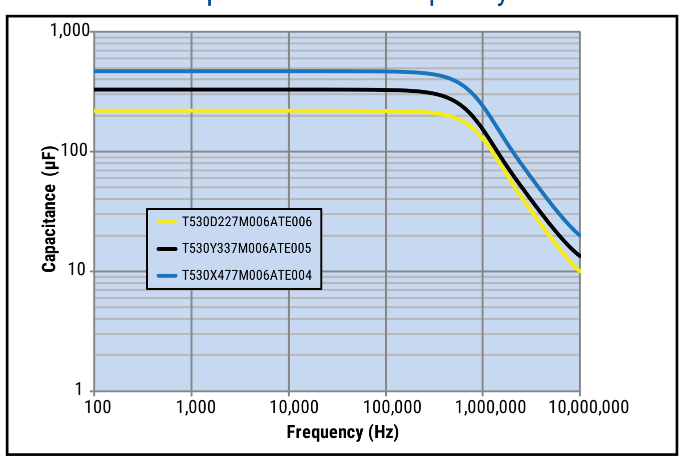


T530 High Cap/Low ESR (2 V – 10 V)

ESR vs. Frequency



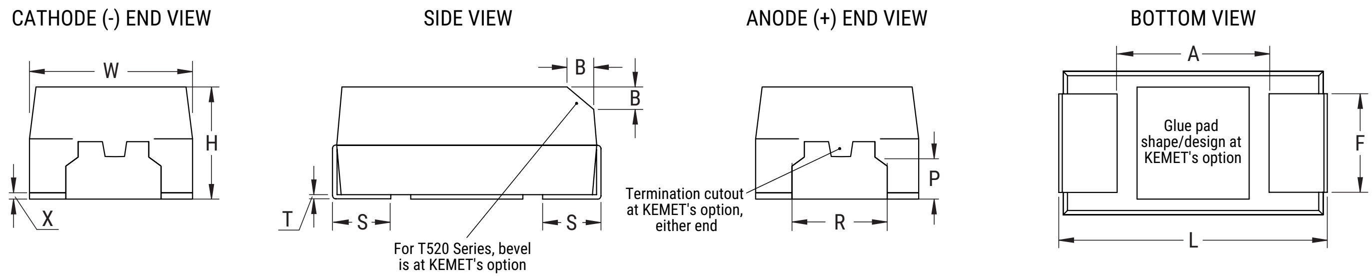
Capacitance vs. Frequency



Dimensions – Millimeters (Inches)

Metric will govern

T520 / T521 / T525 / T530

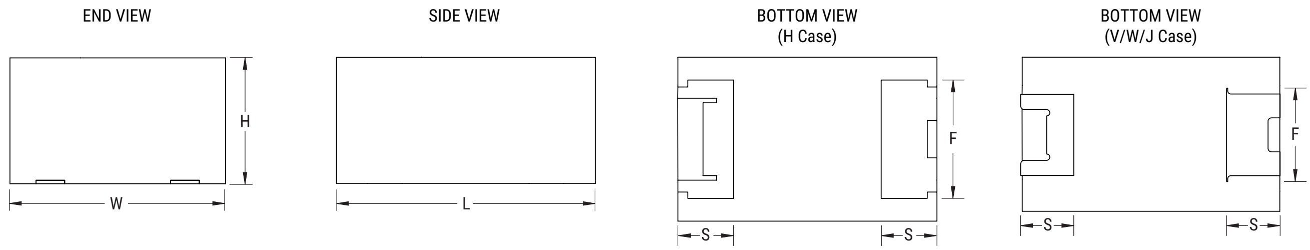


Case Size		Component Dimensions												
KEMET	EIA	L	W	H	F ±0.1 ±(0.004)	S ±0.3 ±(0.012) S1 ±0.4 (0.0157) S2 ±0.2 (0.00)	B ±0.15 (Ref) ±0.006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Min)	Typical Weight (mg)
A	3216-18	3.2 ±0.2 (0.126 ±0.008)	1.6 ±0.2 (0.063 ±0.008)	1.6 ±0.2 (0.063 ±0.008)	1.2 (0.047)	0.8 (0.032)	N/A	0.10 ±0.10 (0.004 ±0.004)	0.4 (0.016)	0.4 (0.016)	0.13 (0.005)	1.2 (0.047)	53
B	3528-21	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.9 ±0.1[*3] (0.075 ±0.004)	2.2 (0.087)	0.8 (0.032) S1 = 0.8 (0.032)[*2] S2 = 0.8 (0.032)[*2]	0.4 (0.016)	0.10 ±0.10 (0.004 ±0.004)	0.5 (0.020)	1.0 (0.039)	0.13 (0.005)	1.9 (0.075)	95
C	6032-28	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.2 (0.126 ±0.008)	2.5 ±0.3 (0.098 ±0.012)	2.2 (0.087)	1.30 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	0.9 (0.035)	1.0 (0.039)	0.13 (0.005)	2.9 (0.114)	184
D	7343-31	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.8 ±0.3 (0.110 ±0.012)	2.4 (0.094)	1.30 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	0.9 (0.035)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	435
H	7360-20	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	1.9 ±0.1 (0.075 ±0.004)	4.1 (0.161)	1.3 (0.051)	N/A	0.10 ±0.10 (0.004 ±0.004)	N/A	N/A	0.13 (0.005)	3.3 (0.130)	385
J	7360-15	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	1.5 (0.059) Maximum	4.1 (0.161)	1.3 (0.051)	N/A	0.10 ±0.10 (0.004 ±0.004)	N/A	N/A	N/A	3.3 (0.130)	263
L	6032-19	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.2 (0.126 ±0.008)	1.8 ±0.1 (0.071 ±0.004)	2.2 (0.087)	1.3 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	2.5 (0.098)	187
M	3528-15	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.4 ±0.1 (0.055 ±0.004)	2.2 (0.087)	0.8 (0.031)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	1.1 (0.043)	98
Q	7343-12	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.1 ±0.1 (0.043 ±0.004)	2.4 (0.094)	1.3 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	170
T	3528-12	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.1 ±0.1 (0.043 ±0.004)	2.2 (0.087)	0.8 (0.031)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	1.9 (0.075)	55
U	6032-15	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.2 (0.126 ±0.008)	1.4 ±0.1 (0.055 ±0.004)	2.2 (0.087)	1.3 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	2.9 (0.114)	117
V	7343-19	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.8 ±0.1[*1] (0.071±0.004)	2.4 (0.094)	1.3 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	274
W	7343-15	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.4 ±0.1 (0.055 ±0.004)	2.4(0.094) 2.8 ±0.2 (0.110 ±0.008)[*2]	1.30 (0.051) S1 = 5.0 (0.197)[*2] S2 = 1.3 (0.051)[*2]	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	223
X	7343-43	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	4.0 ±0.3 (0.157 ±0.012)	2.4 (0.094)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	554
Y	7343-40	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	3.8 ±0.2 (0.150 ±0.008)	2.4 (0.094)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	494

*[*1] Height tolerance is ±0.2 for V case T521 only*
*[*2] S1 and S2 is for T528 series only*
*[*3] Height tolerance is ±0.2 for: T520B with M & N terminations*

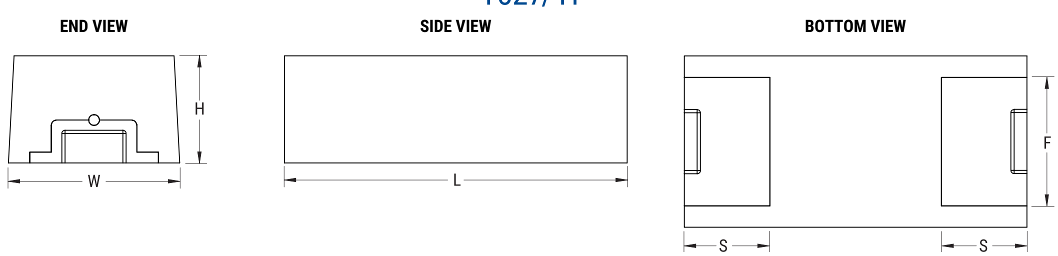
Dimensions – Millimeters cont.

T523

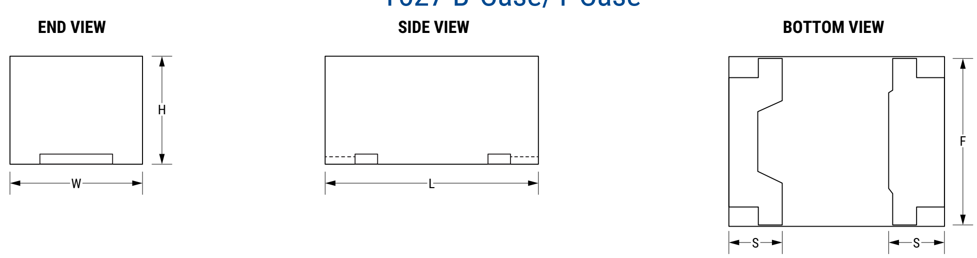


KEMET	EIA	L	W	H	F ±0.1 (±0.004)	S ±0.3 (±0.012)	Typical Weight (mg)
W	7343-15	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	1.4±0.1 (0.055±0.004)	2.4 (0.094)	1.3 (0.051)	223
J	7360-15	7.3±0.3 (0.287±0.012)	6.0±0.3 (0.236±0.012)	1.4±0.1 (0.055±0.004)	4.45 (0.175)	1.6 (0.063)	263
V	7343-20	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	1.9±0.1 (0.075±0.004)	2.4 (0.094)	1.3 (0.051)	274
H	7360-20	7.3±0.3 (0.287±0.012)	6.0±0.3 (0.236±0.012)	1.9±0.1 (0.075±0.004)	4.45 (0.175)	1.6 (0.063)	385

T527/TF



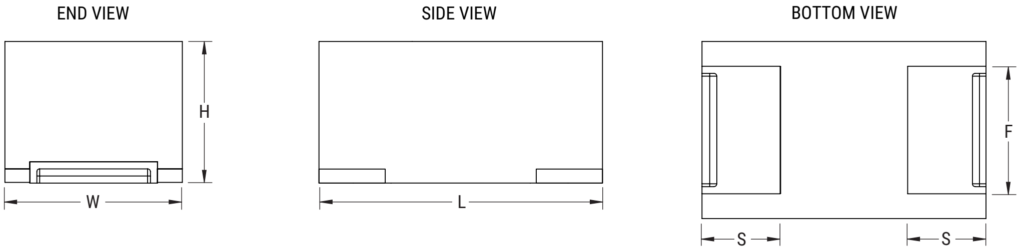
T527 B-Case/T-Case



Case Size		Component Dimensions					Typical Weight
KEMET	EIA	L	W	H	F	S	(mg)
I	3216-10	3.2 ±0.2	1.6 ±0.2	0.9 ±0.1	1.2 ±0.1	0.8 ±0.2	70
08A	3216-08	3.2 ±0.2	1.6 ±0.2	0.8 Maximum	1.2 ±0.1	0.8 ±0.2	–
K	3528-10	3.2 ±0.2	2.8 ±0.2	1.0 Maximum	2.2 ±0.1	0.7 ±0.2	70
T	3528-12	3.5 ±0.2	2.8 ±0.2	1.1 ±0.1	2.2 ±0.1	0.7 ±0.2	55
S	3216-12	3.2 ±0.2	1.6 ±0.2	1.1 ±0.1	1.2 ±0.1	0.8 ±0.2	26.2

Dimensions – Millimeters cont.

T529



Case Size		Component Dimensions					Typical Weight
KEMET	EIA	L	W	H	F	S	(mg)
P	2012–10	2.0±0.1	1.25±0.1	1.0 maximum	0.9±0.1	0.55±0.1	11.4
I	3216–10	3.2±0.2	1.6±0.2	1.0 maximum	1.2±0.1	0.8±0.1	70

Table 1 – Ratings & Part Number Reference

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
2	470	V/7343-19	T520V477M002A(3)E040	94	10	40	2,200	3	105
2.5	47	A/3216-18	T520A476M2R5A(3)E090 ^	11.75	8 *	90	1,100	3	105
2.5	68	A/3216-18	T520A686M2R5A(3)E070 ^	17	8 *	70	1,300	3	105
2.5	68	A/3216-18	T520A686M2R5A(3)E080 ^	17	8 *	80	1,200	3	105
2.5	100	T/3528-12	T520T107M2R5A(3)E040	25	8	40	1,600	3	105
2.5	100	T/3528-12	T520T107M2R5A(3)E070	25	8	70	1,200	3	105
2.5	100	T/3528-12	T525T107M2R5A(3)E080	25	10	80	1,100	3	125
2.5	100	B/3528-21	T520B107M2R5A(3)E025	25	8	25	2,300	3	105
2.5	100	B/3528-21	T520B107M2R5A(3)E035	25	8	35	1,900	3	105
2.5	100	B/3528-21	T520B107M2R5A(3)E040	25	8	40	1,800	3	105
2.5	100	B/3528-21	T520B107M2R5A(3)E070	25	8	70	1,300	3	105
2.5	150	U/6032-15	T520U157M2R5A(3)E055	37.5	8	55	1,600	3	105
2.5	220	A/3216-18	T520A227M2R5A(3)E025 ^	55	8 *	25	1,732	3	105
2.5	220	A/3216-18	T520A227M2R5A(3)E035 ^	55	8 *	35	1,500	3	105
2.5	220	B/3528-21	T520B227M2R5A(3)E015	55	8	15	2,900	3	105
2.5	220	B/3528-21	T520B227M2R5A(3)E018	55	8	18	2,700	3	105
2.5	220	B/3528-21	T520B227M2R5A(3)E021	55	8	21	2,500	3	105
2.5	220	B/3528-21	T520B227M2R5A(3)E025	55	8	25	2,300	3	105
2.5	220	B/3528-21	T520B227M2R5A(3)E030	55	8	30	2,100	3	105
2.5	220	B/3528-21	T520B227M2R5A(3)E035	55	8	35	1,900	3	105
2.5	220	B/3528-21	T520B227M2R5A(3)E055	55	8	55	1,500	3	105
2.5	220	B/3528-21	T520B227M2R5A(3)E070	55	8	70	1,300	3	105
2.5	220	T/3528-12	T520T227M2R5ATE070 ^	55	10 *	70	1,200	3	105
2.5	220	T/3528-12	T520T227M2R5ATE035 ^	55	10 *	35	1,464	3	105
2.5	220	T/3528-12	T520T227M2R5ATE030 ^	55	10 *	30	1,580	3	105
2.5	220	U/6032-15	T520U227M2R5A(3)E055	55	8	55	1,600	3	105
2.5	220	C/6032-28	T520C227M2R5A(3)E025	55	8	25	2,600	3	105
2.5	220	C/6032-28	T520C227M2R5A(3)E045	55	8	45	1,900	3	105
2.5	220	W/7343-15	T520W227M2R5A(3)E025	55	10	25	2,700	3	105
2.5	220	V/7343-19	T520V227M2R5A(3)E006	55	10	6	5,600	3	105
2.5	220	V/7343-19	T520V227M2R5A(3)E007	55	10	7	5,200	3	105
2.5	220	V/7343-19	T520V227M2R5A(3)E009	55	10	9	4,600	3	105
2.5	220	V/7343-19	T520V227M2R5A(3)E012	55	10	12	3,900	3	105
2.5	220	V/7343-19	T520V227M2R5A(3)E015	55	10	15	3,500	3	105
2.5	220	V/7343-19	T520V227M2R5A(3)E025	55	10	25	2,700	3	105
2.5	220	V/7343-19	T520V227M2R5A(3)E045	55	10	45	2,000	3	105
2.5	220	D/7343-31	T520D227M2R5A(3)E007	55	10	7	5,700	3	105
2.5	220	D/7343-31	T520D227M2R5A(3)E040	55	10	40	2,400	3	105
2.5	330	B/3528-21	T520B337M2R5ATE009 ^	82.5	8 *	9	3,073	3	105
2.5	330	B/3528-21	T520B337M2R5ATE012 ^	83	8 *	12	2,700	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
2.5	330	B/3528-21	T520B337M2R5A(3)E015	82.5	8	15	2,900	3	105
2.5	330	B/3528-21	T520B337M2R5A(3)E018	82.5	8	18	2,700	3	105
2.5	330	B/3528-21	T520B337M2R5A(3)E035	82.5	8	35	1,900	3	105
2.5	330	B/3528-21	T520B337M2R5A(3)E045	82.5	8	45	1,700	3	105
2.5	330	B/3528-21	T520B337M2R5A(3)E070	82.5	8	70	1,300	3	105
2.5	330	C/6032-28	T520C337M2R5A(3)E015	82.5	8	15	3,300	3	105
2.5	330	C/6032-28	T520C337M2R5A(3)E018	82.5	8	18	3,000	3	105
2.5	330	C/6032-28	T520C337M2R5A(3)E025	82.5	8	25	2,600	3	105
2.5	330	C/6032-28	T520C337M2R5A(3)E045	82.5	8	45	1,900	3	105
2.5	330	L/6032-19	T520L337M2R5A(3)E009	82.5	8	9	4,100	3	105
2.5	330	L/6032-19	T520L337M2R5A(3)E012	82.5	8	12	3,500	3	105
2.5	330	L/6032-19	T520L337M2R5A(3)E025	82.5	8	25	2,400	3	105
2.5	330	W/7343-15	T520W337M2R5A(3)E015	82.5	10	15	3,500	3	105
2.5	330	W/7343-15	T520W337M2R5A(3)E025	82.5	10	25	2,700	3	105
2.5	330	W/7343-15	T520W337M2R5A(3)E040	82.5	10	40	2,100	3	105
2.5	330	V/7343-19	T520V337M2R5A(3)E006	82.5	10	6	5,600	3	105
2.5	330	V/7343-19	T520V337M2R5A(3)E007	82.5	10	7	5,200	3	105
2.5	330	V/7343-19	T520V337M2R5A(3)E009	82.5	10	9	4,600	3	105
2.5	330	V/7343-19	T520V337M2R5A(3)E012	82.5	10	12	3,900	3	105
2.5	330	V/7343-19	T520V337M2R5A(3)E015	82.5	10	15	3,500	3	105
2.5	330	V/7343-19	T520V337M2R5A(3)E018	82.5	10	18	3,200	3	105
2.5	330	V/7343-19	T520V337M2R5A(3)E025	82.5	10	25	2,700	3	105
2.5	330	V/7343-19	T520V337M2R5A(3)E040	82.5	10	40	2,200	3	105
2.5	330	D/7343-31	T520D337M2R5A(3)E006	82.5	10	6	6,100	3	105
2.5	330	D/7343-31	T520D337M2R5A(3)E007	82.5	10	7	5,700	3	105
2.5	330	D/7343-31	T525D337M2R5A(3)E025	82.5	10	25	3,000	3	125
2.5	470	B/3528-21	T520B477M2R5ATE014 ^	188	8 *	14	3,000	3	85
2.5	470	V/7343-19	T520V477M2R5A(3)E006	117.5	10	6	5,600	3	105
2.5	470	V/7343-19	T520V477M2R5A(3)E007	117.5	10	7	5,200	3	105
2.5	470	V/7343-19	T520V477M2R5A(3)E009	117.5	10	9	4,600	3	105
2.5	470	V/7343-19	T520V477M2R5A(3)E012	117.5	10	12	3,900	3	105
2.5	470	V/7343-19	T520V477M2R5A(3)E015	117.5	10	15	3,500	3	105
2.5	470	V/7343-19	T520V477M2R5A(3)E018	117.5	10	18	3,200	3	105
2.5	470	C/6032-28	T520C477M2R5A(3)E025	117.5	8	25	2,600	3	105
2.5	470	C/6032-28	T520C477M2R5A(3)E045	117.5	8	45	1,900	3	105
2.5	470	D/7343-31	T530D477M2R5A(3)E005	117.5	8	5	7,100	3	125
2.5	470	D/7343-31	T520D477M2R5A(3)E006	117.5	10	6	6,100	3	105
2.5	470	D/7343-31	T530D477M2R5A(3)E006	117.5	8	6	6,500	3	125
2.5	470	D/7343-31	T520D477M2R5A(3)E007	117.5	10	7	5,700	3	105
2.5	470	D/7343-31	T520D477M2R5A(3)E009	117.5	10	9	5,000	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
2.5	470	D/7343-31	T530D477M2R5A(3)E010	117.5	8	10	5,000	3	125
2.5	470	D/7343-31	T525D477M2R5A(3)E025	117.5	10	25	3,000	3	125
2.5	560	D/7343-31	T530D567M2R5A(3)E005	140	8	5	7,100	3	125
2.5	680	D/7343-31	T530D687M2R5A(3)E006	170	8	6	6,500	3	125
2.5	680	D/7343-31	T530D687M2R5A(3)E007	170	8	7	6,000	3	125
2.5	680	D/7343-31	T520D687M2R5A(3)E010	170	10	10	4,700	3	105
2.5	680	D/7343-31	T530D687M2R5A(3)E010	170	8	10	5,000	3	125
2.5	680	D/7343-31	T520D687M2R5A(3)E015	170	10	15	3,900	3	105
2.5	680	D/7343-31	T525D687M2R5A(3)E025	170	10	25	3,000	3	125
2.5	680	D/7343-31	T520D687M2R5A(3)E040	170	10	40	2,400	3	105
2.5	680	Y/7343-40	T530Y687M2R5A(3)E005	170	8	5	7,300	3	125
2.5	680	Y/7343-40	T530Y687M2R5A(3)E006	170	8	6	6,600	3	125
2.5	680	Y/7343-40	T530Y687M2R5A(3)E007	170	8	7	6,100	3	125
2.5	680	Y/7343-40	T520Y687M2R5A(3)E015	170	10	15	4,000	3	105
2.5	680	Y/7343-40	T520Y687M2R5A(3)E025	170	10	25	3,100	3	105
2.5	680	X/7343-43	T530X687M2R5A(3)E006	170	8	6	6,700	3	125
2.5	1000	D/7343-31	T520D108M2R5A(3)E006	250	10	6	6,100	3	105
2.5	1000	D/7343-31	T520D108M2R5A(3)E007	250	10	7	5,700	3	105
2.5	1000	D/7343-31	T520D108M2R5A(3)E009	250	10	9	5,000	3	105
2.5	1000	D/7343-31	T520D108M2R5A(3)E010	250	10	10	4,700	3	105
2.5	1000	D/7343-31	T520D108M2R5A(3)E015	250	10	15	3,900	3	105
2.5	1000	D/7343-31	T520D108M2R5A(3)E030	250	10	30	2,700	3	105
2.5	1000	Y/7343-40	T530Y108M2R5A(3)E005	250	8	5	7,300	3	125
2.5	1000	Y/7343-40	T530Y108M2R5A(3)E006	250	8	6	6,600	3	125
2.5	1000	Y/7343-40	T520Y108M2R5A(3)E010	250	10	10	4,900	3	105
2.5	1000	Y/7343-40	T520Y108M2R5A(3)E015	250	10	15	4,000	3	105
2.5	1000	Y/7343-40	T520Y108M2R5A(3)E025	250	10	25	3,100	3	105
2.5	1000	X/7343-43	T530X108M2R5A(3)E004	250	8	4	8,200	3	125
2.5	1000	X/7343-43	T530X108M2R5A(3)E005	250	8	5	7,300	3	125
2.5	1000	X/7343-43	T530X108M2R5A(3)E006	250	8	6	6,700	3	125
2.5	1000	X/7343-43	T520X108M2R5A(3)E010	250	10	10	5,000	3	105
2.5	1500	Y/7343-40	T520Y158M2R5A(3)E015	375	10	15	4,000	3	105
2.5	1500	X/7343-43	T530X158M2R5A(3)E005	375	8	5	7,300	3	125
2.5	1500	X/7343-43	T520X158M2R5A(3)E015	375	10	15	4,100	3	105
3	100	B/3528-21	T525B107M003A(3)E080	30	8	80	1,300	3	125
3	100	B/3528-21	T520B107M003A(3)E025	30	8	25	2,300	3	105
3	100	B/3528-21	T520B107M003A(3)E035	30	8	35	1,900	3	105
3	100	B/3528-21	T520B107M003A(3)E040	30	8	40	1,800	3	105
3	100	B/3528-21	T520B107M003A(3)E070	30	8	70	1,300	3	105
3	150	B/3528-21	T520B157M003A(3)E025	45	8	25	2,300	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
3	150	B/3528-21	T520B157M003A(3)E035	45	8	35	1,900	3	105
3	150	B/3528-21	T520B157M003A(3)E040	45	8	40	1,800	3	105
3	150	B/3528-21	T520B157M003A(3)E070	45	8	70	1,300	3	105
3	150	B/3528-21	T525B157M003A(3)E080	45	8	80	1,300	3	125
3	330	V/7343-19	T520V337M003A(3)E009	99	10	9	4,600	3	105
3	330	V/7343-19	T520V337M003A(3)E012	99	10	12	3,900	3	105
3	330	V/7343-19	T520V337M003A(3)E015	99	10	15	3,500	3	105
3	330	V/7343-19	T520V337M003A(3)E025	99	10	25	2,700	3	105
3	330	D/7343-31	T525D337M003A(3)E025	99	10	25	3,000	3	125
3	470	D/7343-31	T530D477M003A(3)E010	141	8	10	5,000	3	125
3	470	D/7343-31	T525D477M003A(3)E025	141	10	25	3,000	3	125
3	680	D/7343-31	T530D687M003A(3)E010	204	8	10	5,000	3	125
3	680	D/7343-31	T520D687M003A(3)E015	204	10	15	3,900	3	105
3	680	D/7343-31	T525D687M003A(3)E025	204	10	25	3,000	3	125
3	680	D/7343-31	T520D687M003A(3)E040	204	10	40	2,400	3	105
3	1000	X/7343-43	T530X108M003A(3)E010	300	8	10	5,200	3	125
3	1000	X/7343-43	T520X108M003A(3)E015	300	10	15	4,100	3	105
3	1000	X/7343-43	T520X108M003A(3)E030	300	10	30	2,900	3	105
3	1500	X/7343-43	T530X158M003A(3)E008	450	8	8	5,800	3	125
4	15	T/3528-12	T520T156M004A(3)E100	6	8	100	1,000	3	105
4	33	A/3216-18	T520A336M004A(3)E070 ^	13.2	8 *	70	1,300	3	105
4	33	A/3216-18	T520A336M004A(3)E080 ^	13.2	8 *	80	1,200	3	105
4	47	A/3216-18	T520A476M004A(3)E070 ^	18.8	8 *	70	1,300	3	105
4	47	A/3216-18	T520A476M004A(3)E080 ^	18.8	8 *	80	1,200	3	105
4	47	T/3528-12	T520T476M004A(3)E070	18.8	8	70	1,200	3	105
4	68	A/3216-18	T520A686M004A(3)E180 ^	27	8 *	180	800	3	105
4	68	T/3528-12	T520T686M004A(3)E070	27.2	8	70	1,200	3	105
4	68	B/3528-21	T520B686M004A(3)E025	27.2	8	25	2,300	3	105
4	68	B/3528-21	T520B686M004A(3)E035	27.2	8	35	1,900	3	105
4	68	B/3528-21	T520B686M004A(3)E040	27.2	8	40	1,800	3	105
4	68	B/3528-21	T520B686M004A(3)E070	27.2	8	70	1,300	3	105
4	68	B/3528-21	T525B686M004A(3)E080	27.2	8	80	1,300	3	125
4	68	U/6032-15	T520U686M004A(3)E055	27.2	8	55	1,600	3	105
4	100	I/3216-10	T527I107M004ATE200 ^	40	8 *	200	775	3	105
4	100	A/3216-18	T520A107M004A(3)E150 ^	40	8 *	150	900	3	105
4	100	A/3216-18	T520A107M004A(3)E200 ^	40	8 *	200	700	3	105
4	100	T/3528-12	T520T107M004A(3)E070	40	8	70	1,200	3	105
4	100	T/3528-12	T520T107M004A(3)E150	40	8	150	800	3	105
4	100	B/3528-21	T520B107M004A(3)E025	40	8	25	2,300	3	105
4	100	B/3528-21	T520B107M004A(3)E035	40	8	35	1,900	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
4	100	B/3528-21	T520B107M004A(3)E040	40	8	40	1,800	3	105
4	100	B/3528-21	T520B107M004A(3)E070	40	8	70	1,300	3	105
4	100	B/3528-21	T525B107M004A(3)E080	40	8	80	1,300	3	125
4	100	U/6032-15	T520U107M004A(3)E055	40	8	55	1,600	3	105
4	150	B/3528-21	T520B157M004A(3)E015	60	8	15	2,900	3	105
4	150	B/3528-21	T520B157M004A(3)E018	60	8	18	2,700	3	105
4	150	B/3528-21	T520B157M004A(3)E025	60	8	25	2,300	3	105
4	150	B/3528-21	T520B157M004A(3)E030	60	8	30	2,100	3	105
4	150	B/3528-21	T520B157M004A(3)E035	60	8	35	1,900	3	105
4	150	B/3528-21	T520B157M004A(3)E040	60	8	40	1,800	3	105
4	150	B/3528-21	T520B157M004A(3)E070	60	8	70	1,300	3	105
4	150	U/6032-15	T520U157M004A(3)E055	60	8	55	1,600	3	105
4	150	C/6032-28	T520C157M004A(3)E015	60	8	15	3,300	3	105
4	150	C/6032-28	T520C157M004A(3)E025	60	8	25	2,600	3	105
4	150	C/6032-28	T520C157M004A(3)E045	60	8	45	1,900	3	105
4	150	C/6032-28	T520C157M004A(3)E100	60	8	100	1,300	3	105
4	150	V/7343-19	T520V157M004A(3)E007	60	10	7	5,200	3	105
4	150	V/7343-19	T520V157M004A(3)E009	60	10	9	4,600	3	105
4	150	V/7343-19	T520V157M004A(3)E012	60	10	12	3,900	3	105
4	150	V/7343-19	T520V157M004A(3)E015	60	10	15	3,500	3	105
4	150	V/7343-19	T520V157M004A(3)E025	60	10	25	2,700	3	105
4	150	D/7343-31	T520D157M004A(3)E007	60	10	7	5,700	3	105
4	220	K/3528-10	T527K227M004APE025 ^	88	10	25	1,732	3	105
4	220	K/3528-10	T527K227M004APE030 ^	88	10	30	1,581	3	105
4	220	T/3528-12	T520T227M004ATE025 ^	176	10 *	25	2,050	3	105
4	220	T/3528-12	T520T227M004ATE030 ^	176	10 *	30	1,870	3	105
4	220	T/3528-12	T520T227M004ATE035 ^	176	10 *	35	1,463	3	105
4	220	B/3528-21	T520B227M004A(3)E035	88	8	35	1,900	3	105
4	220	B/3528-21	T520B227M004A(3)E045	88	8	45	1,700	3	105
4	220	B/3528-21	T520B227M004A(3)E070	88	8	70	1,300	3	105
4	220	C/6032-28	T520C227M004A(3)E015	88	8	15	3,300	3	105
4	220	C/6032-28	T520C227M004A(3)E018	88	8	18	3,000	3	105
4	220	C/6032-28	T520C227M004A(3)E025	88	8	25	2,600	3	105
4	220	C/6032-28	T520C227M004A(3)E045	88	8	45	1,900	3	105
4	220	C/6032-28	T520C227M004A(3)E055	88	8	55	1,700	3	105
4	220	L/6032-19	T520L227M004A(3)E012	88	8	12	3,500	3	105
4	220	L/6032-19	T520L227M004A(3)E025	88	8	25	2,400	3	105
4	220	W/7343-15	T520W227M004A(3)E025	88	10	25	2,700	3	105
4	220	W/7343-15	T520W227M004A(3)E040	88	10	40	2,100	3	105
4	220	V/7343-19	T520V227M004A(3)E006	88	10	6	5,600	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
4	220	V/7343-19	T520V227M004A(3)E007	88	10	7	5,200	3	105
4	220	V/7343-19	T520V227M004A(3)E009	88	10	9	4,600	3	105
4	220	V/7343-19	T520V227M004A(3)E012	88	10	12	3,900	3	105
4	220	V/7343-19	T520V227M004A(3)E015	88	10	15	3,500	3	105
4	220	V/7343-19	T520V227M004A(3)E018	88	10	18	3,200	3	105
4	220	V/7343-19	T520V227M004A(3)E025	88	10	25	2,700	3	105
4	220	V/7343-19	T520V227M004A(3)E040	88	10	40	2,200	3	105
4	220	V/7343-19	T520V227M004A(3)E045	88	10	45	2,000	3	105
4	220	D/7343-31	T520D227M004A(3)E006	88	10	6	6,100	3	105
4	220	D/7343-31	T520D227M004A(3)E007	88	10	7	5,700	3	105
4	220	D/7343-31	T520D227M004A(3)E012	88	10	12	4,300	3	105
4	220	D/7343-31	T525D227M004A(3)E025	88	10	25	3,000	3	125
4	220	D/7343-31	T520D227M004A(3)E065	88	10	65	1,900	3	105
4	330	C/6032-28	T520C337M004A(3)E025	132	8	25	2,600	3	105
4	330	C/6032-28	T520C337M004A(3)E045	132	8	45	1,900	3	105
4	330	V/7343-19	T520V337M004A(3)E007	132	10	7	5,200	3	105
4	330	V/7343-19	T520V337M004A(3)E009	132	10	9	4,600	3	105
4	330	V/7343-19	T520V337M004A(3)E012	132	10	12	3,900	3	105
4	330	V/7343-19	T520V337M004A(3)E018	132	10	18	3,200	3	105
4	330	V/7343-19	T520V337M004A(3)E025	132	10	25	2,700	3	105
4	330	V/7343-19	T520V337M004A(3)E040	132	10	40	2,200	3	105
4	330	D/7343-31	T530D337M004A(3)E005	132	8	5	7,100	3	125
4	330	D/7343-31	T520D337M004A(3)E006	132	10	6	6,100	3	105
4	330	D/7343-31	T530D337M004A(3)E006	132	8	6	6,500	3	125
4	330	D/7343-31	T520D337M004A(3)E007	132	10	7	5,700	3	105
4	330	D/7343-31	T520D337M004A(3)E009	132	10	9	5,000	3	105
4	330	D/7343-31	T520D337M004A(3)E012	132	10	12	4,300	3	105
4	330	D/7343-31	T520D337M004A(3)E015	132	10	15	3,900	3	105
4	330	D/7343-31	T525D337M004A(3)E025	132	10	25	3,000	3	125
4	330	D/7343-31	T520D337M004A(3)E040	132	10	40	2,400	3	105
4	330	D/7343-31	T520D337M004A(3)E045	132	10	45	2,200	3	105
4	470	D/7343-31	T530D477M004A(3)E006	188	8	6	6,500	3	125
4	470	D/7343-31	T520D477M004A(3)E010	188	10	10	4,700	3	105
4	470	D/7343-31	T530D477M004A(3)E010	188	8	10	5,000	3	125
4	470	D/7343-31	T520D477M004A(3)E012	188	10	12	4,300	3	105
4	470	D/7343-31	T520D477M004A(3)E015	188	10	15	3,900	3	105
4	470	D/7343-31	T520D477M004A(3)E018	188	10	18	3,500	3	105
4	470	D/7343-31	T520D477M004A(3)E025	188	10	25	3,000	3	105
4	470	D/7343-31	T525D477M004A(3)E025	188	10	25	3,000	3	125
4	470	D/7343-31	T520D477M004A(3)E040	188	10	40	2,400	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
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Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
4	470	D/7343-31	T525D477M004A(3)E040	188	10	40	2,400	3	125
4	470	Y/7343-40	T530Y477M004A(3)E005	188	8	5	7,300	3	125
4	470	Y/7343-40	T530Y477M004A(3)E006	188	8	6	6,600	3	125
4	680	D/7343-31	T520D687M004A(3)E012	272	10	12	4,300	3	105
4	680	D/7343-31	T520D687M004A(3)E015	272	10	15	3,900	3	105
4	680	D/7343-31	T520D687M004A(3)E025	272	10	25	3,000	3	105
4	680	Y/7343-40	T530Y687M004A(3)E005	272	8	5	7,300	3	125
4	680	Y/7343-40	T520Y687M004A(3)E010	272	10	10	4,900	3	105
4	680	Y/7343-40	T520Y687M004A(3)E015	272	10	15	4,000	3	105
4	680	Y/7343-40	T520Y687M004A(3)E025	272	10	25	3,100	3	105
4	680	X/7343-43	T530X687M004A(3)E004	272	8	4	8,200	3	125
4	680	X/7343-43	T530X687M004A(3)E005	272	8	5	7,300	3	125
4	680	X/7343-43	T530X687M004A(3)E006	272	8	6	6,700	3	125
4	680	X/7343-43	T520X687M004A(3)E010	272	10	10	5,000	3	105
4	680	X/7343-43	T530X687M004A(3)E010	272	8	10	5,200	3	125
4	680	X/7343-43	T520X687M004A(3)E015	272	10	15	4,100	3	105
4	680	X/7343-43	T520X687M004A(3)E035	272	10	35	2,700	3	105
4	1000	X/7343-43	T530X108M004A(3)E006	400	8	6	6,700	3	125
6.3	15	T/3528-12	T520T156M006A(3)E100	9.45	8	100	1,000	3	105
6.3	10	P/2012-10	T529P106M006AAE200 ^	18.9	6 *	200	354	3	105
6.3	22	P/2012-10	T529P226M006AAE150 ^	22	6 *	150	408	3	105
6.3	22	P/2012-10	T529P226M006AAE200 ^	22	6 *	200	354	3	105
6.3	22	A/3216-18	T520A226M006A(3)E090 ^	13.86	8 *	90	1,100	3	105
6.3	22	A/3216-18	T520A226M006A(3)E100 ^	13.86	8 *	100	1,100	3	105
6.3	22	T/3528-12	T520T226M006A(3)E100	13.86	8	100	1,000	3	105
6.3	33	A/3216-18	T520A336M006A(3)E070 ^	20.79	8 *	70	1,300	3	105
6.3	33	A/3216-18	T520A336M006A(3)E080 ^	20.79	8 *	80	1,200	3	105
6.3	33	A/3216-18	T520A336M006A(3)E120 ^	20.79	8	120	1,000	3	105
6.3	33	T/3528-12	T520T336M006A(3)E070	20.79	8	70	1,200	3	105
6.3	33	B/3528-21	T520B336M006A(3)E025	20.79	8	25	2,300	3	105
6.3	33	B/3528-21	T520B336M006A(3)E035	20.79	8	35	1,900	3	105
6.3	33	B/3528-21	T520B336M006A(3)E040	20.79	8	40	1,800	3	105
6.3	33	B/3528-21	T520B336M006A(3)E070	20.79	8	70	1,300	3	105
6.3	33	B/3528-21	T525B336M006A(3)E080	20.79	8	80	1,300	3	125
6.3	33	C/6032-28	T520C336M006A(3)E100	20.79	8	100	1,300	3	105
6.3	47	P/2012-10	T529P476M006AAE200 ^	29.61	6 *	200	354	3	105
6.3	47	P/2012-10	T529P476M006AAE150 ^	29.6	6 *	150	408	3	105
6.3	47	3216-08	TF08A476M006APE150 ^	29.6	10 *	150	632	3	105
6.3	47	I/3216-10	T527I476M006ATE200 ^	29.6	6 *	200	548	3	105
6.3	47	A/3216-18	T520A476M006A(3)E150 ^	29.61	8 *	150	900	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
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Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
6.3	47	T/3528-12	T520T476M006A(3)E040	29.61	8	40	1,600	3	105
6.3	47	T/3528-12	T520T476M006A(3)E070	29.61	8	70	1,200	3	105
6.3	47	T/3528-12	T525T476M006A(3)E080	29.61	8	80	1,100	3	125
6.3	47	B/3528-21	T520B476M006A(3)E025	29.61	8	25	2,300	3	105
6.3	47	B/3528-21	T520B476M006A(3)E035	29.61	8	35	1,900	3	105
6.3	47	B/3528-21	T520B476M006A(3)E040	29.61	8	40	1,800	3	105
6.3	47	B/3528-21	T520B476M006A(3)E070	29.61	8	70	1,300	3	105
6.3	47	B/3528-21	T525B476M006A(3)E070	29.61	8	70	1,300	3	125
6.3	47	B/3528-21	T525B476M006A(3)E080	29.61	8	80	1,300	3	125
6.3	68	A/3216-18	T520A686M006A(3)E150 ^	42.84	8 *	150	900	3	105
6.3	68	T/3528-12	T520T686M006A(3)E070	42.84	8	70	1,200	3	105
6.3	68	T/3528-12	T520T686M006A(3)E150	42.84	8	150	800	3	105
6.3	68	B/3528-21	T520B686M006A(3)E025	42.84	8	25	2,300	3	105
6.3	68	B/3528-21	T520B686M006A(3)E035	42.84	8	35	1,900	3	105
6.3	68	B/3528-21	T520B686M006A(3)E040	42.84	8	40	1,800	3	105
6.3	68	B/3528-21	T520B686M006A(3)E070	42.84	8	70	1,300	3	105
6.3	68	B/3528-21	T525B686M006A(3)E080	42.84	8	80	1,300	3	125
6.3	68	U/6032-15	T520U686M006A(3)E055	42.84	8	55	1,600	3	105
6.3	68	U/6032-15	T520U686M006A(3)E070	42.84	8	70	1,400	3	105
6.3	68	C/6032-28	T520C686M006A(3)E100	42.84	8	100	1,300	3	105
6.3	100	I/3216-10	T527I107M006ATE200 ^	63.0	8 *	200	775	3	105
6.3	100	I/3216-10	T527I107M006ATE100 ^	63.0	8 *	100	775	3	105
6.3	100	I/3216-10	T527I107M006ATE070 ^	63.0	8 *	70	1,134	3	105
6.3	100	I/3216-10	T527I107M006ATE055 ^	63.0	8	55	1,044	3	105
6.3	100	A/3216-18	T520A107M006ATE070 ^	63.0	8 *	70	1,035	3	105
6.3	100	A/3216-18	T520A107M006ATE045 ^	63.0	8 *	45	1,600	3	105
6.3	100	A/3216-18	T520A107M006ATE035 ^	63.0	8 *	35	1,500	3	105
6.3	100	A/3216-18	T520A107M006ATE025 ^	63.0	8 *	25	1,732	3	105
6.3	100	T/3528-12	T520T107M006APE070	63.0	8	70	1,200	3	105
6.3	100	T/3528-12	T520T107M006APE055	63.0	8	55	1,200	3	105
6.3	100	B/3528-21	T520B107M006A(3)E015	63.0	8	15	2,900	3	105
6.3	100	B/3528-21	T520B107M006A(3)E018	63.0	8	18	2,700	3	105
6.3	100	B/3528-21	T520B107M006A(3)E025	63.0	8	25	2,300	3	105
6.3	100	B/3528-21	T520B107M006A(3)E035	63.0	8	35	1,900	3	105
6.3	100	B/3528-21	T520B107M006A(3)E040	63.0	8	40	1,800	3	105
6.3	100	B/3528-21	T520B107M006A(3)E045	63.0	8	45	1,700	3	105
6.3	100	B/3528-21	T520B107M006A(3)E070	63.0	8	70	1,300	3	105
6.3	100	U/6032-15	T520U107M006A(3)E055	63.0	8	55	1,600	3	105
6.3	100	W/7343-15	T520W107M006A(3)E040	63.0	10	40	2,100	3	105
6.3	100	V/7343-19	T520V107M006A(3)E007	63.0	10	7	5,170	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
6.3	100	V/7343-19	T520V107M006A(3)E009	63.0	10	9	4,600	3	105
6.3	100	V/7343-19	T520V107M006A(3)E012	63.0	10	12	3,900	3	105
6.3	100	V/7343-19	T520V107M006A(3)E015	63.0	10	15	3,500	3	105
6.3	100	V/7343-19	T520V107M006A(3)E045	63.0	10	45	2,000	3	105
6.3	100	C/6032-28	T520C107M006A(3)E025	63.0	8	25	2,600	3	105
6.3	100	C/6032-28	T520C107M006A(3)E045	63.0	8	45	1,900	3	105
6.3	120	B/3528-21	T520B127M006A(3)E035	75.6	8	35	1,900	3	105
6.3	150	M/3528-15	T520M157M006A(3)E035	94.5	8	35	1,900	3	105
6.3	150	M/3528-15	T520M157M006A(3)E070	94.5	8	70	1,300	3	105
6.3	150	M/3528-15	T520M157M006A(3)E150	94.5	8	150	900	3	105
6.3	150	M/3528-15	T520M157M006A(3)E200	94.5	8	200	800	3	105
6.3	150	B/3528-21	T520B157M006A(3)E018	94.5	9	18	2,700	3	105
6.3	150	B/3528-21	T520B157M006A(3)E025	94.5	8	25	2,300	3	105
6.3	150	B/3528-21	T520B157M006A(3)E035	94.5	8	35	1,900	3	105
6.3	150	B/3528-21	T520B157M006A(3)E045	94.5	8	45	1,700	3	105
6.3	150	B/3528-21	T520B157M006A(3)E070	94.5	8	70	1,300	3	105
6.3	150	T/3528-12	T523T157M006APE030	94.5	8	30	1,870	3	105
6.3	150	T/3528-12	T520T157M006ATE035 ^	94.5	8 *	35	1,700	3	105
6.3	150	C/6032-28	T520C157M006A(3)E015	94.5	8	15	3,300	3	105
6.3	150	C/6032-28	T520C157M006A(3)E025	94.5	8	25	2,600	3	105
6.3	150	C/6032-28	T520C157M006A(3)E045	94.5	8	45	1,900	3	105
6.3	150	C/6032-28	T520C157M006A(3)E055	94.5	8	55	1,700	3	105
6.3	150	U/6032-15	T520U157M006A(3)E045	94.5	8	45	1,700	3	105
6.3	150	U/6032-15	T520U157M006A(3)E055	94.5	8	55	1,600	3	105
6.3	150	L/6032-19	T520L157M006A(3)E012	94.5	8	12	3,500	3	105
6.3	150	L/6032-19	T520L157M006A(3)E025	94.5	8	25	2,400	3	105
6.3	150	W/7343-15	T520W157M006A(3)E025	94.5	10	25	2,700	3	105
6.3	150	W/7343-15	T520W157M006A(3)E040	94.5	10	40	2,100	3	105
6.3	150	V/7343-19	T520V157M006A(3)E006	94.5	10	6	5,600	3	105
6.3	150	V/7343-19	T520V157M006A(3)E007	94.5	10	7	5,200	3	105
6.3	150	V/7343-19	T520V157M006A(3)E009	94.5	10	9	4,600	3	105
6.3	150	V/7343-19	T520V157M006A(3)E012	94.5	10	12	3,900	3	105
6.3	150	V/7343-19	T520V157M006A(3)E015	94.5	10	15	3,500	3	105
6.3	150	V/7343-19	T520V157M006A(3)E018	94.5	10	18	3,200	3	105
6.3	150	V/7343-19	T520V157M006A(3)E025	94.5	10	25	2,700	3	105
6.3	150	V/7343-19	T520V157M006A(3)E040	94.5	10	40	2,200	3	105
6.3	150	V/7343-19	T520V157M006A(3)E045	94.5	10	45	2,000	3	105
6.3	150	D/7343-31	T520D157M006A(3)E006	94.5	10	6	6,100	3	105
6.3	150	D/7343-31	T520D157M006A(3)E007	94.5	10	7	5,700	3	105
6.3	150	D/7343-31	T520D157M006A(3)E015	94.5	10	15	3,900	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
6.3	150	D/7343-31	T520D157M006A(3)E025	94.5	10	25	3,000	3	105
6.3	150	D/7343-31	T525D157M006A(3)E025	94.5	10	25	3,000	3	125
6.3	150	D/7343-31	T520D157M006A(3)E055	94.5	10	55	2,000	3	105
6.3	220	M/3528-15	T520M227M006ATE035 ^	138.6	10*	35	1,512	3	105
6.3	220	B/3528-21	T520B227M006A(3)E025	138.6	8	25	2,300	3	105
6.3	220	B/3528-21	T520B227M006A(3)E035	138.6	8	35	1,900	3	105
6.3	220	B/3528-21	T520B227M006A(3)E045	138.6	8	45	1,700	3	105
6.3	220	B/3528-21	T520B227M006A(3)E070	138.6	8	70	1,300	3	105
6.3	220	C/6032-28	T520C227M006A(3)E015	138.6	8	15	3,300	3	105
6.3	220	C/6032-28	T520C227M006A(3)E018	138.6	8	18	3,000	3	105
6.3	220	C/6032-28	T520C227M006A(3)E025	138.6	8	25	2,600	3	105
6.3	220	C/6032-28	T520C227M006A(3)E045	138.6	8	45	1,900	3	105
6.3	220	V/7343-19	T520V227M006A(3)E007	138.6	10	7	5,200	3	105
6.3	220	V/7343-19	T520V227M006A(3)E009	138.6	10	9	4,600	3	105
6.3	220	V/7343-19	T520V227M006A(3)E012	138.6	10	12	3,900	3	105
6.3	220	V/7343-19	T520V227M006A(3)E015	138.6	10	15	3,500	3	105
6.3	220	V/7343-19	T520V227M006A(3)E018	138.6	10	18	3,200	3	105
6.3	220	V/7343-19	T520V227M006A(3)E025	138.6	10	25	2,700	3	105
6.3	220	V/7343-19	T520V227M006A(3)E040	138.6	10	40	2,200	3	105
6.3	220	D/7343-31	T530D227M006A(3)E005	138.6	8	5	7,100	3	125
6.3	220	D/7343-31	T520D227M006A(3)E006	138.6	10	6	6,100	3	105
6.3	220	D/7343-31	T530D227M006A(3)E006	138.6	8	6	6,500	3	125
6.3	220	D/7343-31	T520D227M006A(3)E007	138.6	10	7	5,700	3	105
6.3	220	D/7343-31	T520D227M006A(3)E009	138.6	10	9	5,000	3	105
6.3	220	D/7343-31	T520D227M006A(3)E015	138.6	10	15	3,900	3	105
6.3	220	D/7343-31	T520D227M006A(3)E018	138.6	10	18	3,500	3	105
6.3	220	D/7343-31	T520D227M006A(3)E025	138.6	10	25	3,000	3	105
6.3	220	D/7343-31	T525D227M006A(3)E025	138.6	10	25	3,000	3	125
6.3	220	D/7343-31	T520D227M006A(3)E040	138.6	10	40	2,400	3	105
6.3	220	D/7343-31	T520D227M006A(3)E050	138.6	10	50	2,100	3	105
6.3	330	B/3528-21	T520B337M006A(3)E040	207.9	8	40	1,800	3	85
6.3	330	B/3528-21	T520B337M006ATE045	415.8	10	45	1,374	3	85
6.3	330	B/3528-21	T520B337M006A(3)E070	208	8	70	1,300	3	85
6.3	330	V/7343-19	T520V337M006A(3)E015	207.9	10	15	3,500	3	105
6.3	330	V/7343-19	T520V337M006A(3)E018	207.9	10	18	3,200	3	105
6.3	330	V/7343-19	T520V337M006A(3)E025	207.9	10	25	2,700	3	105
6.3	330	V/7343-19	T520V337M006A(3)E040	207.9	10	40	2,200	3	105
6.3	330	V/7343-19	T520V337M006A(3)E045	207.9	10	45	2,000	3	105
6.3	330	D/7343-31	T530D337M006A(3)E006	207.9	8	6	6,500	3	125
6.3	330	D/7343-31	T520D337M006A(3)E009	207.9	10	9	5,000	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
6.3	330	D/7343-31	T520D337M006A(3)E010	207.9	10	10	4,700	3	105
6.3	330	D/7343-31	T530D337M006A(3)E010	207.9	8	10	5,000	3	125
6.3	330	D/7343-31	T520D337M006A(3)E015	207.9	10	15	3,900	3	105
6.3	330	D/7343-31	T520D337M006A(3)E018	207.9	10	18	3,500	3	105
6.3	330	D/7343-31	T520D337M006A(3)E025	207.9	10	25	3,000	3	105
6.3	330	D/7343-31	T525D337M006A(3)E025	207.9	10	25	3,000	3	125
6.3	330	D/7343-31	T520D337M006A(3)E040	207.9	10	40	2,400	3	105
6.3	330	D/7343-31	T525D337M006A(3)E040	207.9	10	40	2,400	3	125
6.3	330	D/7343-31	T520D337M006A(3)E045	207.9	10	45	2,200	3	105
6.3	330	Y/7343-40	T530Y337M006A(3)E005	207.9	8	5	7,300	3	125
6.3	330	Y/7343-40	T530Y337M006A(3)E006	207.9	8	6	6,600	3	125
6.3	330	Y/7343-40	T520Y337M006A(3)E010	207.9	10	10	4,900	3	105
6.3	330	Y/7343-40	T530Y337M006A(3)E010	207.9	8	10	5,100	3	125
6.3	330	Y/7343-40	T520Y337M006A(3)E015	207.9	10	15	4,000	3	105
6.3	330	Y/7343-40	T520Y337M006A(3)E025	207.9	10	25	3,100	3	105
6.3	330	Y/7343-40	T520Y337M006A(3)E040	207.9	10	40	2,500	3	105
6.3	470	W/7343-15	T520W477M006A(3)E055	296.1	10	55	1,800	3	85
6.3	470	W/7343-15	T520W477M006A(3)E035	296.1	9	35	2,300	3	85
6.3	470	V/7343-19	T520V477M006A(3)E055	296.1	10	55	1,800	3	105
6.3	470	V/7343-19	T520V477M006A(3)E035	296.1	10	35	2,300	3	105
6.3	470	Y/7343-40	T530Y477M006A(3)E005	296.1	8	5	7,300	3	125
6.3	470	Y/7343-40	T520Y477M006A(3)E010	296.1	10	10	4,900	3	105
6.3	470	Y/7343-40	T520Y477M006A(3)E015	296.1	10	15	4,000	3	105
6.3	470	Y/7343-40	T520Y477M006A(3)E018	296.1	10	18	3,700	3	105
6.3	470	Y/7343-40	T520Y477M006A(3)E025	296.1	10	25	3,100	3	105
6.3	470	Y/7343-40	T520Y477M006A(3)E035	296.1	10	35	2,600	3	105
6.3	470	Y/7343-40	T525Y477M006A(3)E035	296.1	10	35	2,600	3	125
6.3	470	D/7343-31	T520D477M006A(3)E015	296.1	10	15	3,900	3	105
6.3	470	D/7343-31	T520D477(2)006A(3)E025	296.1	10	25	3,000	3	105
6.3	470	D/7343-31	T520D477M006A(3)E030	296.1	10	30	2,700	3	105
6.3	470	X/7343-43	T530X477M006A(3)E004	296.1	8	4	8,200	3	125
6.3	470	X/7343-43	T530X477M006A(3)E005	296.1	8	5	7,300	3	125
6.3	470	X/7343-43	T530X477M006A(3)E006	296.1	8	6	6,700	3	125
6.3	470	X/7343-43	T520X477M006A(3)E010	296.1	10	10	5,000	3	105
6.3	470	X/7343-43	T530X477M006A(3)E010	296.1	8	10	5,200	3	125
6.3	470	X/7343-43	T520X477M006A(3)E018	296.1	10	18	3,700	3	105
6.3	470	X/7343-43	T520X477M006A(3)E035	296.1	10	35	2,700	3	105
6.3	470	X/7343-43	T520X477M006A(3)E040	296.1	10	40	2,500	3	105
6.3	680	V/7343-19	T520V687M006A(3)E025	428.4	10	25	3,100	3	105
6.3	680	V/7343-19	T520V687M006A(3)E035	428.4	10	35	2,300	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
6.3	680	Y/7343-40	T520Y687M006A(3)E018	428.4	10	18	3,700	3	105
6.3	680	Y/7343-40	T520Y687M006A(3)E025	428.4	10	25	3,100	3	105
6.3	680	X/7343-43	T530X687M006A(3)E010	428.4	8	10	5,200	3	125
6.3	680	X/7343-43	T530X687M006A(3)E018	428.4	8	18	3,900	3	125
6.3	680	X/7343-43	T520X687M006A(3)E025	428.4	10	25	3,100	3	105
6.3	680	X/7343-43	T520X687M006A(3)E018	428.0	10	18	3,700	3	105
6.3	680	J/7360-15	T523J687M006APE070	428.0	10	70	2,510	3	85
6.3	1000	H/7360-20	T520H108M006A(3)E055	630.0	20	55	1,800	3	85
6.3	1200	H/7360-20	T520H128M006A(3)E070	756.0	20	70	1,200	3	85
6.3	1500	H/7360-20	T520H158M006A(3)E055	945.0	20	55	1,800	3	85
8	22	T/3528-12	T520T226M008A(3)E070	17.6	8	70	1,200	3	105
8	33	T/3528-12	T520T336M008A(3)E070	26.4	8	70	1,200	3	105
8	33	T/3528-12	T520T336M008A(3)E080	26.4	8	80	1,100	3	105
8	33	T/3528-12	T525T336M008A(3)E080	26.4	8	80	1,100	3	125
8	33	B/3528-21	T520B336M008A(3)E025	26.4	8	25	2,300	3	105
8	33	B/3528-21	T520B336M008A(3)E035	26.4	8	35	1,900	3	105
8	33	B/3528-21	T520B336M008A(3)E040	26.4	8	40	1,800	3	105
8	33	B/3528-21	T520B336M008A(3)E070	26.4	8	70	1,300	3	105
8	33	U/6032-15	T520U336M008A(3)E070	26.4	8	70	1,400	3	105
8	47	B/3528-21	T520B476M008A(3)E035	37.6	8	35	1,900	3	105
8	47	B/3528-21	T520B476M008A(3)E070	37.6	8	70	1,300	3	105
8	82	C/6032-28	T520C826M008A(3)E025	65.6	8	25	2,600	3	105
8	82	C/6032-28	T520C826M008A(3)E045	65.6	8	45	1,900	3	105
8	150	D/7343-31	T520D157M008A(3)E025	120	10	25	3,000	3	105
8	150	D/7343-31	T520D157M008A(3)E040	120	10	40	2,400	3	105
8	150	D/7343-31	T520D157M008A(3)E055	120	10	55	2,000	3	105
8	150	V/7343-19	T520V157M008A(3)E040	120	10	40	2,200	3	105
10	10	P/2012-10	T529P106M010AAE200 ^	30	6 *	200	354	3	105
10	10	A/3216-18	T520A106M010A(3)E080 ^	10	8 *	80	1,200	3	105
10	10	A/3216-18	T525A106M010A(3)E080 ^	10	8	80	1,200	3	125
10	15	A/3216-18	T520A156M010A(3)E080 ^	15	8 *	80	1,200	3	105
10	22	P/2012-10	T529P226M010AAE150 ^	66	6 *	150	408	3	105
10	22	P/2012-10	T529P226M010AAE200 ^	66	6 *	200	354	3	105
10	22	I/3216-10	T527I226M010ATE200 ^	22	8 *	200	548	3	105
10	22	A/3216-18	T520A226M010A(3)E080 ^	22	8 *	80	1,200	3	105
10	22	B/3528-21	T525B226M010A(3)E080	22	8	80	1,300	3	125
10	33	I/3216-10	T527I336M010ATE200 ^	33	6 *	200	548	3	105
10	33	T/3528-12	T520T336M010A(3)E040	33	8	40	1,600	3	105
10	33	T/3528-12	T520T336M010A(3)E070	33	8	70	1,200	3	105
10	33	T/3528-12	T520T336M010A(3)E080	33	8	80	1,100	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
10	33	T/3528-12	T525T336M010A(3)E080	33	8	80	1,100	3	125
10	33	B/3528-21	T520B336M010A(3)E025	33	8	25	2,300	3	105
10	33	B/3528-21	T520B336M010A(3)E035	33	8	35	1,900	3	105
10	33	B/3528-21	T520B336M010A(3)E040	33	8	40	1,800	3	105
10	33	B/3528-21	T520B336M010A(3)E070	33	8	70	1,300	3	105
10	33	B/3528-21	T525B336M010A(3)E080	33	8	80	1,300	3	125
10	33	U/6032-15	T520U336M010A(3)E070	33	8	70	1,400	3	105
10	47	I/3216-10	T527I476M010ATE200 ^	47	6 *	200	548	3	105
10	47	A/3216-18	T520A476M010ATE045 ^	47	8 *	45	1,291	3	105
10	47	B/3528-21	T520B476M010A(3)E035	47	8	35	1,900	3	105
10	47	B/3528-21	T520B476M010A(3)E070	47	8	70	1,300	3	105
10	47	U/6032-15	T520U476M010A(3)E055	47	8	55	1,600	3	105
10	47	C/6032-28	T520C476M010A(3)E100	47	8	100	1,300	3	105
10	68	U/6032-15	T520U686M010A(3)E055	68	8	55	1,600	3	105
10	68	W/7343-15	T520W686M010A(3)E025	68	10	25	2,700	3	105
10	68	W/7343-15	T520W686M010A(3)E040	68	10	40	2,100	3	105
10	68	C/6032-28	T520C686M010A(3)E045	68	8	45	1,900	3	105
10	68	V/7343-19	T520V686M010A(3)E025	68	10	25	2,700	3	105
10	68	V/7343-19	T520V686M010A(3)E040	68	10	40	2,200	3	105
10	68	V/7343-19	T520V686M010A(3)E045	68	10	45	2,000	3	105
10	68	V/7343-19	T520V686M010A(3)E060	68	10	60	1,800	3	105
10	68	V/7343-19	T520V686M010A(3)E100	68	10	100	1,400	3	105
10	68	D/7343-31	T520D686M010A(3)E100	68	10	100	1,500	3	105
10	100	B/3528-21	T520B107M010ATE070 ^	100	8 *	70	1,300	3	105
10	100	C/6032-28	T520C107M010A(3)E025	100	8	25	2,600	3	105
10	100	C/6032-28	T520C107M010A(3)E045	100	8	45	1,900	3	105
10	100	L/6032-19	T520L107M010A(3)E025	100	8	25	2,400	3	105
10	100	W/7343-15	T520W107M010A(3)E040	100	10	40	2,100	3	105
10	100	V/7343-19	T520V107M010A(3)E018	100	10	18	3,200	3	105
10	100	V/7343-19	T520V107M010A(3)E025	100	10	25	2,700	3	105
10	100	V/7343-19	T520V107M010A(3)E045	100	10	45	2,000	3	105
10	100	V/7343-19	T520V107M010A(3)E050	100	10	50	1,900	3	105
10	100	V/7343-19	T520V107M010A(3)E055	100	10	55	1,800	3	105
10	100	D/7343-31	T520D107M010A(3)E018	100	10	18	3,500	3	105
10	100	D/7343-31	T525D107M010A(3)E025	100	10	25	3,000	3	125
10	100	D/7343-31	T520D107M010A(3)E055	100	10	55	2,000	3	105
10	100	D/7343-31	T525D107M010A(3)E055	100	10	55	2,000	3	125
10	100	D/7343-31	T520D107M010A(3)E080	100	10	80	1,700	3	105
10	150	C/6032-28	T520C157M010A(3)E055	150	8	55	1,700	3	105
10	150	V/7343-19	T520V157M010A(3)E018	150	10	18	3,200	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
10	150	V/7343-19	T520V157M010A(3)E025	150	10	25	2,700	3	105
10	150	V/7343-19	T520V157M010A(3)E040	150	10	40	2,200	3	105
10	150	D/7343-31	T530D157M010A(3)E005	150	8	5	7,100	3	125
10	150	D/7343-31	T530D157M010A(3)E006	150	8	6	6,500	3	125
10	150	D/7343-31	T530D157M010A(3)E010	150	8	10	5,000	3	125
10	150	D/7343-31	T520D157M010A(3)E015	150	10	15	3,900	3	105
10	150	D/7343-31	T520D157M010A(3)E018	150	10	18	3,500	3	105
10	150	D/7343-31	T520D157M010A(3)E025	150	10	25	3,000	3	105
10	150	D/7343-31	T525D157M010A(3)E025	150	10	25	3,000	3	125
10	150	D/7343-31	T520D157M010A(3)E040	150	10	40	2,400	3	105
10	150	D/7343-31	T520D157M010A(3)E055	150	10	55	2,000	3	105
10	150	D/7343-31	T525D157M010A(3)E055	150	10	55	2,000	3	125
10	150	Y/7343-40	T520Y157M010A(3)E015	150	10	15	4,000	3	105
10	150	Y/7343-40	T520Y157M010A(3)E018	150	10	18	3,700	3	105
10	150	Y/7343-40	T520Y157M010A(3)E025	150	10	25	3,100	3	105
10	220	V/7343-19	T520V227M010A(3)E040	220	10	40	2,200	3	105
10	220	V/7343-19	T520V227M010A(3)E045	220	10	45	2,000	3	105
10	220	V/7343-19	T520V227M010A(3)E025	220	10	25	2,700	3	105
10	220	D/7343-31	T530D227M010A(3)E006	220	8	6	6,500	3	125
10	220	D/7343-31	T530D227M010A(3)E010	220	8	10	5,000	3	125
10	220	D/7343-31	T520D227M010A(3)E018	220	10	18	3,500	3	105
10	220	D/7343-31	T520D227M010A(3)E025	220	10	25	3,000	3	105
10	220	D/7343-31	T525D227M010A(3)E025	220	10	25	3,000	3	125
10	220	D/7343-31	T520D227M010A(3)E040	220	10	40	2,400	3	105
10	220	Y/7343-40	T530Y227M010A(3)E006	220	8	6	6,600	3	125
10	220	Y/7343-40	T520Y227M010A(3)E040	220	10	40	2,500	3	105
10	330	Y/7343-40	T520Y337M010A(3)E015	330	10	15	4,000	3	105
10	330	Y/7343-40	T520Y337M010A(3)E025	330	10	25	3,100	3	105
10	330	Y/7343-40	T520Y337M010A(3)E035	330	10	35	2,600	3	105
10	330	Y/7343-40	T525Y337M010A(3)E025	330	10	25	3,100	3	125
10	330	Y/7343-40	T525Y337M010A(3)E035	330	10	35	2,600	3	125
10	330	X/7343-43	T530X337M010A(3)E004	330	8	4	8,200	3	125
10	330	X/7343-43	T530X337M010A(3)E005	330	8	5	7,300	3	125
10	330	X/7343-43	T530X337M010A(3)E006	330	8	6	6,700	3	125
10	330	X/7343-43	T520X337M010A(3)E010	330	10	10	5,000	3	105
10	330	X/7343-43	T530X337M010A(3)E010	330	8	10	5,200	3	125
10	330	X/7343-43	T520X337M010A(3)E025	330	10	25	3,100	3	105
10	330	X/7343-43	T520X337M010A(3)E035	330	10	35	2,700	3	105
10	330	J/7360-15	T523J337M010APE070	330	10	70	2,510	3	85
10	470	X/7343-43	T530X477M010A(3)E020	470	10	20	3,670	3	125
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
10	470	J/7360-15	T523J477M010APE070	470	10	70	2,510	3	85
10	820	H/7360-20	T520H827M010A(3)E070	820	20	70	1,200	3	85
10	330	X/7343-43	T520X337M010A(3)E040	330	10	40	2,500	3	105
11	47	Q/7343-12	T520Q476M011A(3)E040	52	10	40	4,500	3	105
12.5	10	T/3528-12	T520T106M12RA(3)E080	12.5	8	80	1,100	3	105
12.5	10	T/3528-12	T520T106M12RA(3)E150	12.5	8	150	800	3	105
12.5	15	T/3528-12	T520T156M12RA(3)E080	18.75	8	80	1,100	3	105
12.5	47	T/3528-12	T521T476M12RA(3)E090	58.8	8	90	1,330	3	105
16	10	P/2012-10	T529P106M016AAE150 ^	80	6 *	150	408	3	105
16	10	A/3216-18	T521A106M016ATE200 ^	16	8	200	612	3	105
16	10	B/3528-21	T520B106M016A(3)E100**	16	8	100	1,100	3	105
16	10	B/3528-21	T521B106M016A(3)E100	16	8	100	1,410	3	125
16	15	B/3528-21	T521B156M016A(3)E090	24	8	90	1,490	3	105
16	22	3216-08	TF08A226M016APE200 ^	70.4	10 *	200	548	4	105
16	22	B/3528-21	T521B226M016A(3)E090	35.2	8	90	1,490	3	105
16	22	C/6032-28	T520C226M016A(3)E080	35.2	8	80	1,400	3	105
16	33	S/3216-12	T527S336M016ATE200 ^	54	10	200	548	4	105
16	33	T/3528-12	T521T336M016A(3)E045	52.8	8	45	1,890	3	105
16	33	T/3528-12	T521T336M016A(3)E050	52.8	10	50	1,790	3	105
16	33	B/3528-21	T521B336M016A(3)E070	52.8	8	70	1,690	3	105
16	33	B/3528-21	T521B336M016A(3)E090	52.8	8	90	1,490	3	105
16	33	B/3528-21	T525B336M016A(3)E070	52.8	8	70	1,300	3	125
16	33	B/3528-21	T525B336M016A(3)E090	52.8	8	90	1,200	3	125
16	33	Q/7343-12	T521Q336M016A(3)E040	52.8	10	40	2,500	3	105
16	33	W/7343-15	T520W336M016A(3)E045	52.8	10	45	2,000	3	105
16	33	V/7343-19	T520V336M016A(3)E045	52.8	10	45	2,000	3	105
16	33	V/7343-19	T520V336M016A(3)E060	52.8	10	60	1,800	3	105
16	33	V/7343-19	T520V336M016A(3)E070	52.8	10	70	1,600	3	105
16	47	T/3528-12	T523T476M016APE090	75.2	10	90	1,080	4	85
16	47	B/3528-21	T521B476M016A(3)E055	75.2	10	55	1,900	3	125
16	47	B/3528-21	T521B476M016A(3)E090	75.2	10	90	1,490	3	125
16	47	W/7343-15	T521W476M016A(3)E040	75.2	10	40	2,530	3	105
16	47	W/7343-15	T520W476M016A(3)E045**	75.2	10	45	2,000	3	105
16	47	W/7343-15	T521W476M016A(3)E045	75.2	10	45	2,380	3	105
16	47	V/7343-19	T521V476M016A(3)E040	75.2	10	40	2,560	3	125
16	47	V/7343-19	T520V476M016A(3)E045	75.2	10	45	2,000	3	105
16	47	V/7343-19	T521V476M016A(3)E055	75.2	10	55	2,220	3	125
16	47	V/7343-19	T520V476M016A(3)E070**	75.2	10	70	1,600	3	105
16	47	V/7343-19	T521V476M016A(3)E070	75.2	10	70	1,960	3	125
16	47	V/7343-19	T521V476M016A(3)E080	75.2	10	80	1,840	3	125
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
16	47	D/7343-31	T520D476M016A(3)E035	75.2	10	35	2,500	3	105
16	47	D/7343-31	T525D476M016A(3)E035	75.2	10	35	2,500	3	125
16	47	D/7343-31	T521D476M016A(3)E040	75.2	10	40	2,810	3	125
16	47	D/7343-31	T521D476M016A(3)E045	75.2	10	45	2,650	3	125
16	47	D/7343-31	T521D476M016A(3)E055	75.2	10	55	2,390	3	125
16	47	D/7343-31	T525D476M016A(3)E065	75.2	10	65	1,900	3	125
16	47	D/7343-31	T520D476M016A(3)E070**	75.2	10	70	1,800	3	105
16	47	D/7343-31	T521D476M016A(3)E070	75.2	10	70	2,120	3	125
16	47	D/7343-31	T521D476M016A(3)E090	75.2	10	90	1,870	3	125
16	68	W/7343-15	T523W686M016APE050	108.8	10	50	2,820	3	105
16	68	W/7343-15	T523W686M016APE070	108.8	10	70	2,376	3	105
16	68	W/7343-15	T523W686M016APE100	108.8	10	100	1,988	3	105
16	68	V/7343-19	T521V686M016A(3)E040	108.8	10	40	2,600	3	125
16	68	V/7343-19	T521V686M016A(3)E050	108.8	10	50	2,320	3	125
16	68	V/7343-19	T521V686M016A(3)E090	108.8	10	90	1,730	3	125
16	68	D/7343-31	T520D686M016A(3)E050	108.8	10	50	2,100	3	105
16	100	W/7343-15	T523W107M016APE050	160	10	50	2,820	3	105
16	100	W/7343-15	T523W107M016APE070	160	10	70	2,376	3	105
16	100	W/7343-15	T523W107M016APE100	160	10	100	1,988	3	105
16	100	V/7343-19	T521V107M016A(3)E040	160	10	40	2,600	3	125
16	100	V/7343-19	T521V107M016A(3)E050	160	10	50	2,320	3	125
16	100	D/7343-31	T521D107M016A(3)E050	160	10	50	2,510	3	105
16	150	W/7343-15	T523W157M016APE050	240	10	50	2,820	3	105
16	150	W/7343-15	T523W157M016APE070	240	10	70	2,376	3	105
16	150	W/7343-15	T523W157M016APE100	240	10	100	1,988	3	105
16	150	V/7343-20	T521V157M016ATE040	240	10	40	2,600	3	105
16	150	V/7343-20	T521V157M016ATE050	240	10	50	2,320	3	105
16	150	V/7343-20	T521V157M016ATK050	120	10	50	2,320	3	105
16	150	V/7343-20	T521V157M016ATE070	240	10	70	1,960	3	105
16	150	V/7343-20	T521V157M016ATK070	120	10	70	1,960	3	105
16	150	V/7343-20	T521V157M016ATE100	240	10	100	1,640	3	105
16	150	V/7343-20	T521V157M016ATK100	120	10	100	1,640	3	105
16	150	D/7343-31	T521D157M016A(3)E050	240	10	50	2,510	3	105
16	150	D/7343-31	T521D157M016A(3)E040	240	10	40	2,810	3	105
16	150	X/7343-43	T530X157M016A(3)E015	240	8	15	4,200	3	125
16	150	X/7343-43	T530X157M016A(3)E025	240	8	25	3,300	3	125
16	150	X/7343-43	T520X157M016A(3)E040	240	10	40	2,500	3	105
16	150	X/7343-43	T530X157M016A(3)E040	240	8	40	2,600	3	125
16	150	X/7343-43	T521X157M016A(3)E080	240	10	80	2,240	3	105
16	220	D/7343-31	T521D227M016A(3)E025	352	10	25	3,550	3	125
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
16	220	D/7343-31	T521D227M016A(3)E035	352	10	35	3,000	3	125
16	220	D/7343-31	T521D227M016A(3)E050	352	10	50	2,510	3	125
16	220	X/7343-43	T521X227M016A(3)E035	352	10	35	3,380	3	125
16	220	X/7343-43	T521X227M016A(3)E050	352	10	50	2,830	3	125
16	220	H/7360-20	T523H227M016APE070	352	10	70	2,510	3	85
16	220	J/7360-15	T523J227M016APE070	352	10	70	2,510	3	85
16	330	X/7343-43	T521X337M016A(3)E015	528	10	15	5,160	3	125
16	330	X/7343-43	T521X337M016A(3)E025	528	10	25	4,000	3	125
16	330	X/7343-43	T521X337M016A(3)K025	264	10	25	4,000	3	125
16	330	X/7343-43	T521X337M016A(3)E050	528	10	50	2,830	3	125
16	330	X/7343-43	T521X337M016A(3)K050	264	10	50	2,830	3	125
16	330	H/7360-20	T523H337M016APE070	528	10	70	2,510	3	85
16	470	X/7343-43	T521X477M016A(3)E020	752	10	20	4,470	3	125
16	470	X/7343-43	T521X477M016A(3)K020	376	10	20	4,470	3	125
16	470	X/7343-43	T521X477M016A(3)I020	226	10	20	4,470	3	125
20	10	B/3528-21	T521B106M020A(3)E100	20	8	100	1,410	3	125
20	15	B/3528-21	T521B156M020A(3)E090	30	10	90	1,490	3	105
20	22	B/3528-21	T521B226M020A(3)E090	44	8	90	1,490	3	105
20	22	W/7343-15	T521W226(2)020A(3)E040	44	10	40	2,530	3	105
20	22	W/7343-15	T521W226(2)020A(3)E055	44	10	55	2,150	3	105
20	22	W/7343-15	T521W226(2)020A(3)E070	44	10	70	1,910	3	105
20	22	V/7343-19	T520V226M020A(3)E040	44	10	40	2,200	3	105
20	22	V/7343-19	T520V226M020A(3)E045	44	10	45	2,000	3	105
20	22	V/7343-19	T520V226M020A(3)E090**	44	10	90	1,400	3	105
20	22	V/7343-19	T521V226M020A(3)E090	44	10	90	1,730	3	125
20	33	B/3528-21	T521B336M020ATE090 ^	132	10 *	90	972	3	105
20	47	W/7343-15	T521W476M020A(3)E040	94	9	40	2,530	3	105
20	47	W/7343-15	T521W476K020A(3)E045	94	9	45	2,380	3	105
20	47	V/7343-19	T521V476M020A(3)E090	94	10	90	1,730	3	125
20	47	V/7343-19	T521V476M020A(3)E080	94	10	80	1,840	3	125
20	47	V/7343-19	T521V476M020A(3)E055	94	10	55	2,220	3	125
20	47	D/7343-31	T521D476M020A(3)E055	94	10	55	2,390	3	125
20	47	D/7343-31	T521D476M020A(3)E040	94	10	40	2,810	3	125
20	68	V/7343-19	T521V686M020A(3)E050	136	10	50	2,320	3	105
20	68	V/7343-20	T523V686M020APE100	136	10	100	1,400	3	105
20	100	W/7343-15	T523W107M020APE050	200	10	50	2,820	3	105
20	100	W/7343-15	T523W107M020APE070	200	10	70	2,376	3	105
20	100	W/7343-15	T523W107M020APE100	200	10	100	1,988	3	105
20	100	V/7343-19	T521V107M020A(3)E055	200	10	55	2,220	3	125
20	100	D/7343-31	T521D107(2)020A(3)E055	200	10	55	2,390	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
20	150	V/7343-20	T523V157M020APE050	300	10	50	2,870	3	105
20	150	V/7343-20	T523V157M020APE070	300	10	70	2,420	3	105
20	150	V/7343-20	T523V157M020APE100	300	10	100	2,030	3	105
20	150	D/7343-31	T521D157M020A(3)E065	300	10	65	2,200	3	105
20	150	D/7343-31	T521D157M020A(3)E050	300	10	50	2,510	3	105
25	4.7	P/2012-10	T529P475M025AAE300 ^	35.3	10 *	300	289	3	105
25	6.8	T/3528-12	T521T685M025ATE100 ^	34	8 *	100	866	3	105
25	10	S/3216-12	T527S106M025ATE150 ^	50	10 *	150	632	3	105
25	10	M/3528-15	T521M106M025ATE100 ^	50	10 *	100	922	3	105
25	10	B/3528-21	T521B106M025A(3)E100	25	8	100	1,410	3	125
25	10	T/3528-12	T521T106M025A(3)E100	25	8	100	1,270	3	125
25	10	T/3528-12	T521T106M025A(3)E060	25	8	60	1,630	3	125
25	15	B/3528-21	T521B156M025ATE090 ^	112.5	10	90	972	3	125
25	15	B/3528-21	T521B156M025A(3)E100	37.5	8	100	1,410	3	105
25	15	T/3528-12	T527T156M025ATE100 ^	112.5	10 *	100	866	3	105
25	15	K/3528-10	T527K156M025ATE150 ^	75.0	10	150	633	3	105
25	15	V/7343-19	T520V156M025A(1)E090**	37.5	10	90	1,400	3	105
25	15	V/7343-19	T521V156M025A(3)E090	37.5	10	90	1,730	3	105
25	15	V/7343-19	T521V156M025A(3)E040	37.5	10	40	2,560	3	105
25	15	D/7343-31	T520D156M025A(3)E060	37.5	10	60	1,900	3	105
25	15	D/7343-31	T520D156M025A(3)E080	37.5	10	80	1,700	3	105
25	22	T/3528-12	T527T226M025ATE100 ^	165	10	100	886	3	105
25	22	B/3528-21	T521B226M025A(3)E100	55	8	100	1,410	3	105
25	22	W/7343-15	T521W226M025A(3)E040	55	10	40	2,530	3	105
25	22	W/7343-15	T521W226M025A(3)E070	55	10	70	1,910	3	105
25	22	V/7343-19	T521V226M025A(3)E040	55	10	40	2,560	3	105
25	22	V/7343-19	T521V226M025A(3)E045	55	10	45	2,450	3	105
25	22	V/7343-19	T521V226M025A(3)E060	55	10	60	2,120	3	105
25	22	V/7343-19	T521V226M025A(3)E090	55	10	90	1,730	3	105
25	33	W/7343-15	T523W336M025APE100	82.5	10	100	1,988	4	105
25	33	V/7343-19	T521V336M025A(3)E025	82.5	10	25	3,290	3	105
25	33	V/7343-19	T521V336M025A(3)E060	82.5	10	60	2,120	3	105
25	33	V/7343-19	T521V336M025A(3)E040	82.5	10	40	2,560	3	105
25	33	D/7343-31	T521D336M025A(3)E040	82.5	10	40	2,810	3	125
25	33	D/7343-31	T521D336M025A(3)E060	82.5	10	60	2,290	3	125
25	47	V/7343-20	T523V476M025APE100	117.5	10	100	1,400	3	105
25	47	D/7343-31	T521D476M025A(3)E065	117.5	10	65	2,200	3	125
25	47	W/7343-15	T523W476M025APE050	117.5	10	50	2,820	3	105
25	47	W/7343-15	T523W476M025APE070	117.5	10	70	2,376	3	105
25	47	W/7343-15	T523W476M025APE100	117.5	10	100	1,988	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
25	68	W/7343-15	T523W686M025APE050	170	10	50	2,820	3	105
25	68	W/7343-15	T523W686M025APE070	170	10	70	2,376	3	105
25	68	W/7343-15	T523W686M025APE100	170	10	100	1,988	3	105
25	68	D/7343-31	T521D686M025A(3)E070	170	10	70	2,120	3	125
25	100	D/7343-31	T521D107M025A(3)E040	250	10	40	2,810	3	125
25	100	D/7343-31	T521D107M025A(3)E050	250	10	50	2,510	3	125
25	100	D/7343-31	T521D107M025A(3)E060	250	10	60	2,290	3	125
25	100	X/7343-43	T521X107M025A(3)E030	250	10	30	3,650	3	105
25	100	X/7343-43	T521X107M025A(3)E060	250	10	60	2,580	3	105
35	3.3	B/3528-21	T521B335M035A(3)E150	11.6	8	150	1,160	3	105
35	3.3	B/3528-21	T521B335M035A(3)E200	11.6	8	200	1,000	3	105
35	4.7	B/3528-21	T521B475M035A(3)E150	16.5	8	150	1,160	3	105
35	4.7	B/3528-21	T521B475M035A(3)E200	16.5	8	200	1,000	3	105
35	6.8	T/3528-12	T521T685M035APE090	23.8	10	90	1,330	3	125
35	6.8	B/3528-21	T521B685M035A(3)E150	23.8	8	150	1,160	3	105
35	6.8	B/3528-21	T521B685M035A(3)E200	23.8	8	200	1,000	3	105
35	10	B/3528-21	T521B106M035A(3)E150	35	8	150	1,160	3	105
35	10	B/3528-21	T521B106M035A(3)E200	35	8	200	1,000	3	105
35	10	V/7343-19	T521V106M035A(3)E120	35	10	120	1,500	3	125
35	15	V/7343-19	T521V156M035A(3)E100	52.5	10	100	1,640	3	125
35	15	V/7343-19	T521V156M035A(3)E125	52.5	10	125	1,470	3	125
35	22	W/7343-15	T523W226M035APE100	77	10	100	1,988	3	105
35	22	D/7343-31	T521D226M035A(3)E040	77	10	40	2,810	3	125
35	22	D/7343-31	T521D226M035A(3)E060	77	10	60	2,290	3	125
35	33	V/7343-20	T523V336M035APE100	115.5	10	100	1,400	3	105
35	33	D/7343-31	T521D336M035A(3)E065	115.5	10	65	2,200	3	125
35	47	V/7343-20	T523V476M035APE100	164.5	10	100	1,400	3	105
35	47	X/7343-43	T521X476M035A(3)E030	164.5	10	30	3,650	3	125
35	47	X/7343-43	T521X476M035A(3)E070	164.5	10	70	2,390	3	125
35	47	W/7343-15	T523W476M035APE090	164.5	10	90	2,100	3	105
35	47	W/7343-15	T523W476M035APE100	164.5	10	100	1,988	3	105
35	68	X/7343-43	T521X686M035A(3)E050	238	10	50	2,830	3	125
50	0.68	B/3528-21	T521B684M050A(3)E200	3.4	8	200	1,000	3	105
50	1	B/3528-21	T521B105M050A(3)E200	5	8	200	1,000	3	105
50	1.5	B/3528-21	T521B155M050A(3)E200	7.5	8	200	1,000	3	105
50	2.2	B/3528-21	T521B225M050A(3)E200	11	8	200	1,000	3	105
50	3.3	B/3528-21	T521B335M050A(3)E200	16.5	8	200	1,000	3	105
50	5.6	D/7343-31	T521D565M050A(3)E070	28	10	70	2,120	3	125
50	5.6	D/7343-31	T521D565M050A(3)E090	28	10	90	1,870	3	125
50	5.6	V/7343-19	T521V565M050A(3)E070	28	10	70	1,960	3	125
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

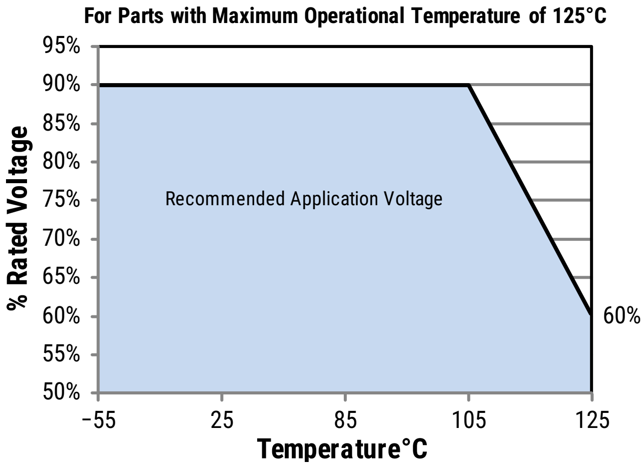
(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

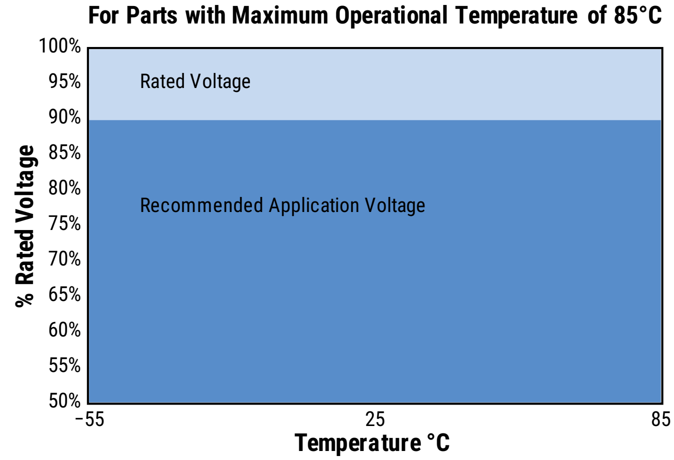
Table 1 – Ratings & Part Number Reference cont.

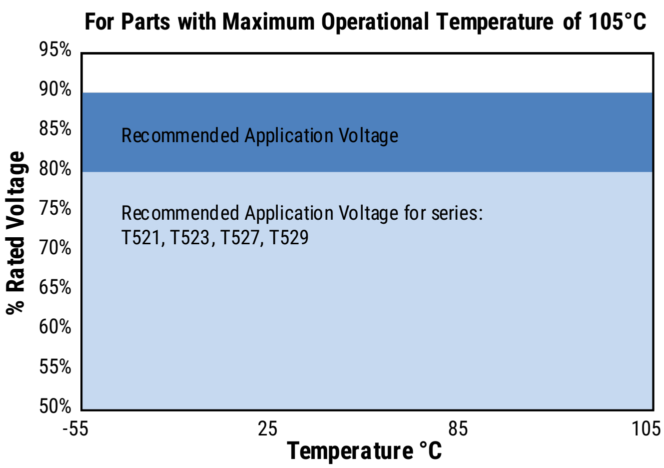
Rated Voltage VDC at 105°C	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
50	5.6	V/7343-19	T521V565M050A(3)E090	28	10	90	1,730	3	125
50	6.8	D/7343-31	T521D685M050A(3)E070	34	10	70	2,120	3	125
50	6.8	D/7343-31	T521D685M050A(3)E090	34	10	90	1,870	3	125
50	6.8	V/7343-19	T521V685M050A(3)E070	34	10	70	1,960	3	125
50	6.8	V/7343-19	T521V685M050A(3)E090	34	10	90	1,730	3	125
50	10	D/7343-31	T521D106M050A(3)E090	50	10	90	1,870	3	125
50	10	D/7343-31	T521D106M050A(3)E120	50	10	120	1,620	3	125
50	10	V/7343-19	T521V106M050A(3)E090	50	10	90	1,730	3	125
50	18	D/7343-31	T521D186M050A(3)E090	90	10	90	1,870	3	125
50	18	X/7343-43	T521X186M050A(3)E070	90	10	70	2,390	3	125
50	18	X/7343-43	T521X186M050A(3)E050	90	10	50	2,830	3	125
50	18	X/7343-43	T521X186M050A(3)E035	90	10	35	3,380	3	125
50	22	D/7343-31	T521D226M050A(3)E090	110	10	90	1,870	3	125
50	22	X/7343-43	T521X226M050A(3)E075	110	10	75	2,310	3	125
50	22	X/7343-43	T521X226M050A(3)E050	110	10	50	2,830	3	125
50	33	X/7343-43	T521X336M050A(3)E075	165	10	75	2,310	3	125
50	33	X/7343-43	T521X336M050A(3)E050	165	10	50	2,830	3	125
63	0.68	B/3528-21	T521B684M063A(3)E200	4.3	8	200	1,000	3	105
63	1	B/3528-21	T521B105M063A(3)E200	6.3	8	200	1,000	3	105
63	1.5	B/3528-21	T521B155M063A(3)E200	9.5	8	200	1,000	3	105
63	4.7	C/6032-28	T521C475M063A(3)E200	29.6	6	200	1,050	3	105
63	4.7	D/7343-31	T521D475M063A(3)E300	29.61	10	300	1,030	3	125
63	4.7	D/7343-31	T521D475M063A(3)E075	29.6	10	75	2,050	3	125
63	6.8	D/7343-31	T521D685M063A(3)E075	42.8	10	75	2,050	3	125
63	10	X/7343-43	T521X106M063A(3)E050	63	10	50	2,830	3	125
63	15	X/7343-43	T521X156M063A(3)E035	94.5	10	35	3,380	3	125
63	15	X/7343-43	T521X156M063A(3)E150	94.5	10	150	1,630	3	125
63	22	X/7343-43	T521X226M063A(3)E075	138.6	10	75	2,310	3	125
75	4.7	D/7343-31	T521D475M075A(3)E075	35.3	10	75	2,050	3	125
75	10	X/7343-43	T521X106M075A(3)E050	75	10	50	2,830	3	125
75	15	X/7343-43	T521X156M075A(3)E035	112.5	10	35	3,380	3	125
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(2) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated or H = Standard Solder coated (SnPb 5% Pb minimum). Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.
Part numbers marked in blue font are not recommended for new designs. Please use the T521 series instead.
^ Denotes the large reel (13") is not available.
** DF measurement condition is 120 Hz/0.5 V_{rms}/1.5 V DC Bias*
Refer to Ordering Information for additional detail.

Derating Guidelines







Recommended Application Voltage

KO-CAPs are solid state capacitors that demonstrate no wearout mechanism when operated within their recommended guidelines. While the KO-CAP can be operated at full rated voltage, most circuit designers seek a minimum level of assurance in long term reliability, which should be demonstrated with data. A voltage derating can provide the desired level of demonstrated reliability based on industry accepted acceleration models. Since most applications do require long term reliability, KEMET recommends that designers consider a voltage derating, according to the graphic above, for the maximum steady state voltage.

Voltage Rating	Maximum Recommended Steady State Voltage	
	-55°C to 105°C	105°C to 125°C
75 V ≤ V_R	90% of V_R	60% of V_R

V_R = Rated Voltage

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage, which may be applied is limited by two criteria:
a. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
b. The negative peak AC voltage, in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage.

The maximum power dissipation must be reduced with increasing environmental operating temperatures. Refer to the table below for temperature compensation requirements.

Temperature Compensation Multipliers for Maximum Ripple Current				
Max Operational Temperature (Series)	−55°C < T ≤ 45°C	45°C < T ≤ 85°C	85°C < T ≤ 105°C	105°C < T ≤ 125°C
85°C (T520, T523)	1.00	0.7		
105°C (T520, T521, T523, T527, T529 , TF)	1.00	0.7	0.25	
125°C (T525 , T530)	1.00	0.7	0.25	0.25
125°C dedicated to T521	1.00	1.00	0.70	0.25

T= Environmental Temperature

Maximum Power Dissipation (Pmax) mWatts at 45°C with +30°C Rise						
Case Code	**EIA Case Code**	**T520/T525**	**T521**	**T523**	**T527/T529**	**T530**
P	2012				25	
I / S	3216				60	
A	3216-18	112				
T	3528-12	105	160	105	75	
M	3528-15	120	120			
B	3528-21	127	200			
U	6032-15	135				
L	6032-19	150				
C	6032-28	165	220			
W	7343-15	180	255	395		
V	7343-20	187	270	423		
D	7343-31	225	315			255
Q	7343-12	170	245			
Y	7343-40	241				263
X	7343-43	247	400			270
J	7360-15			440		
H	7360-20	187		440		

Surge Voltage

Surge voltage is the maximum voltage (peak value) which may be applied to the capacitor. The surge voltage must not be applied for periodic charging and discharging in course of normal operation and cannot be part of the application voltage. Surge voltage capability is demonstrated by application of 1,000 cycles at operating temperature. The parts are charged through a 33 Ohm resistor for 30 seconds and then discharged though a 33 Ohm resistor for each cycle.

Rated Voltage (V)	Surge Voltage (V)	Category Voltage (V)	Category Surge Voltage (V)
–55°C to 105°C		Up to 125°C	
2	2.6	–	
2.5	3.3	1.7	2.2
3	3.9	2.0	2.7
4	5.2	2.7	3.5
6.3	8.2	4.2	5.5
8	10.4	5.4	7.1
10	13	6.7	8.7
12.5	16.25	–	
16	20.8	10.7	13.9
20	26	13.4	17.4
25	32.5	16.8	21.8
35	45.5	23.5	30.5
50	65	33.5	43.6
63	81.9	42.2	54.9
75	97.5	50.3	65.3

Reverse Voltage

Polymer electrolytic capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a small degree of transient voltage reversal for short periods as shown in the below table.

Temperature	Permissible Transient Reverse Voltage
25°C	15% of Rated Voltage
55°C	10% of Rated Voltage
85°C	5% of Rated Voltage
105°C	3% of Rated Voltage
125°C*	1% of Rated Voltage

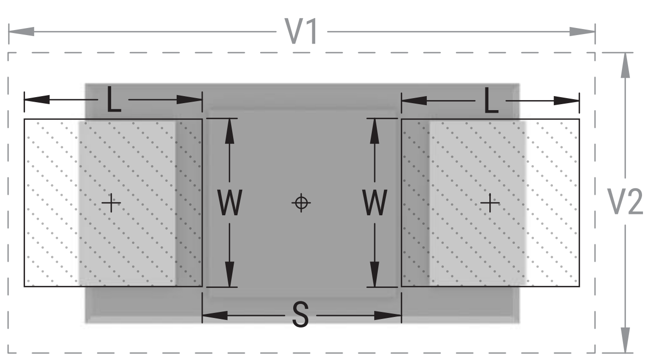
**For series rated to 125°C*

Table 2 – Land Dimensions/Courtyard

T520/T521/T525/T530

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
A	3216–18	1.35	2.20	0.62	6.02	2.80	1.23	1.80	0.82	4.92	2.30	1.13	1.42	0.98	4.06	2.04
B	3528–21	2.35	2.21	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
C	6032–28	2.35	2.77	2.37	8.92	4.50	2.23	2.37	2.57	7.82	4.00	2.13	1.99	2.73	6.96	3.74
D	7343–31	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
H	7360-20	4.25	2.77	3.67	10.22	7.30	4.13	2.37	3.87	9.12	6.80	4.03	1.99	4.03	8.26	6.54
L	6032-19	2.35	2.77	2.37	8.92	4.50	2.23	2.37	2.57	7.82	4.00	2.13	1.99	2.73	6.96	3.74
M	3528-15	2.35	2.20	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
Q	7343-12	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
T	3528–12	2.35	2.20	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
U	6032–15	2.35	2.77	2.37	8.92	4.50	2.23	2.37	2.57	7.82	4.00	2.13	1.99	2.73	6.96	3.74
V	7343–21	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
W	7343–15	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
X[1]	7343–43	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
Y[1]	7343–40	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] Height of these chips may create problems in wave soldering.

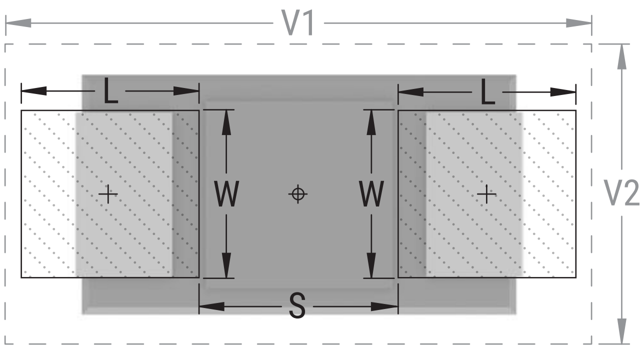


Grid Placement Courtyard

Table 2 – Land Dimensions/Courtyard cont.

T523 / T527

KEMET	Metric Size Code	Maximum (Most) Land Protrusion (mm)					Median (Nominal) Land Protrusion (mm)					Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
P	2012-10	1.05	1.76	0.21	4.74	2.36	0.93	1.36	0.41	3.64	1.86	0.83	0.98	0.57	2.93	1.6
K	3528-10	2.35	2.04	1.24	6.32	4.00	2.23	1.64	1.44	5.22	3.50	2.13	1.26	1.60	4.52	3.24
W	7343–15	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
V	7343-20	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
G	7360-12	4.60	3.07	3.07	10.22	7.30	4.48	2.67	3.27	9.12	6.80	4.38	2.29	3.43	8.26	6.54
J	7360-15	4.60	3.07	3.07	10.22	7.30	4.48	2.67	3.27	9.12	6.80	4.38	2.29	3.43	8.26	6.54
H	7360-20	4.60	3.07	3.07	10.22	7.30	4.48	2.67	3.27	9.12	6.80	4.38	2.29	3.43	8.26	6.54

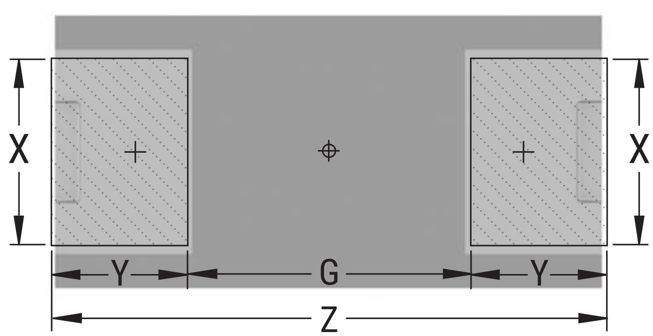


Grid Placement Courtyard

T527 / T529

KEMET	Metric Size Code	Dimensions (mm) Minimum – Maximum			
Case	EIA	G	Z	X	Y
A08	3216–08	1.00 – 1.65	3.25 – 3.80	1.1 – 1.30	0.8 – 1.40
I	3216–10	1.00 – 1.65	3.25 – 3.80	1.10 – 1.30	0.80 – 1.40
S	3216–12	1.00 – 1.65	3.25 – 3.80	1.1 – 1.30	0.8 – 1.40
P	2012–10	0.40 – 1.05	2.05 – 2.60	0.80 – 1.00	0.5 – 1.1

(JEITA RC-2371 is recommended for reference)



Soldering Process

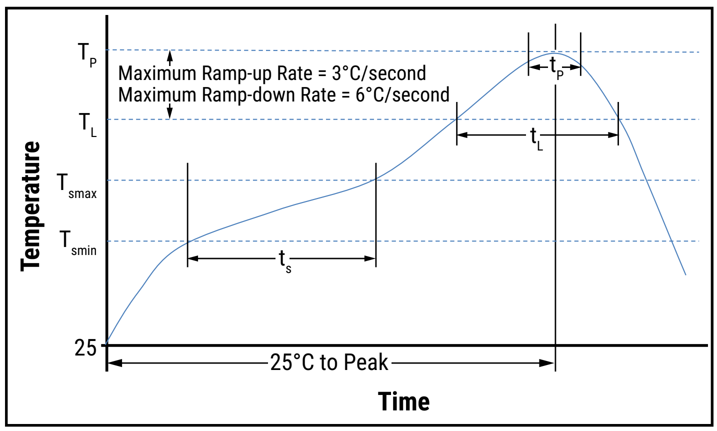
The KEMET families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. “Wiping” the edges of a chip and heating the top surface is not recommended.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/seconds maximum	3°C/seconds maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/seconds maximum	6°C/seconds maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



Storage

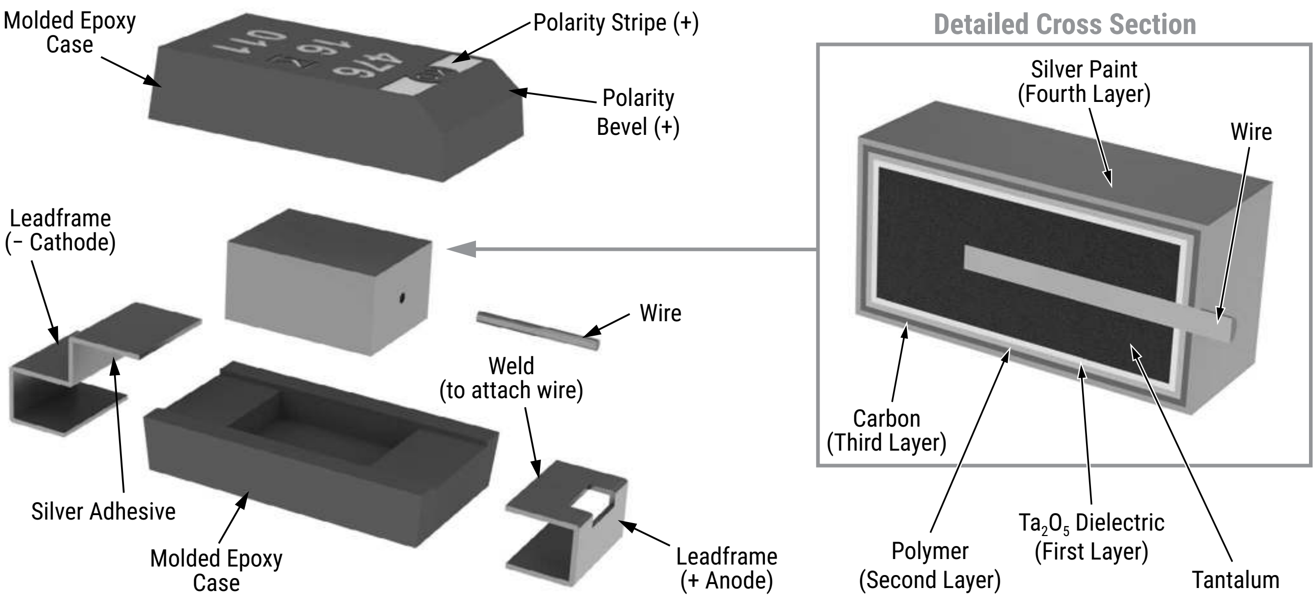
All KO-CAP Series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J–STD–020 and packaged per IPC/JEDEC J–STD–033. MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

The calculated shelf life in a sealed bag would be 12 months from a bag seal date in a storage environment of < 40°C and humidity < 90% RH. It should be 24 months from a bag seal date in a storage environment of < 30°C and humidity < 70% RH.

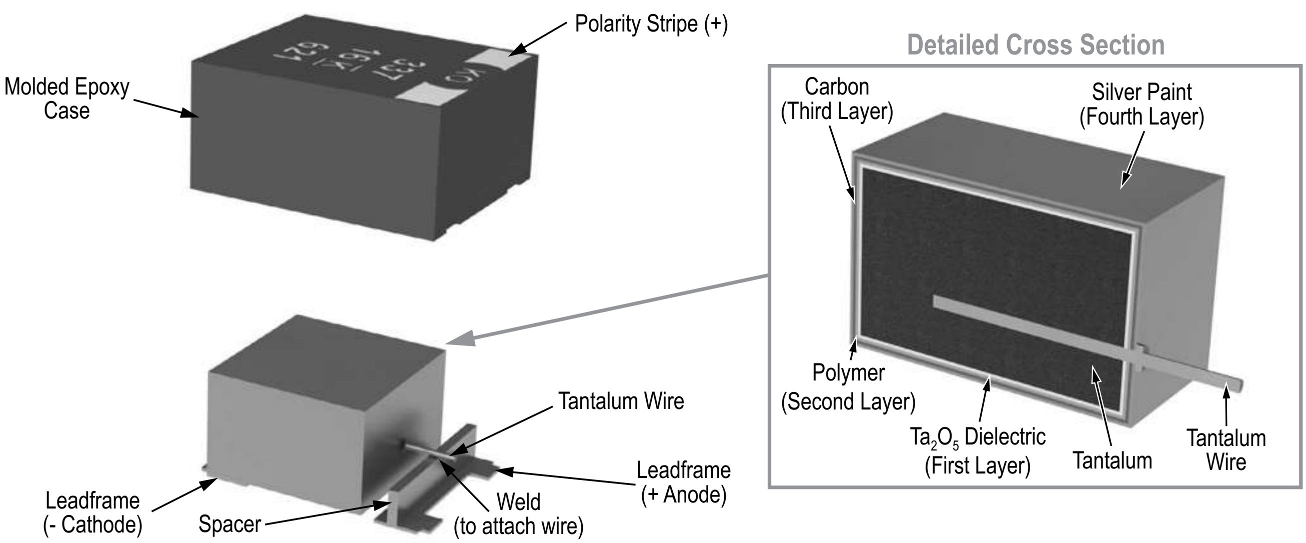
If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure.

Construction

T520/T521/T525/T530

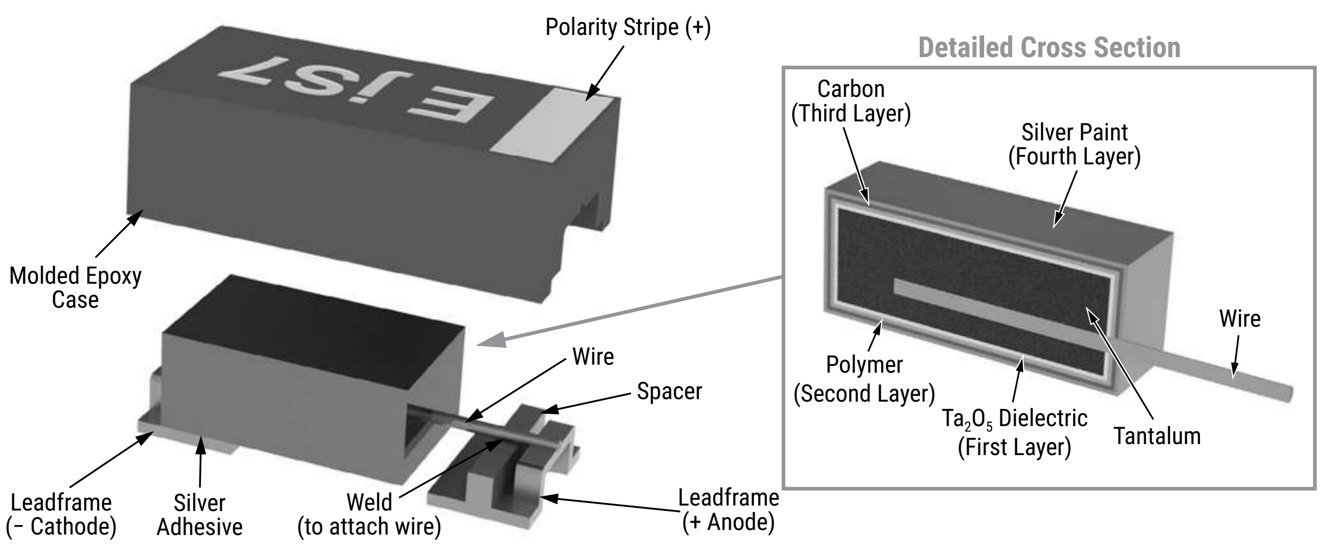


T523

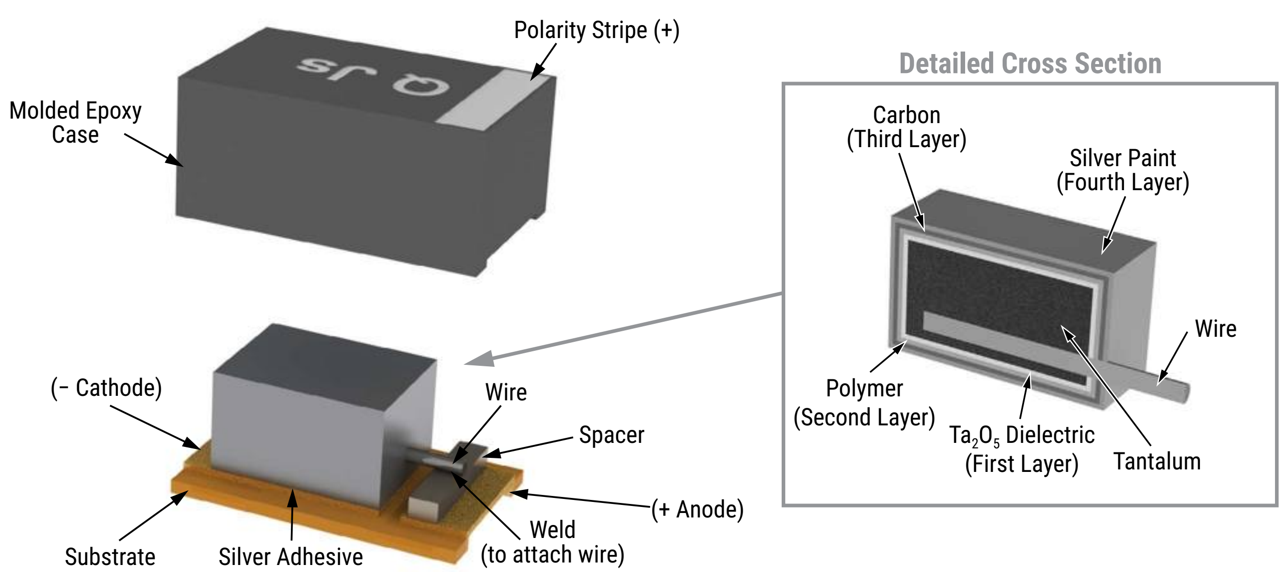


Construction cont.

T527

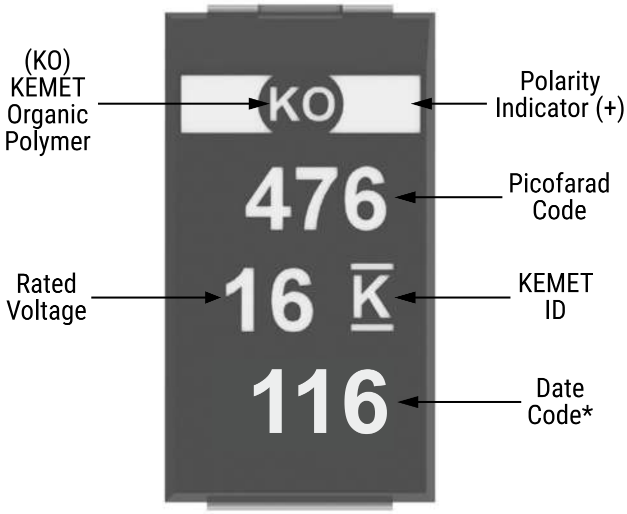


T529



Capacitor Marking

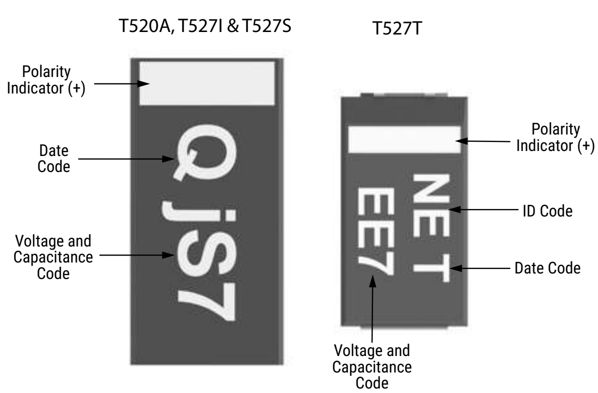
T520/T521/T523/T525/T530



* 116 = 16th week of 2021

Date Code*	
1st digit = Last number of Year	9 = 2019 0 = 2020 1 = 2021 2 = 2022 3 = 2023
2nd and 3rd digit = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

T520A/T527I/T527S/T527T



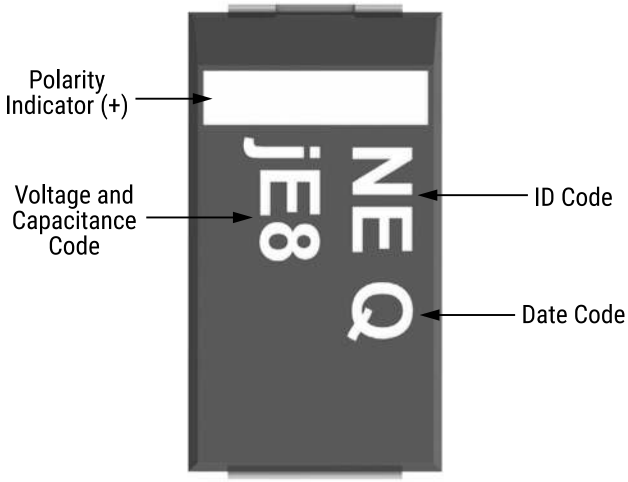
Code	e	g	j	A	C	E
Rated Voltage	2.5 V	4 V	6.3 V	10 V	16 V	25 V

Code	A7	E7	J7	N7
Capacitance	10	15	22	33

Code	S7	W7	A8	J8
Capacitance	47	68	100	220

Date Code*												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	N	P	Q	R	S	T	U	V	W	X	Y	Z
2019	a	b	c	d	e	f	g	h	j	k	l	m
2020	n	p	q	r	s	t	u	v	w	x	y	z
2021	A	B	C	D	E	F	G	H	J	K	L	M
2022	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	a	b	c	d	e	f	g	h	j	k	l	m

Capacitor Marking cont.

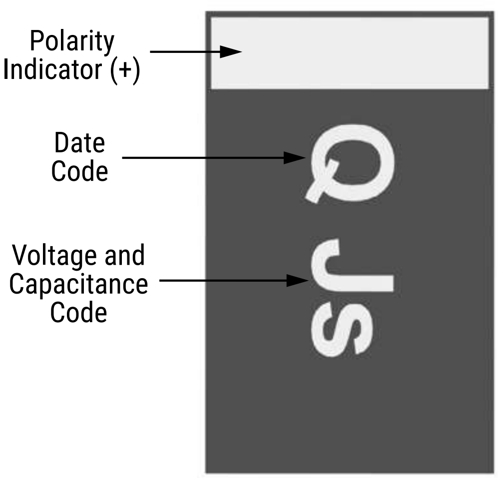


T520B/T521B/T520T

Code	e	g	J	A	C	D	E
Rated Voltage	2.5 V	4 V	6.3 V	10 V	16 V	20 V	25 V

Code	E7	J7	N7	A8
Capacitance	15	22	33	100

Code	E8	J8	N8	S8
Capacitance	150	220	330	470



T529

Code	J	A	C	E
Rated Voltage	6.3 V	10 V	16 V	25 V

Code	S	a	j	s
Capacitance (µF)	4.7	10	22	47

Date Code*

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	N	P	Q	R	S	T	U	V	W	X	Y	Z
2019	a	b	c	d	e	f	g	h	j	k	l	m
2020	n	p	q	r	s	t	u	v	w	x	y	z
2021	A	B	C	D	E	F	G	H	J	K	L	M
2022	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	a	b	c	d	e	f	g	h	j	k	l	m

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

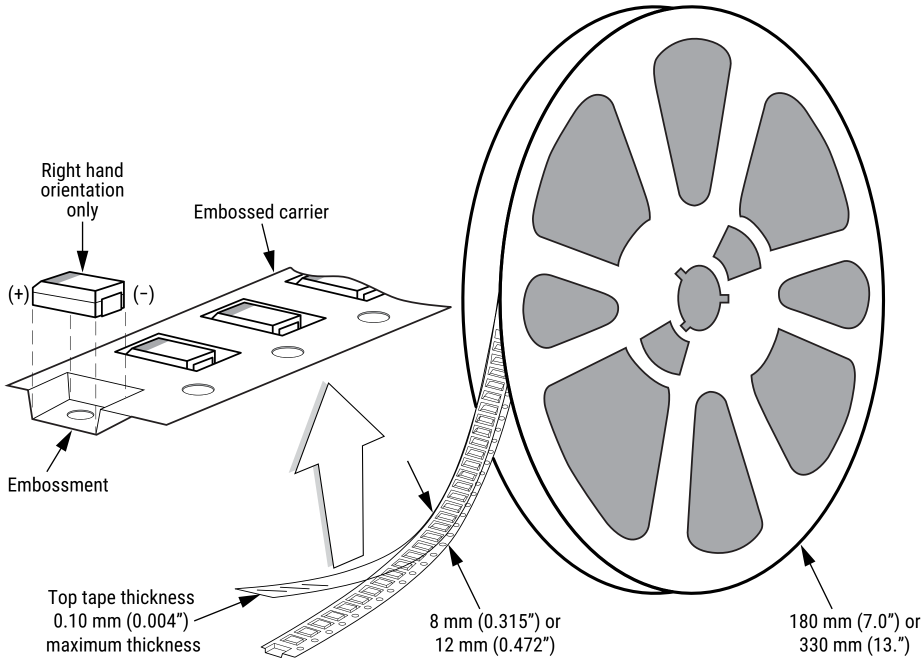


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
P	2012-10	8	3,000	N/A
R	2012-12	8	2,500	10,000
08A	3216-08	8	3,000	N/A
I	3216-10	8	3,000	N/A
S	3216-12	8	3,000	N/A
A	3216-18	8	2,000	N/A
K	3528-10	8	3,000	N/A
T	3528-12	8	3,000	10,000
M	3528-15	8	2,500	8,000
B	3528-21	8	2,000	8,000
U	6032-15	12	1,000	5,000
L	6032-19	12	1,000	3,000
C	6032-28	12	500	3,000
Q	7343-12	12	1,000	3,000
W	7343-15	12	1,000	3,000
Z	7343-17	12	1,000	3,000
V	7343-19	12	1,000	3,000
D	7343-31	12	500	2,500
Y	7343-40	12	500	2,000
X	7343-43	12	500	2,000
J	7360-15	12	1,000	3,000
H	7360-20	12	1,000	3,000
O	7360-43	12	250	1,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

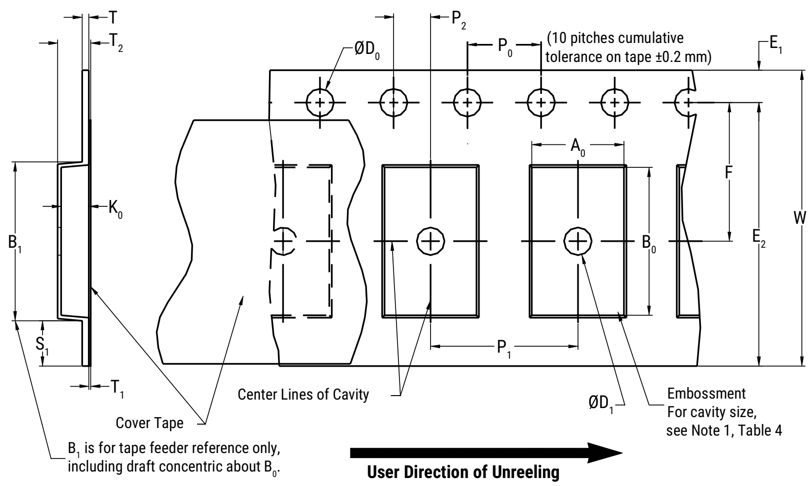


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/−0.0 (0.059 +0.004/−0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0, B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) and Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape, with or without components, shall pass around R without damage (see Figure 4).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
   (e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

Packaging Information Performance Notes

1. Cover Tape Break Force: 1.0 Kg minimum.
2. Cover Tape Peel Strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 Newton (10 to 100 gf)
12 mm	0.1 to 1.3 Newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.

3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624.*

Figure 2 – Maximum Component Rotation

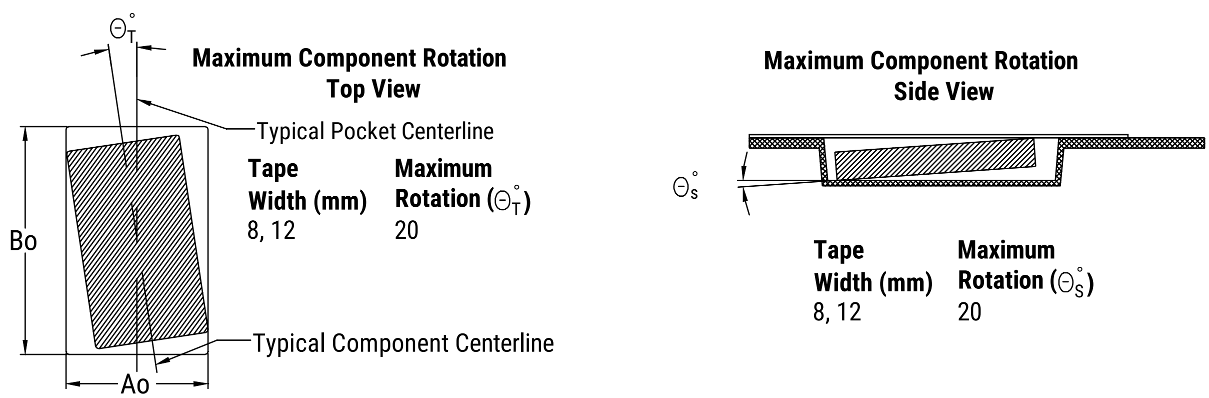


Figure 3 – Maximum Lateral Movement

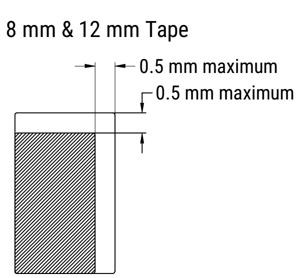


Figure 4 – Bending Radius

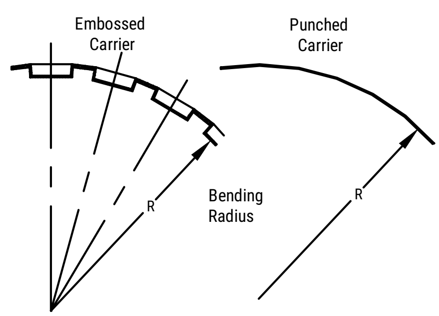
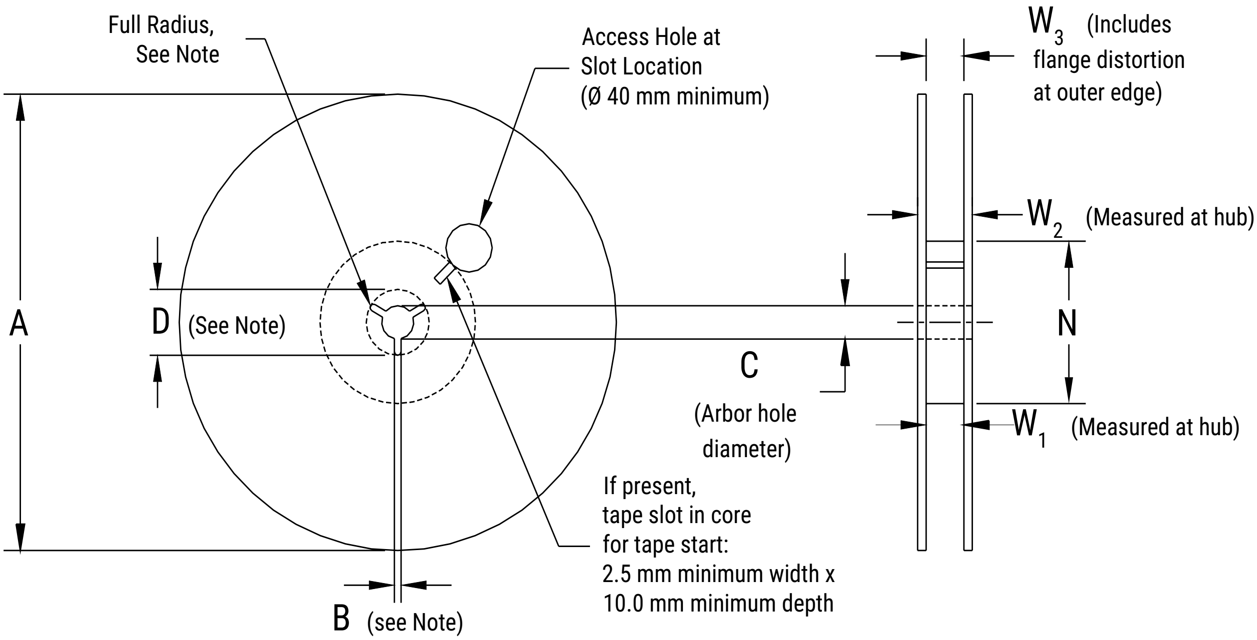


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
12 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

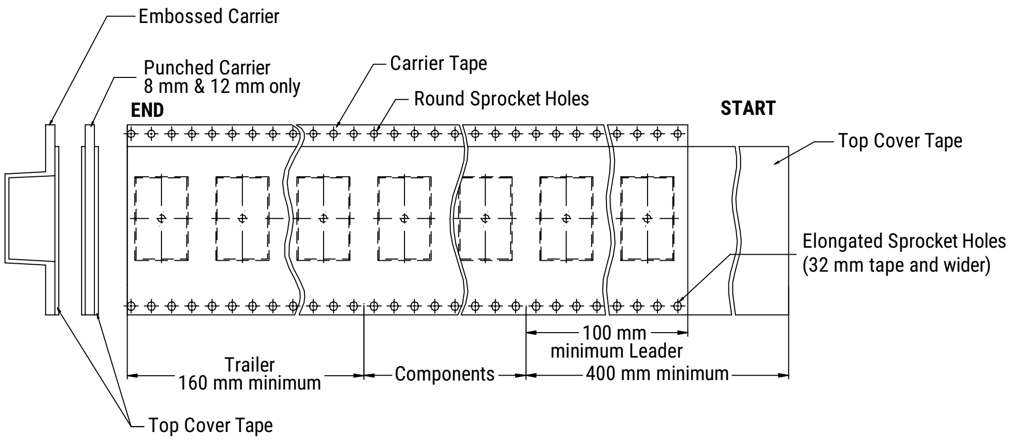
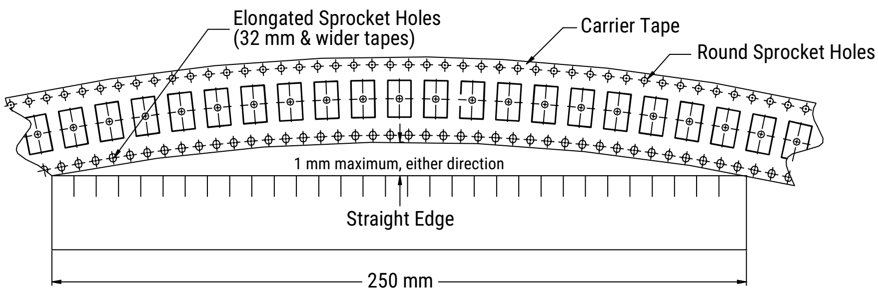


Figure 7 – Maximum Camber



A750 105°C

Overview

KEMET's Radial Solid Polymer Aluminum Capacitors offer longer life and greater stability across a wide range of temperatures. This highly conductive solid polymer electrolyte eliminates the risk of drying out and, due to its low ESR properties, is able to withstand higher ripple currents during normal operation. This series is ideally suited for industrial and commercial applications.

Applications

Typical applications include mobile phone chargers, computer motherboards, servers, and adapters (laptop power supplies).

Benefits

- Through-hole form factor
- Low impedance
- High ripple current
- 105°C/2,000 hours
- RoHS compliant
- Halogen-free

Part Number System

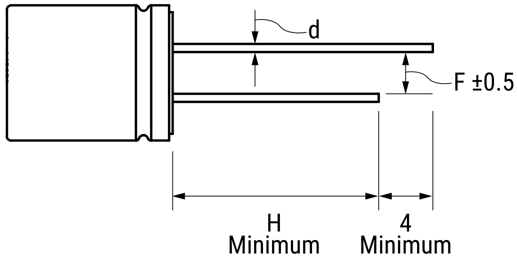
A	750	EK	567	M	0E	AA	E	020
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Radial Solid Polymer Aluminum Capacitors 105°C 2,000 hours	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	2.5 = 0E 4 = 0G 6.3 = 0J 10 = 1A 16 = 1C 25 = 1E 35 = 1V 50 = 1H 63 = 1J	See Ordering Options Table	E = Standard/ESR	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

Diameter	Packaging Type	Lead Type	Lead Length (mm)	Lead and Packaging Code
Standard Bulk Packaging Options				
5 – 18	Bulk (bag)	Long Lead (Loose Standard Leads)	15 Minimum	AA
5 – 18	Bulk (bag)	Cut Leads	5(1)	BA
5 – 18	Bulk (bag)	Formed Leads	5(1)	CA
Standard Auto-Insertion Packaging Options				
5	Ammo Tape and Box	Formed to 2.5 mm	H_0 = 16±0.5	FA
5 – 8	Ammo Tape and Box	Formed to 5 mm	H_0 = 16±0.5	DA
6 – 8	Ammo Tape and Box	Straight	H = 18.5±0.5 (for 8 x 12 H = 20±0.5)	EA
10 – 13	Ammo Tape and Box	Straight	H = 18.5±0.5	EA
Contact KEMET for other Lead and Packaging options **(1)Contact KEMET for custom Lead Length and options 3 to 10 mm**				

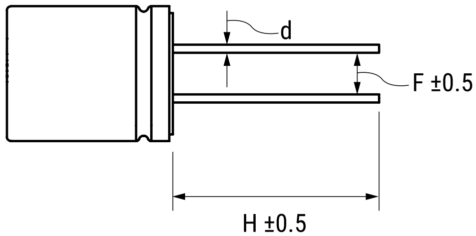
Size Code	Dimensions DxL	Lead and Packaging Code (SPQ)			
		AA Bulk (Bag)	**BA Bulk (Bag)**	**CA Bulk (Bag)**	**DA, EA, FA Ammo, Tape and Box**
BG	5x7	1,000	1,000	1,000	2,000
BK	5x8	1,000	1,000	1,000	2,000
BM	5x9	1,000	1,000	1,000	2,000
BQ	5x11	1,000	1,000	1,000	2,000
EA	6.3x5	1,000	1,000	1,000	1,500
EK	6.3x8	1,000	1,000	1,000	1,500
EM	6.3x9	1,000	1,000	1,000	1,500
EQ	6.3x11	1,000	1,000	1,000	1,500
KK	8x8	500	500	500	1,000
KR	8x11.5	500	500	500	1,000
KS	8x12	500	500	500	1,000
KV	8x14	500	500	500	1,000
KW	8x16	500	500	500	1,000
MS	10x12	250	250	250	600
MU	10x12.5	250	250	250	600
MV	10x14	250	250	250	600
MW	10x16	250	250	250	600

Long Lead (Loose Standard Leads)



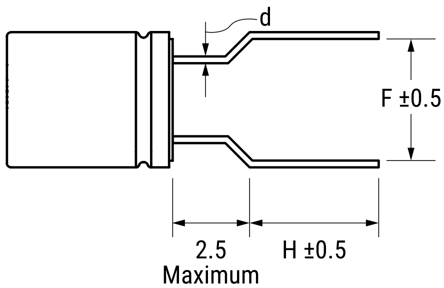
	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	2	2.5	3.5	5	5	7.5
H	15	15	15	15	15	15

Cut Lead



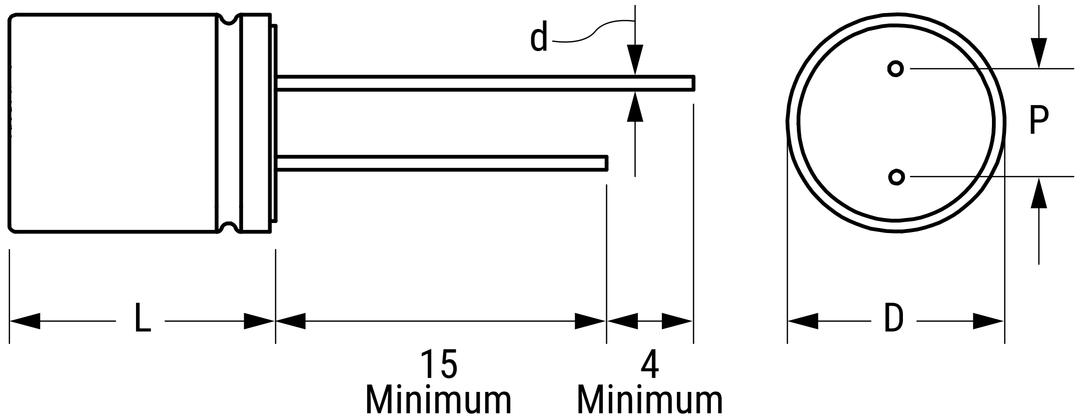
	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	2	2.5	3.5	5	5	7.5
H	According to customer requirement 3 – 10 mm					

Formed Lead



	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	5	5	5	5	5	5
H	According to customer requirement 3 – 10 mm					

Dimensions – Millimeters



Size Code	D		L		d		P		Safety Vent
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	
BG	5	±0.5	7	±1.0	0.5	±0.05	2.0	±0.5	
BK	5	±0.5	8	±1.0	0.5	±0.05	2.0	±0.5	
BM	5	±0.5	9	±1.0	0.5	±0.05	2.0	±0.5	
EK	6.3	±0.5	8	±1.0	0.5	±0.05	2.5	±0.5	
EM	6.3	±0.5	9	±1.0	0.5	±0.05	2.5	±0.5	
EQ	6.3	±0.5	11	±1.0	0.5	±0.05	2.5	±0.5	
KK	8	±0.5	8	±1.0	0.6	±0.05	3.5	±0.5	
KR	8	±0.5	11.5	±1.5	0.6	±0.05	3.5	±0.5	
KS	8	±0.5	12	±1.0	0.6	±0.05	3.5	±0.5	
KV	8	±0.5	14	±2.0	0.6	±0.05	3.5	±0.5	
KW	8	±0.5	16	±2.0	0.6	±0.05	3.5	±0.5	
MS	10	±0.5	12	±1.0	0.6	±0.05	5.0	±0.5	Yes
MU	10	±0.5	12.5	±1.5	0.6	±0.05	5.0	±0.5	Yes
MV	10	±0.5	14	±2.0	0.6	±0.05	5.0	±0.5	Yes
MW	10	±0.5	16	±2.0	0.6	±0.05	5.0	±0.5	Yes

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	47 – 2,200 µF
Rated Voltage	2.5 – 63 VDC
Operating Temperature	−55°C to +105°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	2,000 hours (see conditions in Test Method & Performance)
Leakage Current	I ≤ 0.2 CV or 280 µA, whichever is greater
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Dissipation Factor (tan δ)

Rated Voltage (V)	2.5 – 63
tan δ (Maximum) at 120 Hz/20°C	0.12

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
Coefficient	0.05	0.30	0.70	1.00

Test Method & Performance

Conditions	Load Life Test	Shelf Life Test
Temperature	105°C	105°C
Test Duration	2,000 hours	96 hours
Ripple Current	No ripple current applied	No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 1,000 hours at 60°C, 90%~95% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Surge Voltage (Rated Voltage x 1.15 (V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles each consisting of charge with the surge voltages specified at 105°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	

Shelf Life and Re-Ageing

Shelf Life
Solderability is 12 months

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

- This series should not be stored in high temperatures or where there is a high level of humidity.
- The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
- Do not store in damp conditions such as water, saltwater spray or oil spray.
- Do not store in an environment full of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.)
- Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 24 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 105°C for a period of 120 minutes through a 1 kΩ series resistor.

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant, and Halogen-Free.

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and makes any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of Lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free, or LFW = Lead-free wires on the label.

Table 1 – Ratings & Part Number Reference

VDC	VDC Surge Voltage	Rated Capacitance 120 Hz 20°C (µF)	Case Size D x L (mm)	ESR 100 kHz 20°C (mΩ)	RC 100 kHz 105°C (mA)	LC 20°C 2 minutes (µA)	KEMET Part Number
2.5	2.9	330	6.3 x 8	7	5,600	500	A750EK337M0E(1)E007
2.5	2.9	470	6.3 x 8	7	5,600	500	A750EK477M0E(1)E007
2.5	2.9	560	6.3 x 8	20	2,690	280	A750EK567M0E(1)E020
2.5	2.9	820	6.3 x 8	7	5,600	500	A750EK827M0E(1)E007
2.5	2.9	1,000	8 x 8	12	5,700	500	A750KK108M0E(1)E012
2.5	2.9	1500	8 × 11.5	7	6,100	750	A750KR158M0E(1)E007
4	4.6	560	6.3 x 8	18	3,100	448	A750EK567M0G(1)E018
4	4.6	680	8 × 11.5	7	6,100	544	A750KR687M0G(1)E007
4	4.6	820	8 × 11.5	7	6,100	656	A750KR827M0G(1)E007
4	4.6	1000	8 × 11.5	7	6,100	800	A750KR108M0G(1)E007
4	4.6	1200	8 × 11.5	7	6,100	960	A750KR128M0G(1)E007
4	4.6	1800	10 × 12.5	7	6,100	1,440	A750MU188M0G(1)E007
4	4.6	2200	10 × 12.5	7	6,100	1,760	A750MU228M0G(1)E007
6.3	7.2	220	5 x 7	20	2,500	280	A750BG227M0J(1)E020
6.3	7.2	270	5 × 8	11	3,700	340	A750BK277M0J(1)E011
6.3	7.2	270	5 x 7	20	3,100	340	A750BG277M0J(1)E020
6.3	7.2	330	5 × 8	11	3,700	416	A750BK337M0J(1)E011
6.3	7.2	330	5 x 7	20	3,100	416	A750BG337M0J(1)E020
6.3	7.2	390	5 × 8	11	3,700	491	A750BK397M0J(1)E011
6.3	7.2	390	5 x 9	20	3,100	491	A750BM397M0J(1)E020
6.3	7.2	470	6.3 x 8	18	3,100	592	A750EK477M0J(1)E018
6.3	7.2	560	6.3 x 8	18	3,100	706	A750EK567M0J(1)E018
6.3	7.2	680	6.3 x 8	8	5,000	857	A750EK687M0J(1)E008
6.3	7.2	680	8 x 8	16	4,100	857	A750KK687M0J(1)E016
6.3	7.2	820	6.3 × 9	8	5,000	1,033	A750EM827M0J(1)E008
6.3	7.2	820	8 x 8	16	4,100	1,033	A750KK827M0J(1)E016
6.3	7.2	1,000	8 x 8	15	4,100	1,260	A750KK108M0J(1)E015
6.3	7.2	1,200	8 x 12	14	4,100	1,512	A750KS128M0J(1)E014
6.3	7.2	1,500	8 x 12	14	4,100	1,890	A750KS158M0J(1)E014
10	11.5	100	5 × 8	24	2,490	200	A750BK107M1A(1)E024
10	11.5	120	5 × 8	24	2,490	240	A750BK127M1A(1)E024
10	11.5	220	6.3 x 8	18	3,100	440	A750EK227M1A(1)E018
10	11.5	270	6.3 x 8	10	4,680	540	A750EK277M1A(1)E010
10	11.5	330	6.3 x 8	16	4,100	660	A750EK337M1A(1)E016
10	11.5	470	6.3 × 9	12	4,100	940	A750EM477M1A(1)E012
10	11.5	470	8 x 8	16	4,100	940	A750KK477M1A(1)E016
10	11.5	560	6.3 × 11	12	4,100	1,120	A750EQ567M1A(1)E012
10	11.5	560	8 x 8	16	4,100	1,120	A750KK567M1A(1)E016
10	11.5	680	6.3 × 11	15	3,600	1,360	A750EQ687M1A(1)E015
10	11.5	680	8 x 12	14	4,100	1,360	A750KS687M1A(1)E014
10	11.5	820	8 x 12	14	4,100	1,640	A750KS827M1A(1)E014
10	11.5	1,000	10 x 12	13	4,500	2,000	A750MS108M1A(1)E013
VDC	**VDC Surge**	**Rated Capacitance**	**Case Size**	**ESR**	**RC**	**LC**	**Part Number**

(1)Please see packaging codes for options.
(2)Electrical Parameters code. See Part Number System for available options

Table 1 – Ratings & Part Number Reference cont.

VDC	VDC Surge Voltage	Rated Capacitance 120 Hz 20°C (µF)	Case Size D x L (mm)	ESR 100 kHz 20°C (mΩ)	RC 100 kHz 105°C (mA)	LC 20°C 2 minutes (µA)	KEMET Part Number
16	18.4	100	6.3 x 8	18	2,900	320	A750EK107M1C(1)E018
16	18.4	220	6.3 x 8	16	2,900	704	A750EK227M1C(1)E016
16	18.4	270	6.3 × 9	15	3,600	864	A750EM277M1C(1)E015
16	18.4	330	6.3 × 9	15	3,600	1,056	A750EM337M1C(1)E015
16	18.4	330	8 x 8	14	5,000	1,056	A750KK337M1C(1)E014
16	18.4	390	6.3 × 11	15	3,600	1,248	A750EQ397M1C(1)E015
16	18.4	470	6.3 × 11	15	3,600	1,504	A750EQ477M1C(1)E015
16	18.4	470	8 x 12	13	4,100	1,504	A750KS477M1C(1)E013
16	18.4	560	8 x 12	13	4,800	1,792	A750KS567M1C(1)E013
16	18.4	820	10 x 12	13	4,800	2,624	A750MS827M1C(1)E013
16	18.4	1,000	10 x 12	13	5,250	3,200	A750MS108M1C(1)E013
16	18.4	1200	10 × 14	12	6,100	3,840	A750MV128M1C(1)E012
16	18.4	1500	10 × 14	10	6,100	4,800	A750MV158M1C(1)E010
16	18.4	1800	10 × 16	10	7,000	5,760	A750MW188M1C(1)E010
16	18.4	2200	10 × 16	10	7,000	7,040	A750MW228M1C(1)E010
25	28.8	47	6.3 x 8	40	2,900	280	A750EK476M1E(1)E040
25	28.8	100	8 x 8	40	4,500	500	A750KK107M1E(1)E040
25	28.8	220	8 x 12	15	4,420	1,100	A750KS227M1E(1)E015
25	28.8	330	8 x 12	18	3,500	1,650	A750KS337M1E(1)E018
25	28.8	470	10 x 12	15	4,900	2,350	A750MS477M1E(1)E015
25	28.8	560	10 x 12	15	4,900	2,800	A750MS567M1E(1)E015
25	28.8	680	8 × 16	16	4,650	3,400	A750KW687M1E(1)E016
25	28.8	820	10 × 14	14	5,100	4,100	A750MV827M1E(1)E014
25	28.8	1000	10 × 14	14	5,100	5,000	A750MV108M1E(1)E014
25	28.8	1200	10 × 16	14	5,910	6,000	A750MW128M1E(1)E014
35	40.3	270	8 × 14	20	4,000	1,890	A750KV277M1V(1)E020
35	40.3	330	8 × 16	20	4,100	2,310	A750KW337M1V(1)E020
35	40.3	390	10 × 14	20	4,300	2,730	A750MV397M1V(1)E020
35	40.3	470	10 × 14	18	4,500	3,290	A750MV477M1V(1)E018
35	40.3	560	10 × 16	18	4,690	3,920	A750MW567M1V(1)E018
35	40.3	680	10 × 16	18	4,690	4,760	A750MW687M1V(1)E018
50	57.5	180	10 × 14	22	4,100	1,800	A750MV187M1H(1)E022
50	57.5	220	10 × 14	20	4,300	2,200	A750MV227M1H(1)E020
50	57.5	270	10 × 14	18	4,500	2,700	A750MV277M1H(1)E018
50	57.5	330	10 × 16	20	4,950	3,300	A750MW337M1H(1)E020
63	72.5	150	10 × 14	22	4,100	1,890	A750MV157M1J(1)E022
63	72.5	180	10 × 16	20	4,950	2,268	A750MW187M1J(1)E020
VDC	VDC Surge	Rated Capacitance	Case Size	ESR	RC	LC	Part Number

(1)Please see packaging codes for options.
(2)Electrical Parameters code. See Part Number System for available options

Installing

Solid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that electrolytic capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

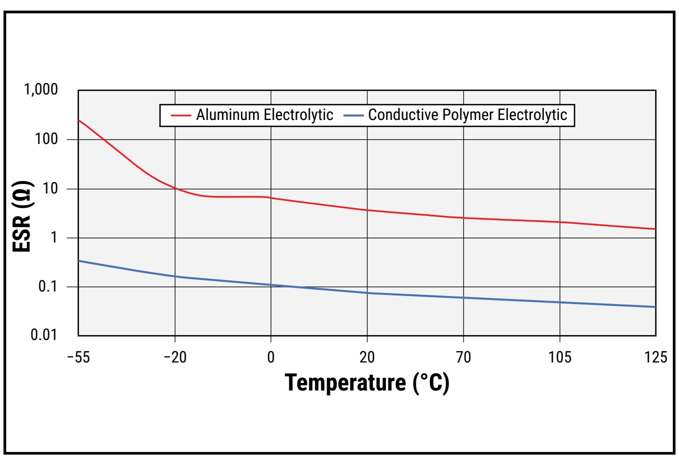
Temperature Stability Characteristics

Stable characteristics in a very low temperature range allows for less circuits in the design.

Due to a solid polymer electrolyte, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

The ESR of polymer capacitors is nearly constant within its operating temperature range, while the ESR of a standard electrolytic capacitor noticeably changes with temperature.

Temperature Stability Characteristics



Expected Life Calculation Chart

Expected life depends on operating temperature according to the following formula:

$L = Lo \times 10^{(To-T)/20}$

Where:

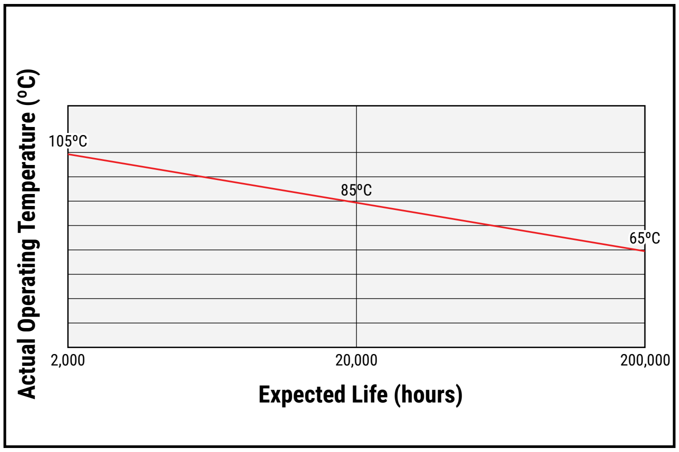
L: Expected life

Lo: Life at maximum permissible operating temperature with rated operating voltage applied (hours)

T: Actual operating temperature

To: Maximum permissible operating temperature

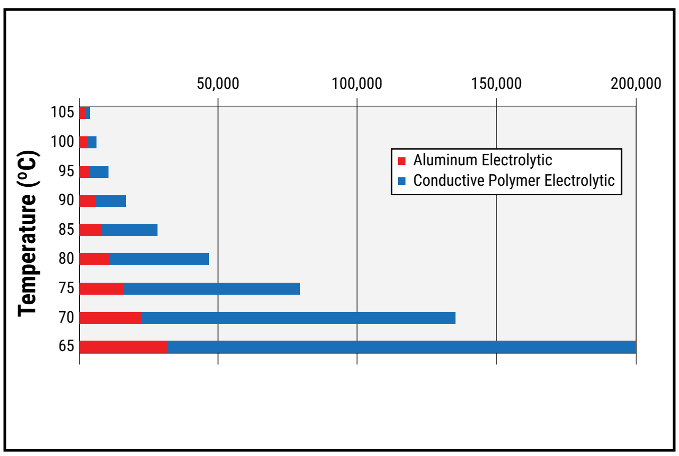
Expected Life Calculation Chart



The effect of derating temperature can be seen in this graph.

In this example, the life expectancy of a 2,000 hour Polymer capacitor is significantly greater than that of a 2,000 hour standard electrolytic capacitor.

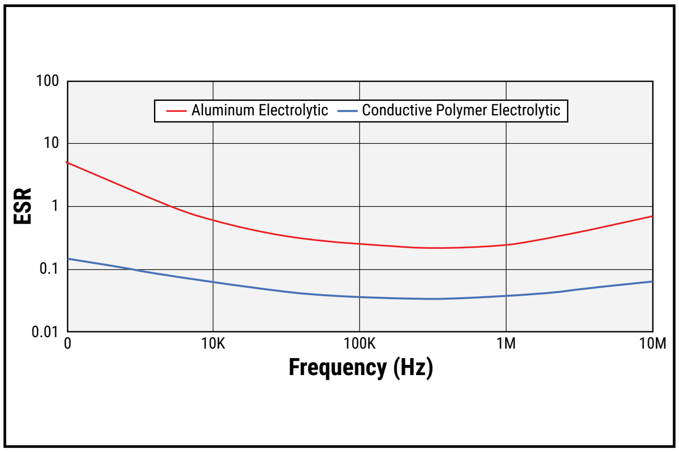
Capacitor Life (H)



Stability of ESR across Frequency Range

Due to a solid polymer electrolyte, the ESR curve of a solid polymer aluminum capacitor, is lower and more stable than that of a standard electrolytic capacitor.

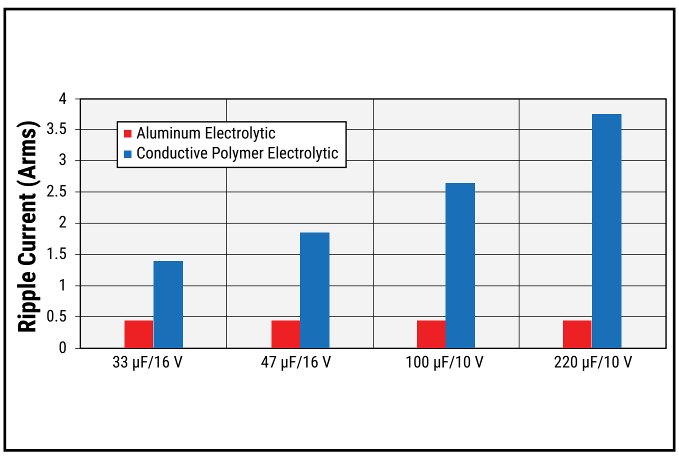
Stable ESR Values across Frequency



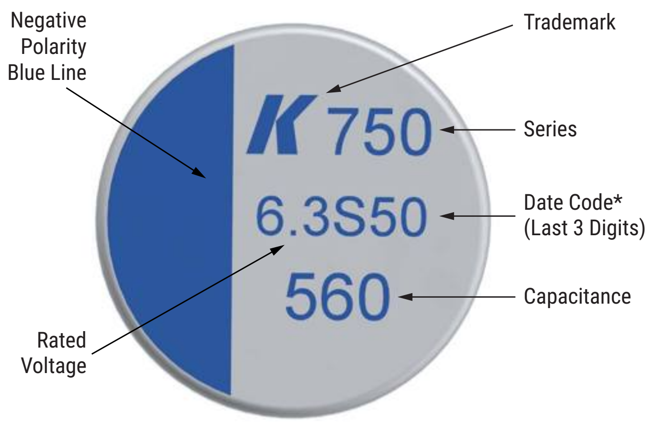
High Resistance to Ripple Current

As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation.

Allowable Ripple Current (100 kHz 105°C)

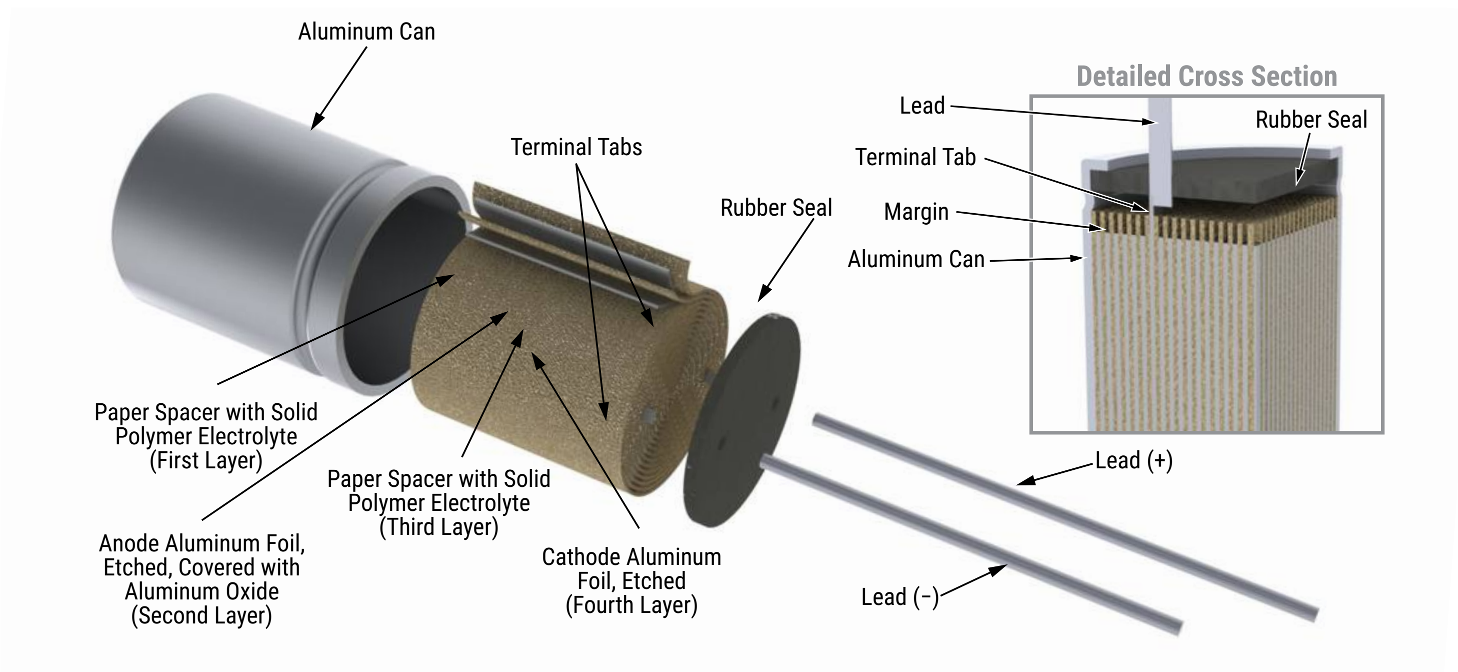


Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	S = 2019
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year
Year Code	
S	2019
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction



Flow Soldering (not suitable for SMD parts)

The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Flow Soldering

	Temperature (°C)	Maximum Time (Seconds)	Maximum Repetitions
Pre-heat	< 120	< 120	1
Solder	260±5°C	< 10	2

Taping for Automatic Insertion Machines

Fig. 1 (Diameter Φ5) 5 mm formed to 2.5 mm FA

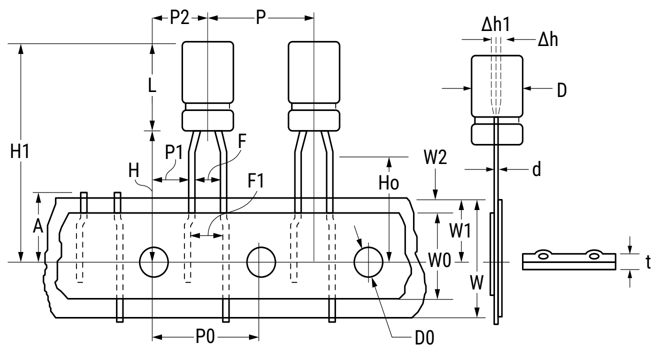


Fig. 2 (Diameter for Φ5 to Φ8) 5 – 8 mm formed to 5 mm DA

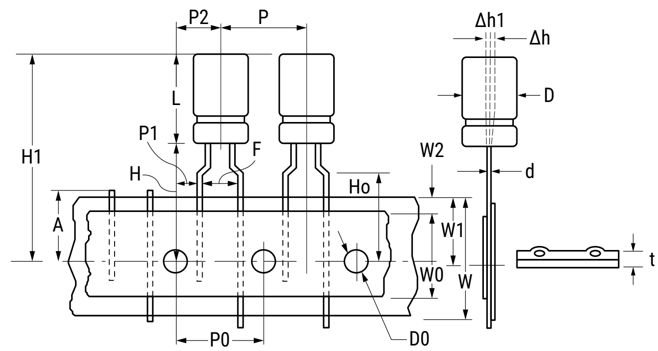


Fig. 3 (Diameter for Φ6 to Φ8) 6 – 8 mm EA

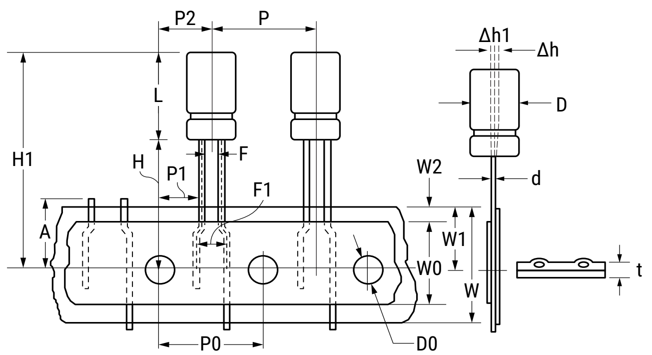
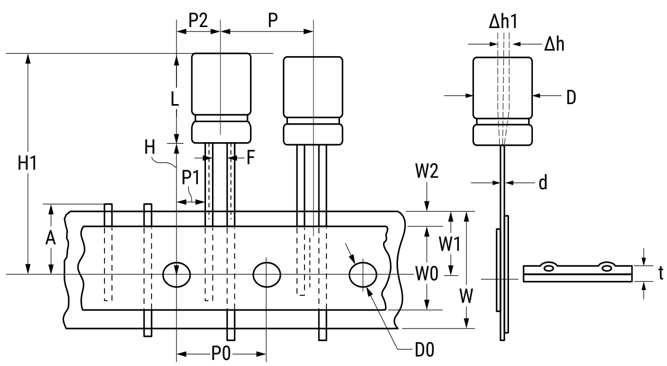
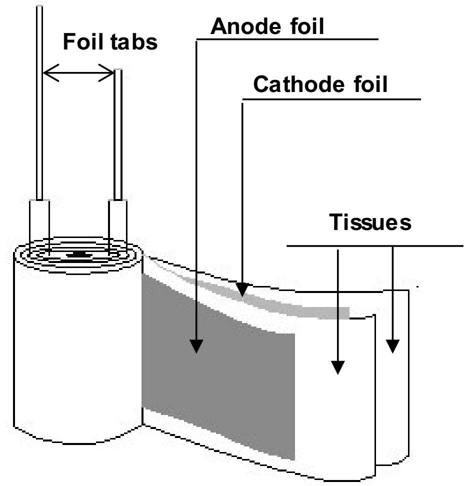


Fig. 4 (Diameter for Φ10) 10 mm EA



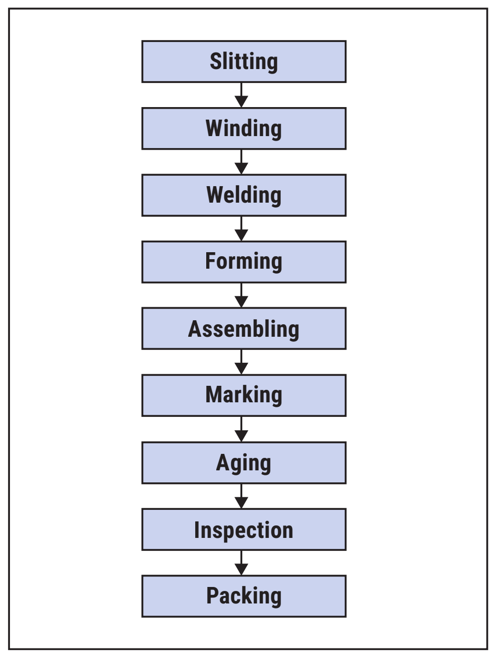
<table>
<tr><th>Dimensions (mm)</th><th>D</th><th>L</th><th>d</th><th>P</th><th>P0</th><th>P1</th><th>P2</th><th>F</th><th>W</th><th>W0</th><th>W1</th><th>W2</th><th>H</th><th>Ho</th><th>D0</th><th>A</th><th>H1</th><th>Δh</th><th>Δh1</th><th>t</th></tr>
<tr><td>Tolerance</td><td>±0.5</td><td></td><td>±0.02</td><td>±1.0</td><td>±0.2</td><td>±0.7</td><td>±1.0</td><td>±0.5</td><td>±0.5</td><td>min</td><td>±0.5</td><td>max</td><td>±0.75</td><td>±0.5</td><td>±0.2</td><td>Max.</td><td>Max.</td><td>±2</td><td>±1</td><td>±0.3</td></tr>
<tr><td rowspan="2">Formed to 2.5 mm</td><td rowspan="2">5</td><td>7.0</td><td rowspan="2">0.5</td><td rowspan="2">12.7</td><td rowspan="2">12.7</td><td rowspan="2">5.1</td><td rowspan="2">6.35</td><td rowspan="2">2.5</td><td rowspan="2">18</td><td rowspan="2">12.5</td><td rowspan="2">9</td><td rowspan="2">1.5</td><td rowspan="2">17.5</td><td rowspan="2">16</td><td rowspan="14">4</td><td rowspan="14">11</td><td rowspan="9">32.5</td><td rowspan="14">0</td><td rowspan="14">0</td><td rowspan="14">0.7</td></tr>
<tr><td>9–11</td></tr>
<tr><td rowspan="4">Formed to 5 mm</td><td>5</td><td>7–11</td><td rowspan="3">0.5</td><td rowspan="4">12.7</td><td rowspan="4">12.7</td><td rowspan="4">3.85</td><td rowspan="4">6.35</td><td rowspan="4">5</td><td rowspan="4">18</td><td rowspan="4">12.5</td><td rowspan="4">9</td><td rowspan="4">1.5</td><td rowspan="4">18.5</td><td rowspan="4">16</td></tr>
<tr><td>6.3</td><td>8–11</td></tr>
<tr><td rowspan="2">8</td><td>8.0</td></tr>
<tr><td>12.0</td><td>0.6</td></tr>
<tr><td rowspan="3">Straight leads 6 – 8 mm</td><td>6.3</td><td>8–11</td><td rowspan="2">0.5</td><td rowspan="3">12.7</td><td rowspan="3">12.7</td><td rowspan="3">5.4</td><td rowspan="3">6.35</td><td>2.5</td><td rowspan="3">18</td><td rowspan="3">12.5</td><td rowspan="3">9</td><td rowspan="3">1.5</td><td rowspan="2">18.5</td><td rowspan="8">--</td></tr>
<tr><td rowspan="2">8</td><td>8.0</td><td rowspan="2">3.5</td></tr>
<tr><td>12.0</td><td>0.6</td><td>20</td></tr>
<tr><td rowspan="5">Straight leads 10 – 13 mm</td><td rowspan="4">10</td><td>12</td><td rowspan="5">0.6</td><td rowspan="4">12.7</td><td rowspan="4">12.7</td><td rowspan="4">3.85</td><td rowspan="4">6.35</td><td rowspan="5">5</td><td rowspan="5">18</td><td rowspan="5">12.5</td><td rowspan="5">9</td><td rowspan="5">1.5</td><td rowspan="5">18.5</td><td>33</td></tr>
<tr><td>16.0</td><td>36</td></tr>
<tr><td>18.0</td><td rowspan="2">41</td></tr>
<tr><td>20.0</td></tr>
<tr><td>13</td><td>20.0</td><td>15</td><td>15</td><td>5</td><td>7.5</td><td>40.5</td></tr>
</table>

Construction Data



The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.

The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.



Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

A755 105°C

RoHS REACH COMPLIANT HF Halogen Free

Overview

KEMET's Radial Solid Polymer Aluminum Capacitors offer longer life and greater stability across a wide range of temperatures. This highly conductive solid polymer electrolyte eliminates the risk of drying out and, due to its low ESR properties, is able to withstand higher ripple currents during normal operation. This series is ideally suited for industrial and commercial applications.

Applications

Typical applications include LED driver power supplies, adapters (laptop power supplies), and medical equipment.

Benefits

- Through-hole form factor
- Low impedance
- High ripple current
- Long life
- 105°C/5,000 hours
- RoHS compliant
- Halogen-free

Part Number System

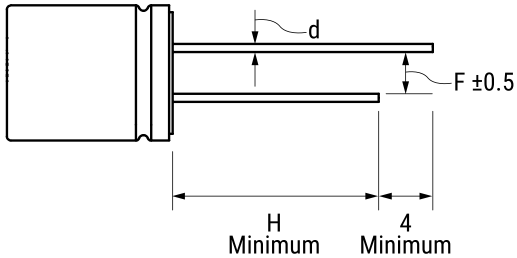
A	755	KS	687	M	0E	AA	E	014
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Radial Solid Polymer Aluminum Capacitors 105°C 5,000 hours	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	2.5 = 0E 4 = 0G 6.3 = 0J 10 = 1A 16 = 1C 20 = 1D 25 = 1E	See Ordering Options Table	E = Standard/ESR	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

Diameter	Packaging Type	Lead Type	Lead Length (mm)	Lead and Packaging Code
Standard Bulk Packaging Options				
5 – 18	Bulk (bag)	Long Lead (Loose Standard Leads)	15 Minimum	AA
5 – 18	Bulk (bag)	Cut Leads	5(1)	BA
5 – 18	Bulk (bag)	Formed Leads	5(1)	CA
Standard auto-insertion packaging options				
5	Ammo Tape and Box	Formed to 2.5 mm	H_0 = 16±0.5	FA
5 – 8	Ammo Tape and Box	Formed to 5 mm	H_0 = 16±0.5	DA
6 – 8	Ammo Tape and Box	Straight	H = 18.5±0.5 (for 8 x 12 H = 20±0.5)	EA
10 – 13	Ammo Tape and Box	Straight	H = 18.5±0.5	EA
Contact KEMET for other Lead and Packaging options **(1)Contact KEMET for custom Lead Length and options 3 to 10 mm**				

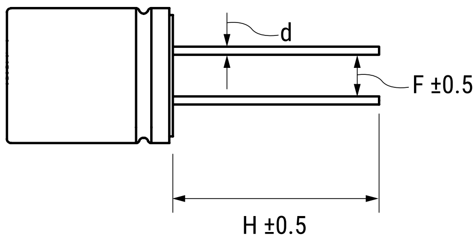
Size Code	Dimensions DxL	Lead and Packaging Code (SPQ)			
		AA Bulk (Bag)	**BA Bulk (Bag)**	**CA Bulk (Bag)**	**DA, EA, FA Ammo, Tape and Box**
BG	5x7	1,000	1,000	1,000	2,000
BK	5x8	1,000	1,000	1,000	2,000
BM	5x9	1,000	1,000	1,000	2,000
BQ	5x11	1,000	1,000	1,000	2,000
EA	6.3x5	1,000	1,000	1,000	1,500
EK	6.3x8	1,000	1,000	1,000	1,500
EM	6.3x9	1,000	1,000	1,000	1,500
EQ	6.3x11	1,000	1,000	1,000	1,500
KK	8x8	500	500	500	1,000
KR	8x11.5	500	500	500	1,000
KS	8x12	500	500	500	1,000
KV	8x14	500	500	500	1,000
KW	8x16	500	500	500	1,000
MS	10x12	250	250	250	600
MU	10x12.5	250	250	250	600
MV	10x14	250	250	250	600
MW	10x16	250	250	250	600

Long Lead (Loose Standard Leads)



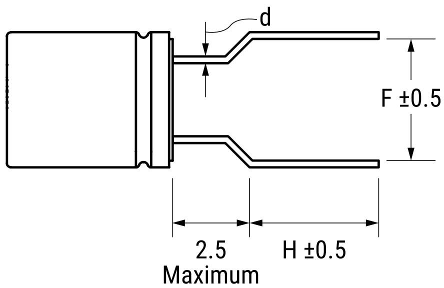
	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	2	2.5	3.5	5	5	7.5
H	15	15	15	15	15	15

Cut Lead



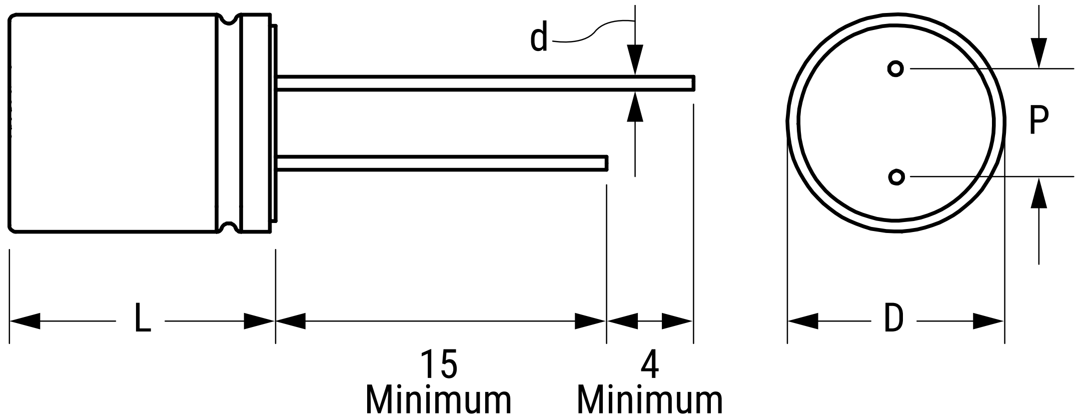
	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	2	2.5	3.5	5	5	7.5
H	According to customer requirement 3 – 10 mm					

Formed Lead



	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	5	5	5	5	5	5
H	According to customer requirement 3 – 10 mm					

Dimensions – Millimeters



Size Code	D		L		d		P		Safety Vent
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	
BQ	5	±0.5	11	±1.0	0.5	±0.05	2	±0.5	
KS	8	±0.5	12	±1.0	0.6	±0.05	3.5	±0.5	
MS	10	±0.5	12	±1.0	0.6	±0.05	5.0	±0.5	Yes

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	47 – 1,500 µF
Rated Voltage	2.5 – 25 VDC
Operating Temperature	−55°C to +105°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	5,000 hours (see conditions in Test Method & Performance)
Leakage Current	I ≤ 0.15 CV
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Dissipation Factor (tan δ)

Rated Voltage (V)	2.5 – 25
tan δ (Maximum) at 120 Hz/20°C	0.10

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
Coefficient	0.05	0.30	0.70	1.00

Test Method & Performance

Conditions	Load Life Test	Shelf Life Test
Temperature	105°C	105°C
Test Duration	5,000 hours	96 hours
Ripple Current	No ripple current applied	No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 1,000 hours at 60°C, 90%~95% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Surge Voltage (Rated Voltage x 1.15 (V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles each consisting of charge with the surge voltages specified at 105°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	

Shelf Life and Re-Ageing

Shelf Life
Solderability is 12 months

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

- This series should not be stored in high temperatures or where there is a high level of humidity.
- The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
- Do not store in damp conditions such as water, saltwater spray or oil spray.
- Do not store in an environment full of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.)
- Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 24 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 105°C for a period of 120 minutes through a 1 kΩ series resistor.

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant, and Halogen-Free.

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and makes any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of Lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free, or LFW = Lead-free wires on the label.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Surge Voltage	Rated Capacitance	Case Size	ESR	RC	LC	KEMET Part Number
(VDC)	(VDC)	120 Hz 20°C (µF)	D x L (mm)	100 kHz 20°C (mΩ)	100 kHz 105°C (mA)	20°C 2 min (µA)	() Represents Part Number Options
2.5	2.9	680	8 x 12	14	4,800	255	A755KS687M0E(1)E014
2.5	2.9	820	8 x 12	14	4,800	308	A755KS827M0E(1)E014
2.5	2.9	1,500	10 x 12	13	5,250	563	A755MS158M0E(1)E013
4	4.6	560	8 x 12	14	4,800	336	A755KS567M0G(1)E014
4	4.6	1,200	8 x 12	14	4,900	720	A755KS128M0G(1)E014
6.3	7.2	220	5 x 11	18	2,000	208	A755BQ227M0J(1)E018
6.3	7.2	680	8 x 12	14	4,500	643	A755KS687M0J(1)E014
6.3	7.2	1,000	8 x 12	13	4,500	945	A755KS108M0J(1)E013
6.3	7.2	1,500	10 x 12	13	5,250	1,418	A755MS158M0J(1)E013
10	11.5	270	8 x 12	15	4,820	405	A755KS277M1A(1)E015
10	11.5	560	8 x 12	15	4,820	840	A755KS567M1A(1)E015
10	11.5	820	8 x 12	14	4,820	1,230	A755KS827M1A(1)E014
10	11.5	1,000	10 x 12	13	5,100	1,500	A755MS108M1A(1)E013
10	11.5	1,500	10 x 12	13	5,100	2,250	A755MS158M1A(1)E013
16	18.4	270	8 x 12	15	4,100	648	A755KS277M1C(1)E015
16	18.4	470	10 x 12	13	5,250	1,128	A755MS477M1C(1)E013
16	18.4	560	10 x 12	13	5,250	1,344	A755MS567M1C(1)E013
16	18.4	1,000	10 x 12	12	5,250	2,400	A755MS108M1C(1)E012
20	23	100	8 x 12	20	4,420	300	A755KS107M1D(1)E020
20	23	150	8 x 12	20	4,420	450	A755KS157M1D(1)E020
25	28.8	47	8 x 12	25	2,320	176	A755KS476M1E(1)E025
25	28.8	100	8 x 12	25	2,500	375	A755KS107M1E(1)E025
25	28.8	220	8 x 12	25	3,000	825	A755KS227M1E(1)E025
25	28.8	270	10 x 12	15	4,850	1,013	A755MS277M1E(1)E015
25	28.8	330	10 x 12	15	4,850	1,238	A755MS337M1E(1)E015
(VDC)	(VDC)	120 Hz 20°C (µF)	D x L (mm)	100 kHz 20°C (mΩ)	100 kHz 105°C (mA)	20°C 2 min (µA)	() Represents Part Number Options
Rated Voltage	Surge Voltage	Rated Capacitance	Case Size	ESR	RC	LC	KEMET Part Number

(1) Please see packaging codes for options.
(2) Electrical Parameters code. See Part Number System for available options.

Installing

Solid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that electrolytic capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

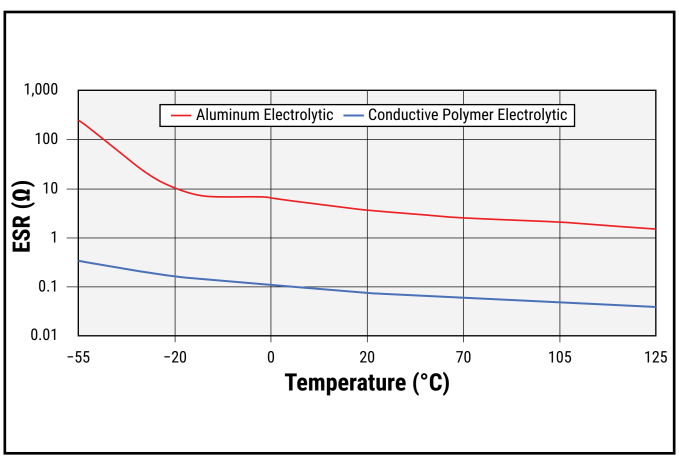
Temperature Stability Characteristics

Stable characteristics in a very low temperature range allows for less circuits in the design.

Due to a solid polymer electrolyte, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

The ESR of polymer capacitors is nearly constant within its operating temperature range, while the ESR of a standard electrolytic capacitor noticeably changes with temperature.

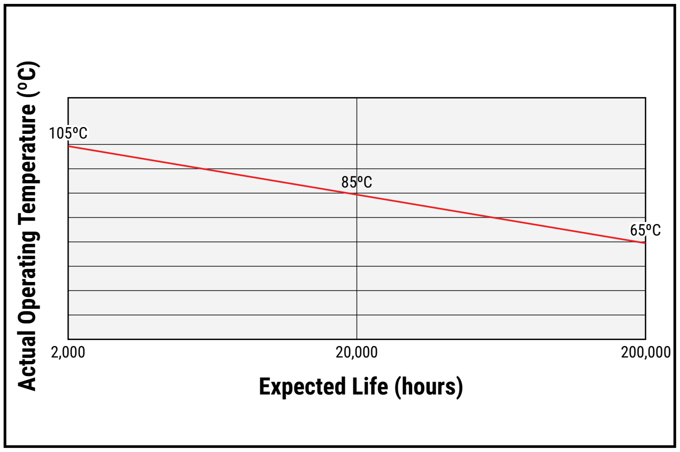
Temperature Stability Characteristics



Expected Life Calculation Chart

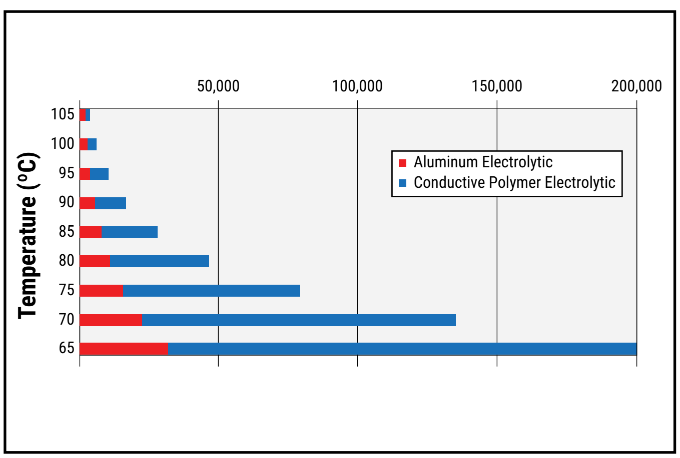
Expected life depends on operating temperature according to the following formula:
$L = Lo \times 10^{(To-T)/20}$
Where:
L: Expected life
Lo: Life at maximum permissible operating temperature with rated operating voltage applied (hours)
T: Actual operating temperature
To: Maximum permissible operating temperature

Expected Life Calculation Chart



The effect of derating temperature can be seen in this graph.
In this example, the life expectancy of a 2,000 hour Polymer capacitor is significantly greater than that of a 2,000 hour standard electrolytic capacitor.

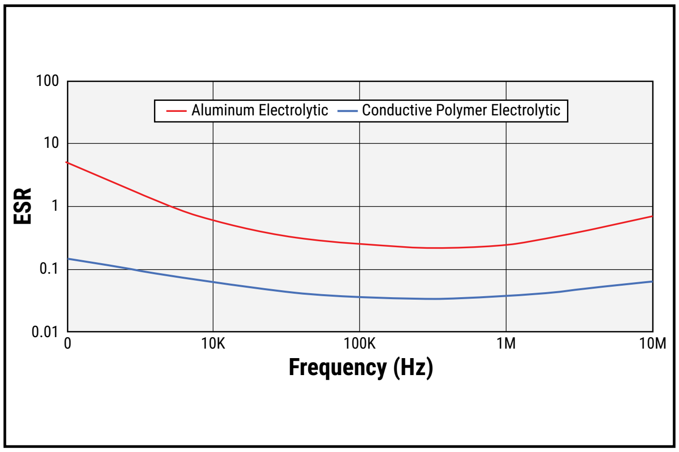
Capacitor Life (H)



Stability of ESR across Frequency Range

Due to a solid polymer electrolyte, the ESR curve of a solid polymer aluminum capacitor, is lower and more stable than that of a standard electrolytic capacitor.

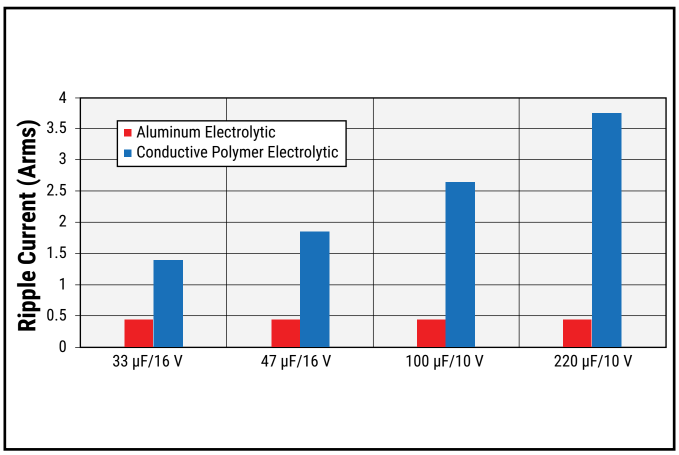
Stable ESR Values across Frequency



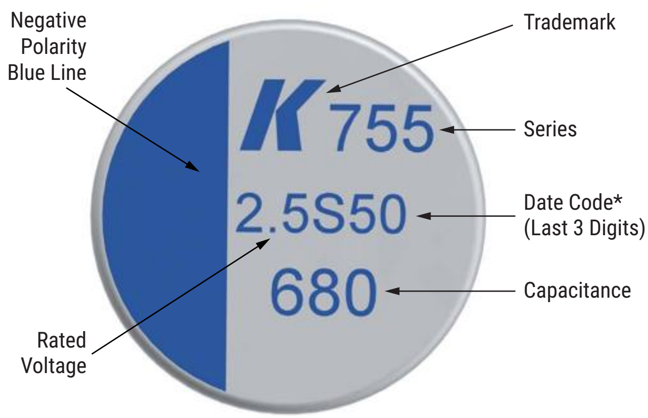
High Resistance to Ripple Current

As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation.

Allowable Ripple Current (100 kHz 105°C)

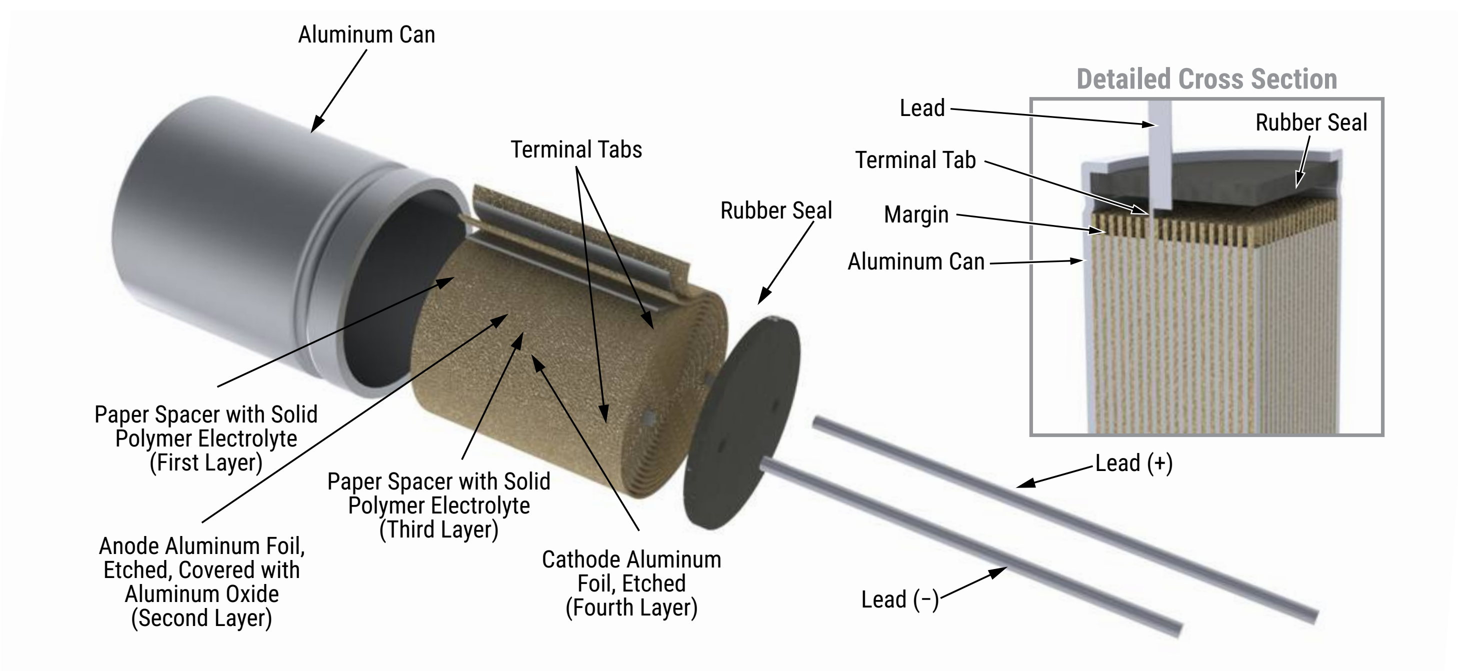


Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	S = 2019
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year
Year Code	
S	2019
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction



Flow Soldering (not suitable for SMD parts)

The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Flow Soldering

	Temperature (°C)	Maximum Time (Seconds)	Maximum Repetitions
Pre-heat	< 120	< 120	1
Solder	260±5°C	< 10	2

Taping for Automatic Insertion Machines

Fig. 1 (Diameter Φ5) 5 mm formed to 2.5 mm FA

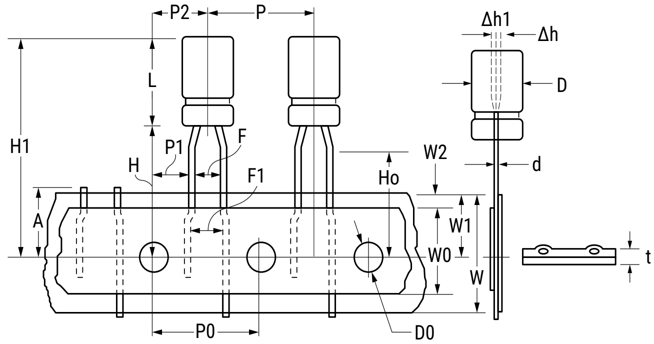


Fig. 2 (Diameter for Φ5 to Φ8) 5 – 8 mm formed to 5 mm DA

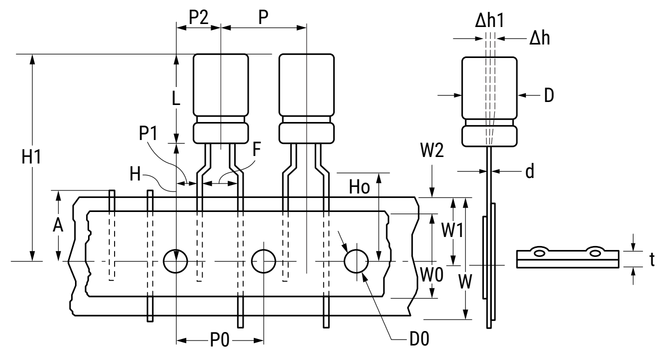


Fig. 3 (Diameter for Φ6 to Φ8) 6 – 8 mm EA

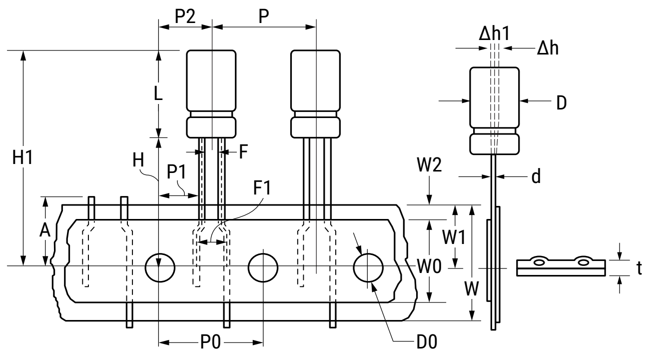
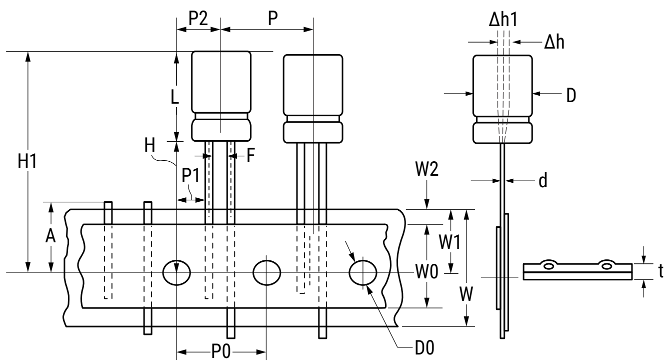
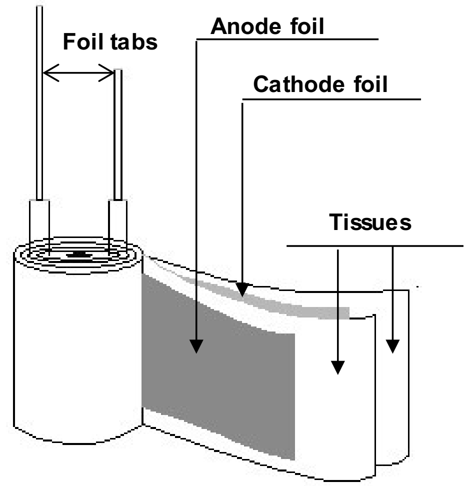


Fig. 4 (Diameter for Φ10) 10 mm EA



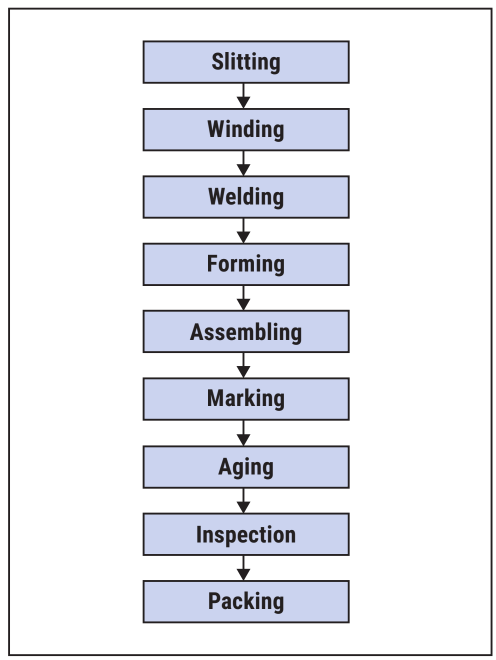
Dimensions (mm)	D	L	d	P	P0	P1	P2	F	W	W0	W1	W2	H	Ho	D0	A	H1	Δh	Δh1	t
Tolerance	±0.5		±0.02	±1.0	±0.2	±0.7	±1.0	±0.5	±0.5	min	±0.5	max	±0.75	±0.5	±0.2	Max.	Max.	±2	±1	±0.3
Formed to 2.5 mm	5	7.0	0.5	12.7	12.7	5.1	6.35	2.5	18	12.5	9	1.5	17.5	16	4	11	32.5	0	0	0.7
		9–11																		
Formed to 5 mm	5	7–11	0.5	12.7	12.7	3.85	6.35	5	18	12.5	9	1.5	18.5	16						
	6.3	8–11																		
	8	8.0																		
		12.0	0.6																	
Straight leads 6 – 8 mm	6.3	8–11	0.5	12.7	12.7	5.4	6.35	2.5	18	12.5	9	1.5	18.5	--						
	8	8.0						3.5												
		12.0	0.6										20							
Straight leads 10 – 13 mm	10	12	0.6	12.7	12.7	3.85	6.35	5	18	12.5	9	1.5	18.5				33			
		16.0															36			
		18.0															41			
		20.0																		
	13	20.0		15	15	5	7.5										40.5			

Construction Data



The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.

The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.



Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

Radial Solid Polymer Aluminum Capacitors

A758 105°C

KEMET
a YAGEO company

Overview

KEMET's Radial Solid Polymer Aluminum Capacitors offer longer life and greater stability across a wide range of temperatures. This highly conductive solid polymer electrolyte eliminates the risk of drying out and, due to its low ESR properties, is able to withstand higher ripple currents during normal operation. This series is ideally suited for industrial and commercial applications.

Applications

Typical applications include mobile phone chargers, adapters (laptop power supplies), and medical equipment.

Benefits

- Through-hole form factor
- Miniature
- Low impedance
- High ripple current
- Long life
- 105°C/5,000 hours
- RoHS compliant
- Halogen-free

Part Number System

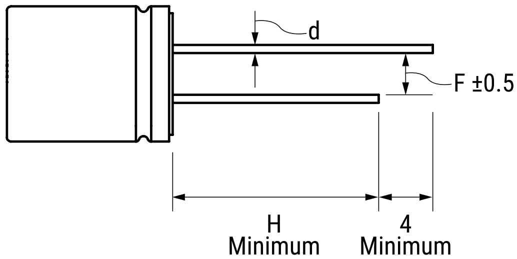
A	758	EK	337	M	0E	AA	E	018
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Radial Solid Polymer Aluminum Capacitors 105°C 5,000 hours Miniature	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	2.5 = 0E 4 = 0G 6.3 = 0J 10 = 1A 16 = 1C 25 = 1E	See Ordering Options Table	E = Standard/ESR	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

Diameter	Packaging Type	Lead Type	Lead Length (mm)	Lead and Packaging Code
Standard Bulk Packaging Options				
5 – 18	Bulk (bag)	Long Lead (Loose Standard Leads)	15 Minimum	AA
5 – 18	Bulk (bag)	Cut Leads	5[(1)]	BA
5 – 18	Bulk (bag)	Formed Leads	5[(1)]	CA
Standard Auto-Insertion Packaging Options				
5	Ammo Tape and Box	Formed to 2.5 mm	H_0 = 16±0.5	FA
5 – 8	Ammo Tape and Box	Formed to 5 mm	H_0 = 16±0.5	DA
6 – 8	Ammo Tape and Box	Straight	H = 18.5±0.5 (for 8 x 12 H = 20±0.5)	EA
10 – 13	Ammo Tape and Box	Straight	H = 18.5±0.5	EA
Contact KEMET for other Lead and Packaging options **[(1)]Contact KEMET for custom Lead Length and options 3 to 10 mm**				

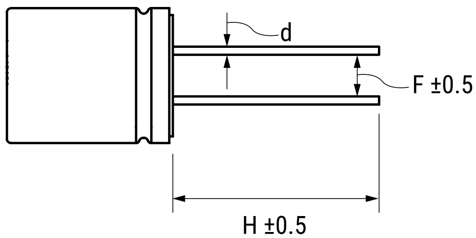
Size Code	Dimensions DxL	Lead and Packaging Code (SPQ)			
		AA Bulk (Bag)	**BA Bulk (Bag)**	**CA Bulk (Bag)**	**DA, EA, FA Ammo, Tape and Box**
BG	5x7	1,000	1,000	1,000	2,000
BK	5x8	1,000	1,000	1,000	2,000
BM	5x9	1,000	1,000	1,000	2,000
BQ	5x11	1,000	1,000	1,000	2,000
EA	6.3x5	1,000	1,000	1,000	1,500
EK	6.3x8	1,000	1,000	1,000	1,500
EM	6.3x9	1,000	1,000	1,000	1,500
EQ	6.3x11	1,000	1,000	1,000	1,500
KK	8x8	500	500	500	1,000
KR	8x11.5	500	500	500	1,000
KS	8x12	500	500	500	1,000
KV	8x14	500	500	500	1,000
KW	8x16	500	500	500	1,000
MS	10x12	250	250	250	600
MU	10x12.5	250	250	250	600
MV	10x14	250	250	250	600
MW	10x16	250	250	250	600

Long Lead (Loose Standard Leads)



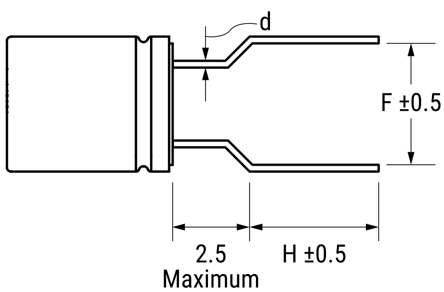
	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	2	2.5	3.5	5	5	7.5
H	15	15	15	15	15	15

Cut Lead



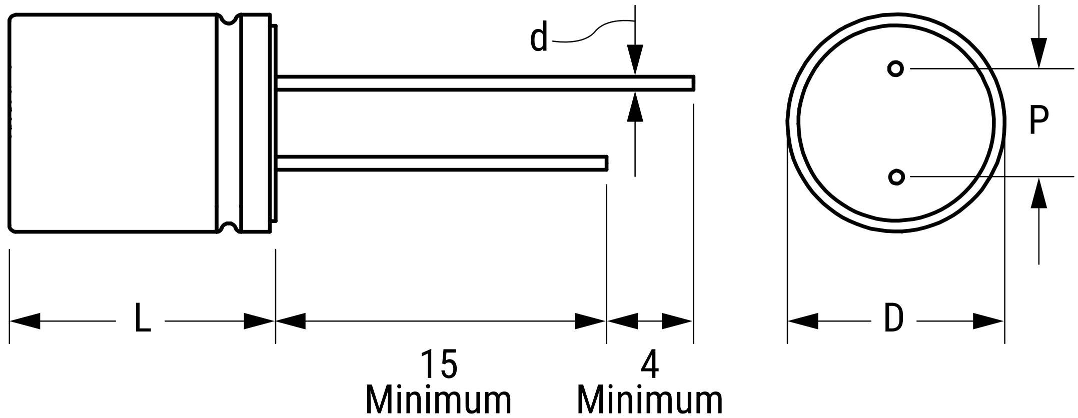
	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	2	2.5	3.5	5	5	7.5
H	According to customer requirement 3 – 10 mm					

Formed Lead



	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	5	5	5	5	5	5
H	According to customer requirement 3 – 10 mm					

Dimensions – Millimeters



Size Code	D		L		d		P	
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
BG	5	±0.5	7	±1.0	0.5	±0.05	2.0	±0.5
EK	6.3	±0.5	8	±1.0	0.5	±0.05	2.5	±0.5
KK	8	±0.5	8	±1.0	0.6	±0.05	3.5	±0.5
KR	8	±0.5	11.5	±1.5	0.6	±0.05	3.5	±0.5
MU	10	±0.5	12.5	±1.5	0.6	±0.05	5.0	±0.5

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	10 – 1,200 µF
Rated Voltage	2.5 – 25 VDC
Operating Temperature	−55°C to +105°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	5,000 hours (see conditions in Test Method & Performance)
Leakage Current	I ≤ 0.15 CV or 120 µA, whichever is greater
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Dissipation Factor (tan δ)

Rated Voltage (V)	2.5 – 25
tan δ (Maximum) at 120 Hz/20°C	0.10

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
Coefficient	0.05	0.30	0.70	1.00

Test Method & Performance

Conditions	Load Life Test	Shelf Life Test
Temperature	105°C	105°C
Test Duration	5,000 hours	96 hours
Ripple Current	No ripple current applied	No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 1,000 hours at 60°C, 90%~95% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Surge Voltage (Rated Voltage x 1.15 (V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles each consisting of charge with the surge voltages specified at 105°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	

Shelf Life and Re-Ageing

Shelf Life
Solderability is 12 months

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

- This series should not be stored in high temperatures or where there is a high level of humidity.
- The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
- Do not store in damp conditions such as water, saltwater spray or oil spray.
- Do not store in an environment full of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.)
- Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 24 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 105°C for a period of 120 minutes through a 1 kΩ series resistor.

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant, and Halogen-Free.

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and makes any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of Lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free, or LFW = Lead-free wires on the label.

Table 1 – Ratings & Part Number Reference

VDC	VDC Surge Voltage	Rated Capacitance 120 Hz 20°C (µF)	Case Size D x L (mm)	ESR 100 kHz 20°C (mΩ)	RC 100 kHz 105°C (mA)	LC 20°C 2 minutes (µA)	KEMET Part Number
2.5	2.9	330	6.3 x 8	18	3,100	124	A758EK337M0E(1)E018
2.5	2.9	390	6.3 x 8	18	3,100	146	A758EK397M0E(1)E018
2.5	2.9	470	6.3 x 8	18	3,100	176	A758EK477M0E(1)E018
2.5	2.9	560	6.3 x 8	16	3,100	210	A758EK567M0E(1)E016
2.5	2.9	680	8 x 8	16	4,100	255	A758KK687M0E(1)E016
2.5	2.9	820	8 x 8	15	4,100	308	A758KK827M0E(1)E015
2.5	2.9	1,000	8 x 8	15	4,500	375	A758KK108M0E(1)E015
2.5	2.9	1,200	8 x 8	14	4,500	450	A758KK128M0E(1)E014
4	4.6	220	5 x 7	20	2,500	132	A758BG227M0G(1)E020
4	4.6	270	5 x 7	20	2,500	162	A758BG277M0G(1)E020
4	4.6	330	6.3 x 8	18	3,100	198	A758EK337M0G(1)E018
4	4.6	560	6.3 x 8	16	3,100	336	A758EK567M0G(1)E016
4	4.6	680	8 x 8	16	4,100	408	A758KK687M0G(1)E016
4	4.6	820	8 x 8	15	4,100	492	A758KK827M0G(1)E015
6.3	7.2	180	5 x 7	18	2,500	170	A758BG187M0J(1)E018
6.3	7.2	220	5 x 7	18	2,500	208	A758BG227M0J(1)E018
6.3	7.2	270	6.3 x 8	18	2,900	255	A758EK277M0J(1)E018
6.3	7.2	330	6.3 x 8	16	3,100	312	A758EK337M0J(1)E016
6.3	7.2	390	6.3 x 8	16	3,100	369	A758EK397M0J(1)E016
6.3	7.2	470	6.3 x 8	15	3,100	444	A758EK477M0J(1)E015
6.3	7.2	560	8 x 8	14	4,100	529	A758KK567M0J(1)E014
6.3	7.2	680	8 x 8	14	4,100	643	A758KK687M0J(1)E014
6.3	7.2	820	8 x 8	13	4,900	775	A758KK827M0J(1)E013
10	11.5	100	6.3 x 8	16	2,000	150	A758EK107M1A(1)E016
10	11.5	150	6.3 x 8	16	2,500	225	A758EK157M1A(1)E016
10	11.5	180	6.3 x 8	16	2,500	270	A758EK187M1A(1)E016
10	11.5	220	8 x 8	14	4,800	330	A758KK227M1A(1)E014
10	11.5	470	8 × 11.5	11	5,100	940	A758KR477M1A(1)E011
10	11.5	560	8 × 11.5	11	5,100	1120	A758KR567M1A(1)E011
10	11.5	680	8 × 11.5	8	5,650	1360	A758KR687M1A(1)E008
16	18.4	100	6.3 x 8	18	2,900	240	A758EK107M1C(1)E018
16	18.4	150	8 x 8	15	4,100	360	A758KK157M1C(1)E015
16	18.4	180	8 x 8	14	4,550	432	A758KK187M1C(1)E014
16	18.4	220	8 x 8	14	4,800	528	A758KK227M1C(1)E014
16	18.4	270	8 × 11.5	11	5,000	864	A758KR277M1C(1)E011
16	18.4	470	10 × 12.5	10	6,100	1504	A758MU477M1C(1)E010
25	28.8	10	5 x 7	70	750	120	A758BG106M1E(1)E070
25	28.8	22	6.3 x 8	50	2,000	120	A758EK226M1E(1)E050
25	28.8	33	6.3 x 8	40	3,100	124	A758EK336M1E(1)E040
VDC	**VDC Surge**	**Rated Capacitance**	**Case Size**	**ESR**	**RC**	**LC**	**Part Number**

(1) Please see packaging codes for options.
(2) Electrical Parameters code. See Part Number System for available options.

Installing

Solid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that electrolytic capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

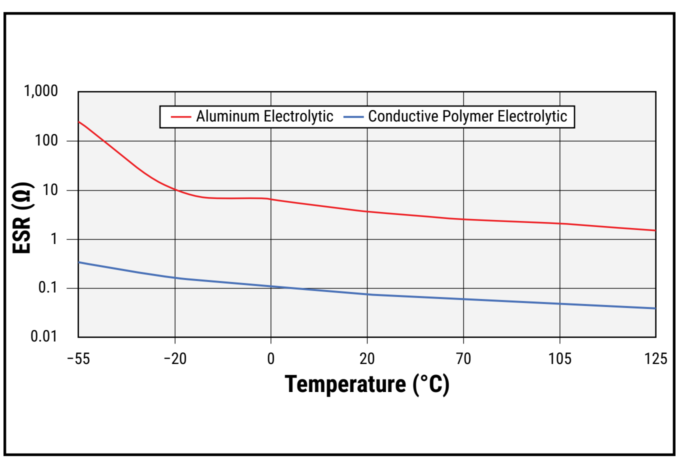
Temperature Stability Characteristics

Stable characteristics in a very low temperature range allows for less circuits in the design.

Due to a solid polymer electrolyte, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

The ESR of polymer capacitors is nearly constant within its operating temperature range, while the ESR of a standard electrolytic capacitor noticeably changes with temperature.

Temperature Stability Characteristics



Expected Life Calculation Chart

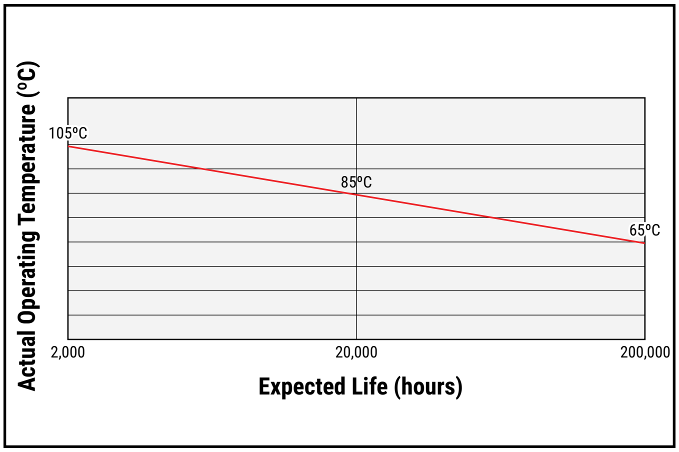
Expected life depends on operating temperature according to the following formula:

$L = Lo \times 10^{(To-T)/20}$

Where:

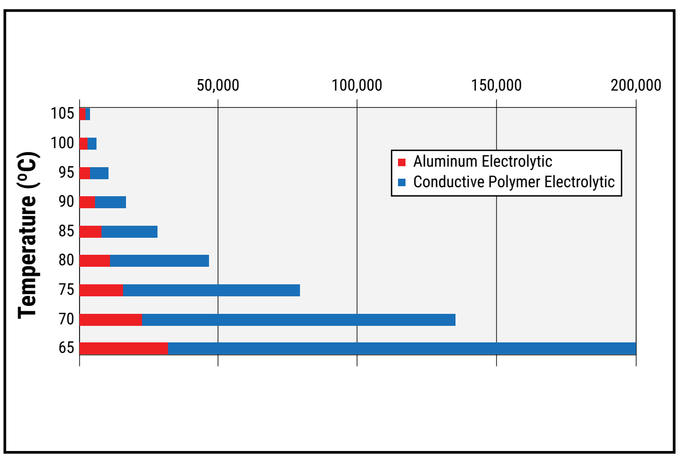
L: Expected life
Lo: Life at maximum permissible operating temperature with rated operating voltage applied (hours)
T: Actual operating temperature
To: Maximum permissible operating temperature

Expected Life Calculation Chart



The effect of derating temperature can be seen in this graph.
In this example, the life expectancy of a 2,000 hour Polymer capacitor is significantly greater than that of a 2,000 hour standard electrolytic capacitor.

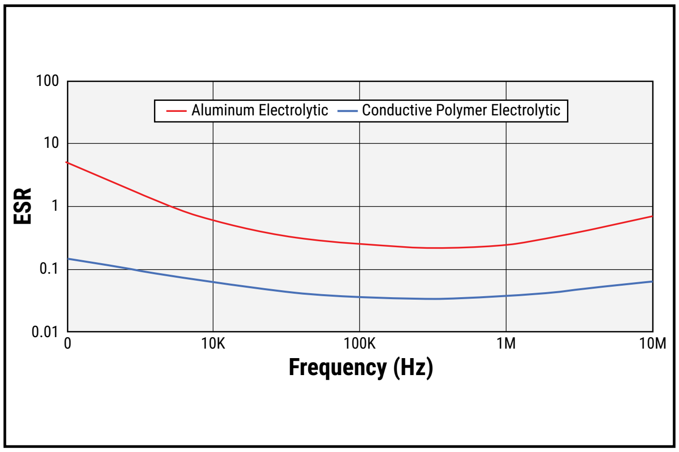
Capacitor Life (H)



Stability of ESR across Frequency Range

Due to a solid polymer electrolyte, the ESR curve of a solid polymer aluminum capacitor, is lower and more stable than that of a standard electrolytic capacitor.

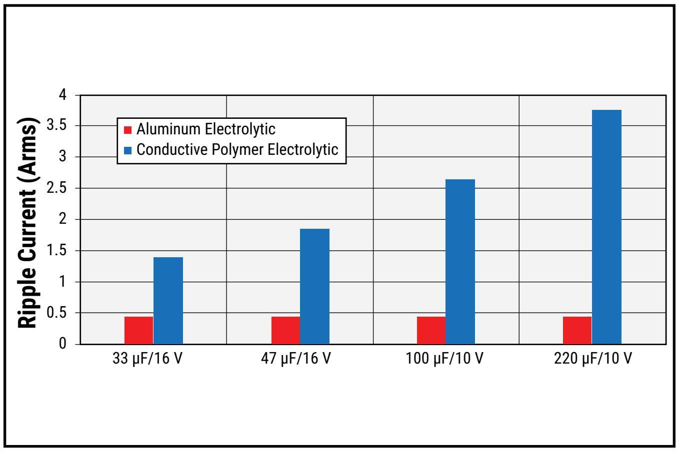
Stable ESR Values across Frequency



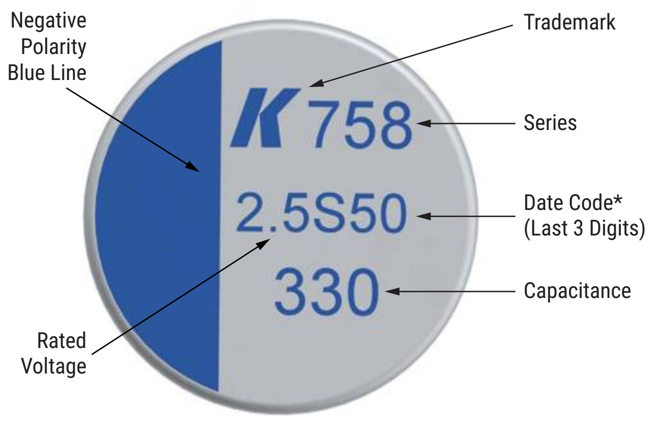
High Resistance to Ripple Current

As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation.

Allowable Ripple Current (100 kHz 105°C)

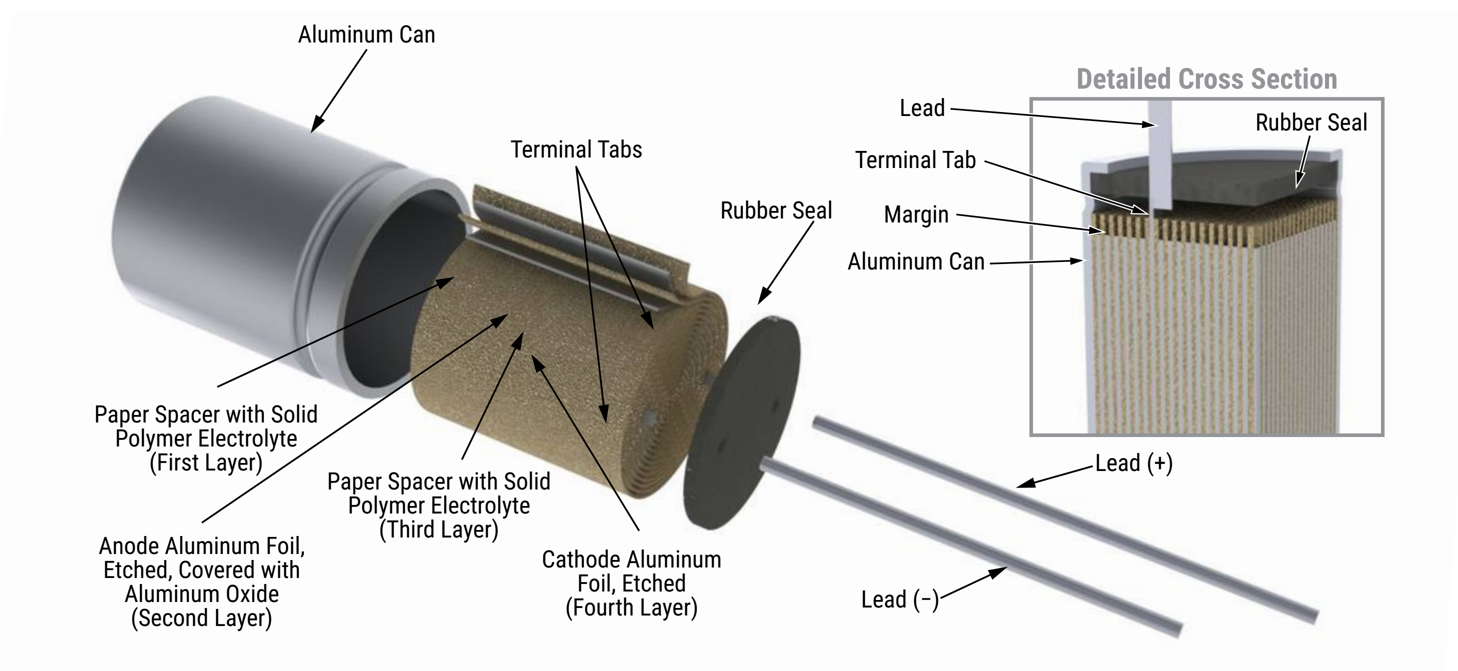


Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	S = 2019
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year
Year Code	
S	2019
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction



Flow Soldering (not suitable for SMD parts)

The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Flow Soldering

	Temperature (°C)	Maximum Time (Seconds)	Maximum Repetitions
Pre-heat	< 120	< 120	1
Solder	260±5°C	< 10	2

Taping for Automatic Insertion Machines

Fig. 1 (Diameter Φ5) 5 mm formed to 2.5 mm FA

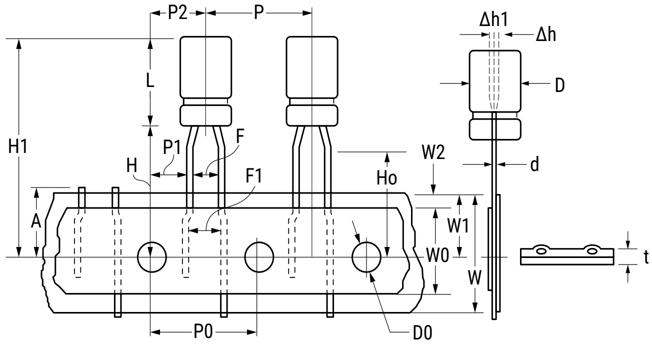


Fig. 2 (Diameter for Φ5 to Φ8) 5 – 8 mm formed to 5 mm DA

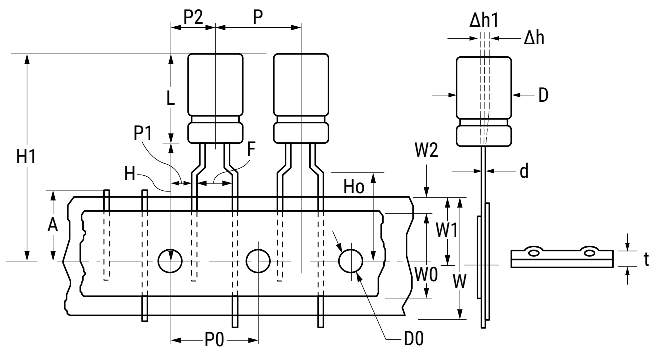


Fig. 3 (Diameter for Φ6 to Φ8) 6 – 8 mm EA

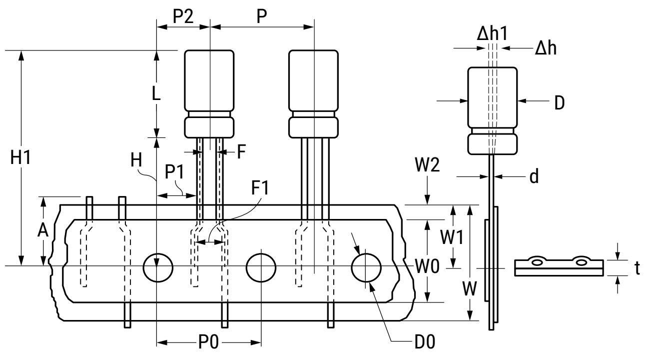
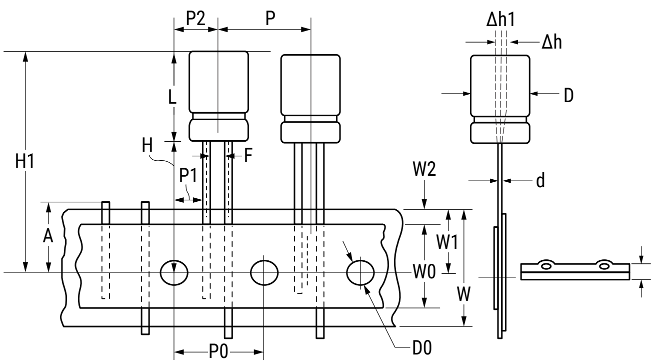


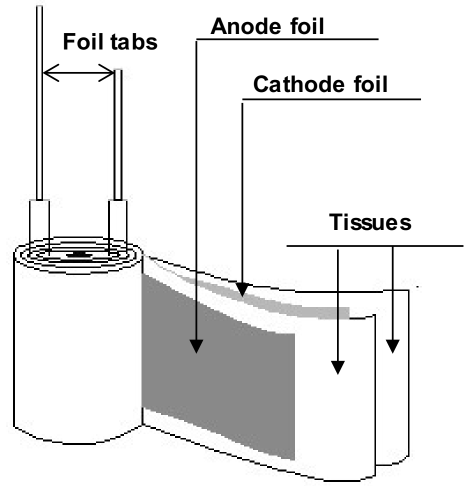
Fig. 4 (Diameter for Φ10) 10 mm EA



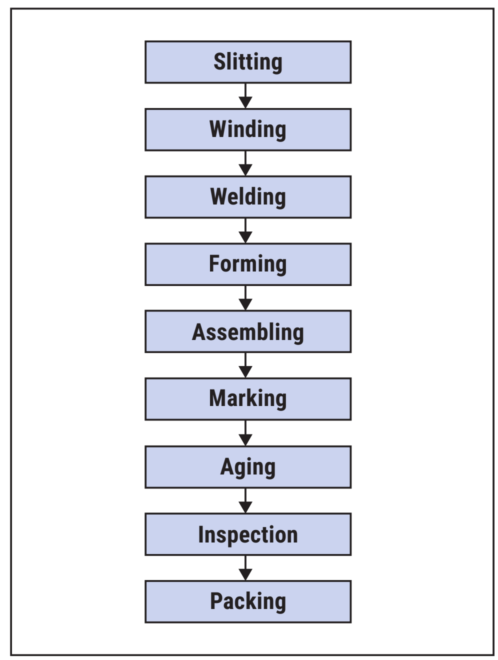
Dimensions (mm)	D	L	d	P	P0	P1	P2	F	W	W0	W1	W2	H	Ho	D0	A	H1	Δh	Δh1	t
Tolerance	±0.5		±0.02	±1.0	±0.2	±0.7	±1.0	±0.5	±0.5	min	±0.5	max	±0.75	±0.5	±0.2	Max.	Max.	±2	±1	±0.3
Formed to 2.5 mm	5	7.0	0.5	12.7	12.7	5.1	6.35	2.5	18	12.5	9	1.5	17.5	16	4	11	32.5	0	0	0.7
		9–11																		
Formed to 5 mm	5	7–11	0.5	12.7	12.7	3.85	6.35	5	18	12.5	9	1.5	18.5	16						
	6.3	8–11																		
	8	8.0																		
		12.0	0.6																	
Straight leads 6 – 8 mm	6.3	8–11	0.5	12.7	12.7	5.4	6.35	2.5	18	12.5	9	1.5	18.5	--						
	8	8.0						3.5												
		12.0	0.6										20							
Straight leads 10 – 13 mm	10	12	0.6	12.7	12.7	3.85	6.35	5	18	12.5	9	1.5	18.5				33			
		16.0															36			
		18.0															41			
		20.0																		
	13	20.0		15	15	5	7.5										40.5			

Construction Data

The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.



The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.



Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

A765 105°C

Overview

KEMET's Surface Mount Solid Polymer Aluminum Capacitors offer longer life and greater stability across a wide range of temperatures. This highly conductive solid polymer electrolyte eliminates the risk of drying out and, due to its low ESR properties, is able to withstand higher ripple currents during normal operation. This series is ideally suited for industrial and commercial applications.

Applications

Typical applications include mobile phone chargers, computer motherboards, servers, and consumer electronics.

Benefits

- Surface mount form factor
- Miniature
- Ultra low impedance
- High ripple current
- 105°C/2,000 hours
- RoHS compliant
- Halogen-free

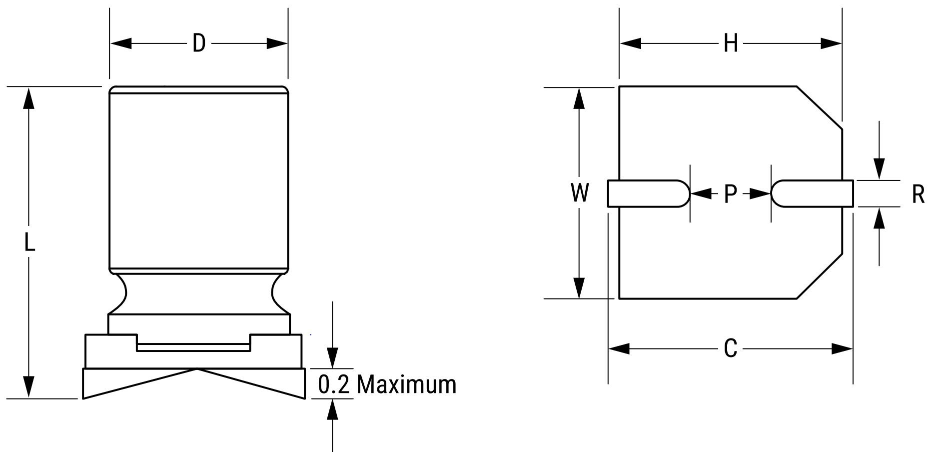
Part Number System

A	765	EB	397	M	0E	LA	E	020
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Surface Mount Solid Polymer Aluminum Capacitors 105°C 2,000 hours Ultra Low Impedance	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	2.5 = 0E 4 = 0G 6.3 = 0J 10 = 1A 16 = 1C 25 = 1E	LA = Tape & Reel	E = Standard/ESR	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

Packaging Type	Packaging Code
Standard Packaging Options	
Tape & Reel	LA
Contact KEMET for other Lead and Packaging options	

Dimensions – Millimeters



Size Code	D		L		W		H		C		R	P
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance		Nominal
BC	5	±0.5	6.0	±0.3	5.3	±0.2	5.3	±0.2	6.0	±0.2	0.5 – 0.8	1.4
BG	5	±0.5	7.0	±0.3	5.3	±0.2	5.3	±0.2	6.0	±0.2	0.5 – 0.8	1.4
EB	6.3	±0.5	5.7	±0.3	6.6	±0.2	6.6	±0.2	7.3	±0.2	0.5 – 0.8	2.0
EG	6.3	±0.5	7.0	±0.3	6.6	±0.2	6.6	±0.2	7.3	±0.2	0.5 – 0.8	2.0
EK	6.3	±0.5	8.0	±0.3	6.6	±0.2	6.6	±0.2	7.3	±0.2	0.5 – 0.8	2.0
EN	6.3	±0.5	9.7	±0.3	6.6	±0.2	6.6	±0.2	7.3	±0.2	0.5 – 0.8	2.0
KE	8	±0.5	6.7	±0.3	8.3	±0.2	8.3	±0.2	9.0	±0.2	0.8 – 1.1	3.1
KG	8	±0.5	7.0	±0.3	8.3	±0.2	8.3	±0.2	9.0	±0.2	0.8 – 1.1	3.1
KH	8	±0.5	7.5	±0.3	8.3	±0.2	8.3	±0.2	9.0	±0.2	0.8 – 1.1	3.1
KN	8	±0.5	9.7	±0.3	8.3	±0.2	8.3	±0.2	9.0	±0.2	0.8 – 1.1	3.1
MN	10	±0.5	10.2	±0.3	10.3	±0.2	10.3	±0.2	11.0	±0.2	0.8 – 1.1	4.6
MU	10	±0.5	12.6	±0.3	10.3	±0.2	10.3	±0.2	11.0	±0.2	0.8 – 1.1	4.6

Environmental Compliance

RoHS

REACH COMPLIANT

HF Halogen Free

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Due to customer requirements, there may appear additional markings such as LF = Lead-free or LFW = Lead-free wires on the label.

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	10 – 2,700 µF
Rated Voltage	2.5 – 25 VDC
Operating Temperature	−55°C to +105°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	2,000 hours (see conditions in Test Method & Performance)
Leakage Current	≤ Specified Value
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
Coefficient	0.05	0.30	0.70	1.00

Test Method & Performance

Conditions	Load Life Test	Shelf Life Test
Temperature	105°C	105°C
Test Duration	2,000 hours	168 hours
Ripple Current	No ripple current applied	No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 1,000 hours at 60°C, 90%~95% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Surge Voltage (Rated Voltage x 1.15(V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles, each consisting of charge with the surge voltages specified at 105°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes, 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Resistance to Soldering Heat	**Measurement for solder temperature profile at capacitor top and terminal.**	
Capacitance Change	Within ±10% of the initial value	
Dissipation Factor	Does not exceed 130% of the specified value	
ESR	Does not exceed 130% of the specified value	
Leakage Current	Does not exceed specified value	

Shelf Life & Re-Ageing

Shelf Life
Solderability is 12 months after manufacturing date.

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

• This series should not be stored in high temperatures or where there is a high level of humidity.
• The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
• Do not store in damp conditions such as water, saltwater spray or oil spray.
• Do not store in an environment of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.)
•Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 12 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

Note: The JEDEC-J-STD-020 standard does not apply.

Floor Life
The Capacitor should be soldered within 4 weeks after removal from sealed bag. Reseal the unused capacitors into plastic bags. All parts manufactured from week 1 of year 2022 are packed in sealed plastic bags.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 105°C for a period of 120 minutes through a 1 kΩ series resistor.

Table 1 – Ratings & Part Number Reference

VDC	VDC Surge Voltage	Rated Capacitance 120 Hz 20°C (µF)	Case Size D x L (mm)	ESR 100 kHz 20°C (mΩ)	RC 100 kHz 105°C (mA)	LC 20°C 2 Minutes (µA)	KEMET Part Number
2.5	2.9	330	6.3 x 5.7	14	3,160	165	A765EB337M0ELAE014
2.5	2.9	390	6.3 x 5.7	20	2,800	300	A765EB397M0ELAE020
2.5	2.9	470	6.3 x 7	20	3,200	300	A765EG477M0ELAE020
2.5	2.9	560	6.3 x 8	20	3,200	300	A765EK567M0ELAE020
2.5	2.9	680	6.3 x 9.7	12	4,300	340	A765EN687M0ELAE012
2.5	2.9	820	8 x 9.7	12	4,880	410	A765KN827M0ELAE012
2.5	2.9	1,000	8 x 9.7	12	4,260	500	A765KN108M0ELAE012
2.5	2.9	1,200	8 x 9.7	12	5,100	600	A765KN128M0ELAE012
2.5	2.9	1,500	8 x 9.7	10	3,400	750	A765KN158M0ELAE010
2.5	2.9	2,700	10 x 12.6	12	5,070	1,350	A765MU278M0ELAE012
4	4.6	270	6.3 × 5.7	15	3,160	216	A765EB277M0GLAE015
4	4.6	330	6.3 × 5.7	14	3,160	264	A765EB337M0GLAE014
4	4.6	390	6.3 × 5.7	14	3,160	312	A765EB397M0GLAE014
4	4.6	470	8 × 6.7	14	3,950	376	A765KE477M0GLAE014
4	4.6	560	8 x 7.5	16	3,220	448	A765KH567M0GLAE016
4	4.6	680	8 x 9.7	12	4,520	544	A765KN687M0GLAE012
4	4.6	820	8 x 9.7	12	5,220	656	A765KN827M0GLAE012
4	4.6	1,000	8 x 9.7	12	5,220	800	A765KN108M0GLAE012
4	4.6	1,200	8 x 9.7	12	3,500	960	A765KN128M0GLAE012
4	4.6	1,500	10 x 12.6	12	5,440	1,200	A765MU158M0GLAE012
4	4.6	1,800	10 × 10	10	5,500	1,440	A765MN188M0GLAE010
6.3	7.2	100	5 x 6	25	1,700	300	A765BC107M0JLAE025
6.3	7.2	150	6.3 x 5.7	20	2,500	300	A765EB157M0JLAE020
6.3	7.2	180	6.3 x 5.7	20	2,800	300	A765EB187M0JLAE020
6.3	7.2	220	5 x 7	20	2,700	300	A765BG227M0JLAE020
6.3	7.2	220	6.3 x 5.7	20	2,800	300	A765EB227M0JLAE020
6.3	7.2	270	6.3 x 7	20	2,800	340	A765EG277M0JLAE020
6.3	7.2	330	6.3 x 7	17	2,570	415	A765EG337M0JLAE017
6.3	7.2	390	8 x 9.7	30	3,220	491	A765KN397M0JLAE030
6.3	7.2	470	8 x 7.5	16	3,220	592	A765KH477M0JLAE016
6.3	7.2	560	8 x 9.7	12	5,000	706	A765KN567M0JLAE012
6.3	7.2	680	8 x 9.7	12	5,000	857	A765KN687M0JLAE012
6.3	7.2	820	8 x 9.7	10	3,350	1,033	A765KN827M0JLAE010
6.3	7.2	1,000	8 x 9.7	12	4,770	1,260	A765KN108M0JLAE012
6.3	7.2	1,200	8 x 9.7	12	4,770	1,512	A765KN128M0JLAE012
6.3	7.2	1,500	10 x 12.6	10	4,100	1,890	A765MU158M0JLAE010
VDC	**VDC Surge**	**Rated Capacitance**	**Case Size**	**ESR**	**RC**	**LC**	**KEMET Part Number**

(1) Electrical Parameters code. See Part Number System for available options.

Table 1 – Ratings & Part Number Reference cont.

VDC	VDC Surge Voltage	Rated Capacitance 120 Hz 20°C (µF)	Case Size D x L (mm)	ESR 100 kHz 20°C (mΩ)	RC 100 kHz 105°C (mA)	LC 20°C 2 Minutes (µA)	KEMET Part Number
10	11.5	120	6.3×5.7	18	2,900	240	A765EB127M1ALAE018
10	11.5	150	6.3 x 5.7	22	2,320	300	A765EB157M1ALAE022
10	11.5	180	8 x 9.7	20	3,500	360	A765KN187M1ALAE020
10	11.5	220	8 x 9.7	20	3,500	440	A765KN227M1ALAE020
10	11.5	270	8 x 9.7	20	3,600	540	A765KN277M1ALAE020
10	11.5	330	8 x 7.5	17	2,350	660	A765KH337M1ALAE017
10	11.5	390	8×9.7	17	4,000	780	A765KN397M1ALAE017
10	11.5	680	10 x 12.6	13	3,800	1,360	A765MU687M1ALAE013
10	11.5	680	10 × 10	13	4,820	1,360	A765MN687M1ALAE013
10	11.5	1,500	10 x 12.6	14	5,400	3,000	A765MU158M1ALAE014
16	18.4	56	6.3×5.7	25	2,440	179	A765EB566M1CLAE025
16	18.4	68	6.3×5.7	25	2,440	218	A765EB686M1CLAE025
16	18.4	100	6.3 x 5.7	25	2,500	320	A765EB107M1CLAE025
16	18.4	150	6.3 x 7	27	2,530	480	A765EG157M1CLAE027
16	18.4	180	8 x 7.5	16	2,800	576	A765KH187M1CLAE016
16	18.4	220	8 x 9.7	16	3,700	704	A765KN227M1CLAE016
16	18.4	270	8 x 9.7	16	3,890	864	A765KN277M1CLAE016
16	18.4	330	8 x 9.7	16	3,890	1,056	A765KN337M1CLAE016
16	18.4	390	8 x 9.7	16	3,890	1,248	A765KN397M1CLAE016
16	18.4	470	10 x 12.6	16	4,720	1,504	A765MU477M1CLAE016
16	18.4	560	10 x 12.6	18	4,200	1,792	A765MU567M1CLAE018
16	18.4	680	10 x 12.6	18	4,200	2,176	A765MU687M1CLAE018
16	18.4	820	10 x 12.6	18	4,200	2,624	A765MU827M1CLAE018
16	18.4	1,000	10 x 12.6	18	4,300	3,200	A765MU108M1CLAE018
25	28.8	10	8 x 7.0	35	1,600	125	A765KG106M1ELAE035
25	28.7	47	6.3 x 5.7	40	1,200	300	A765EB476M1ELAE040
25	28.7	56	8 x 9.7	75	1,300	300	A765KN566M1ELAE075
25	28.7	82	8 x 9.7	29	2,700	410	A765KN826M1ELAE029
25	28.7	100	8 x 9.7	24	3,300	500	A765KN107M1ELAE024
25	28.7	150	10 x 12.6	50	3,800	750	A765MU157M1ELAE050
25	28.7	180	10 x 12.6	50	3,800	900	A765MU187M1ELAE050
25	28.7	220	10 x 12.6	50	3,800	1,100	A765MU227M1ELAE050
25	28.7	270	10 x 12.6	50	3,800	1,350	A765MU277M1ELAE050
25	28.7	330	10 x 12.6	20	2,890	1,650	A765MU337M1ELAE020
VDC	**VDC Surge**	**Rated Capacitance**	**Case Size**	**ESR**	**RC**	**LC**	**KEMET Part Number**

(1) Electrical Parameters code. See Part Number System for available options.

Installing

Solid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that electrolytic capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

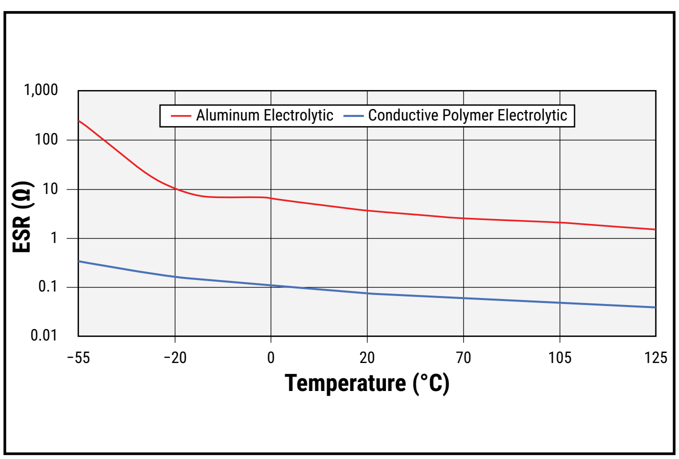
Temperature Stability Characteristics

table characteristics in a very low temperature range allows for less circuits in the design.

Due to a solid polymer electrolyte, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

The ESR of polymer capacitors is nearly constant within its operating temperature range, while the ESR of a standard electrolytic capacitor noticeably changes with temperature.

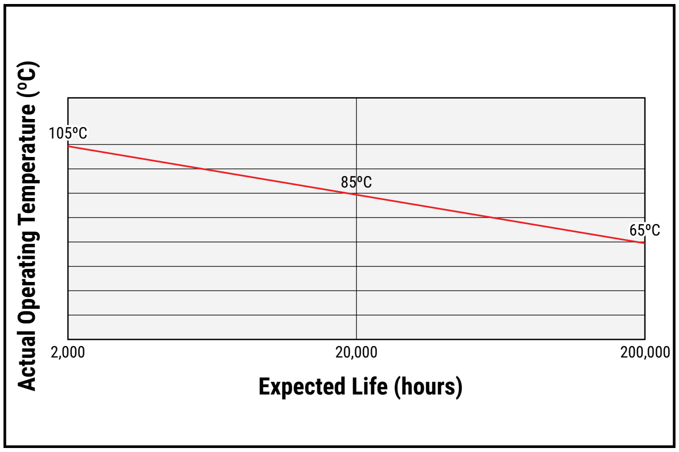
Temperature Stability Characteristics



Expected Life Calculation Chart

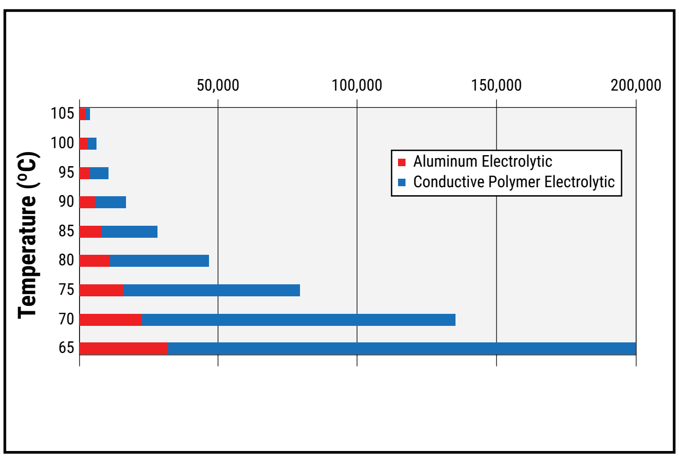
Expected life depends on operating temperature according to the following formula:
$L = Lo \times 10^{(To-T)/20}$
Where:
L: Expected life
Lo: Life at maximum permissible operating temperature with rated operating voltage applied (hours)
T: Actual operating temperature
To: Maximum permissible operating temperature

Expected Life Calculation Chart



The effect of derating temperature can be seen in this graph.
In this example, the life expectancy of a 2,000 hour polymer capacitor is significantly greater than that of a 2,000 hour standard electrolytic capacitor.

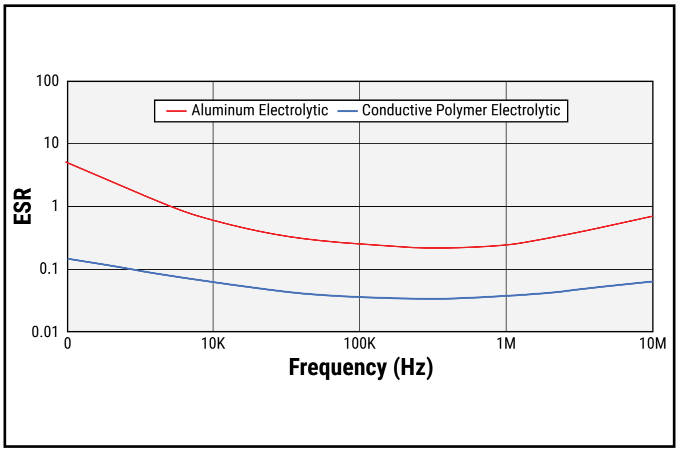
Capacitor Life (H)



Stability of ESR across Frequency Range

Due to a solid polymer electrolyte, the ESR curve of a solid polymer aluminum capacitor, is lower and more stable than that of a standard electrolytic capacitor.

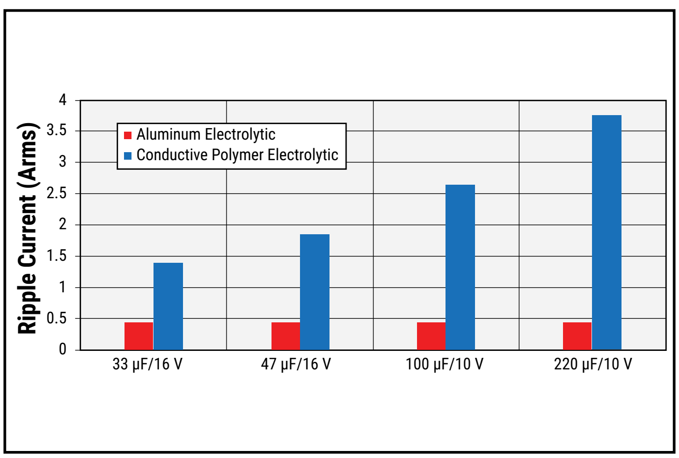
Stable ESR Values across Frequency



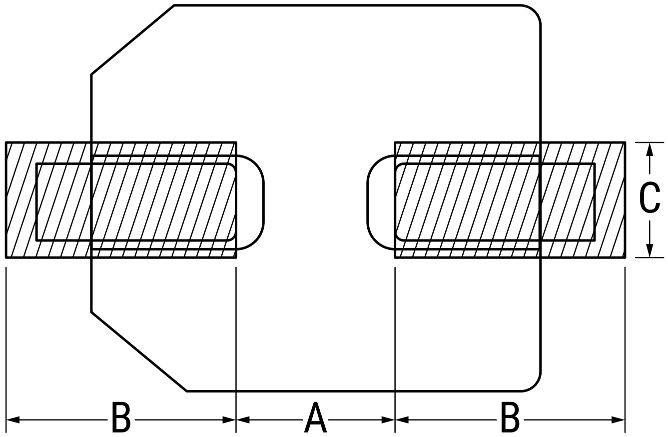
High Resistance to Ripple Current

As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation.

Allowable Ripple Current (100 kHz 105°C)

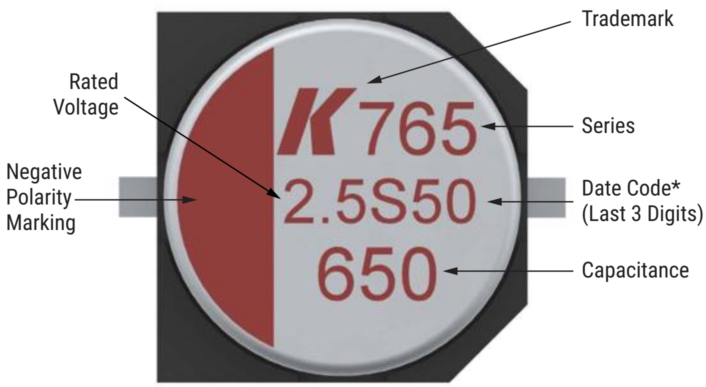


Landing Pad – Millimeters



Diameter	A	B	C
5	1.4	3	1.6
6.3	1.9	3.5	1.6
8	3.1	4.2	2.2
10	4.5	4.4	2.2

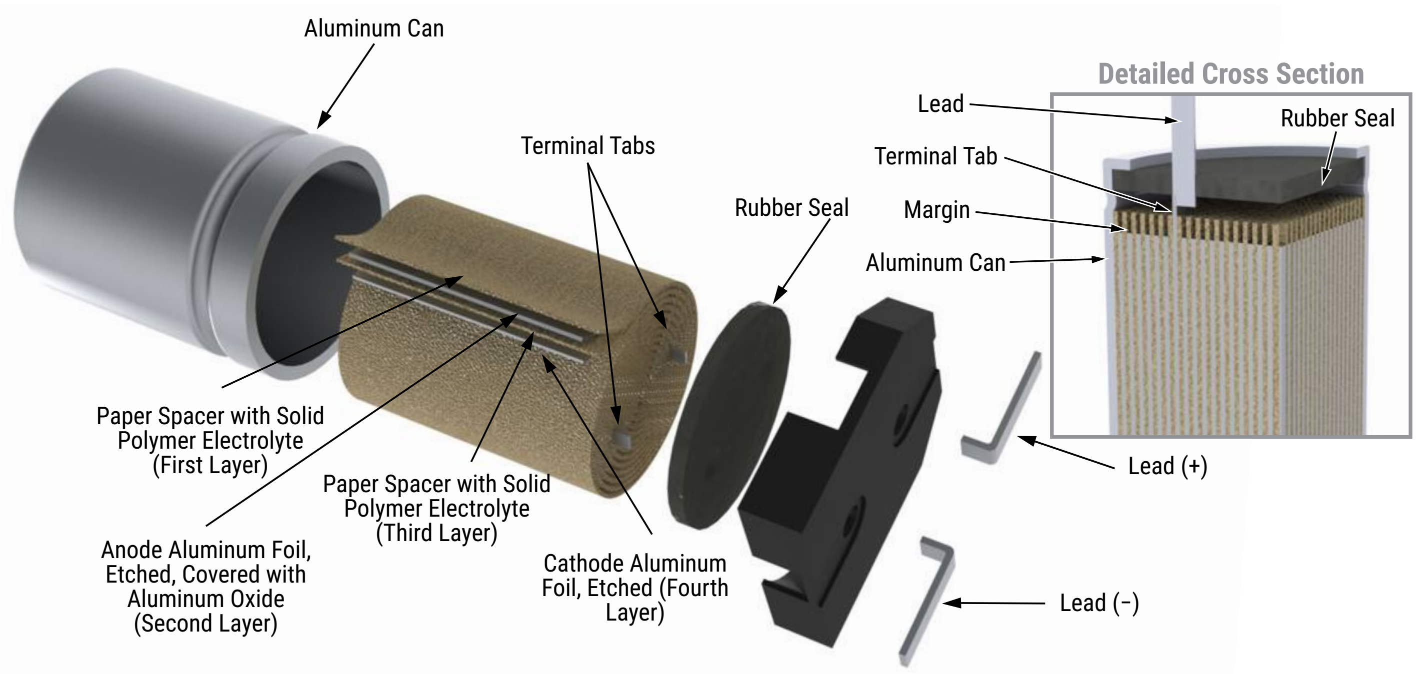
Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	S = 2019
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

Year Code	
S	2019
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction

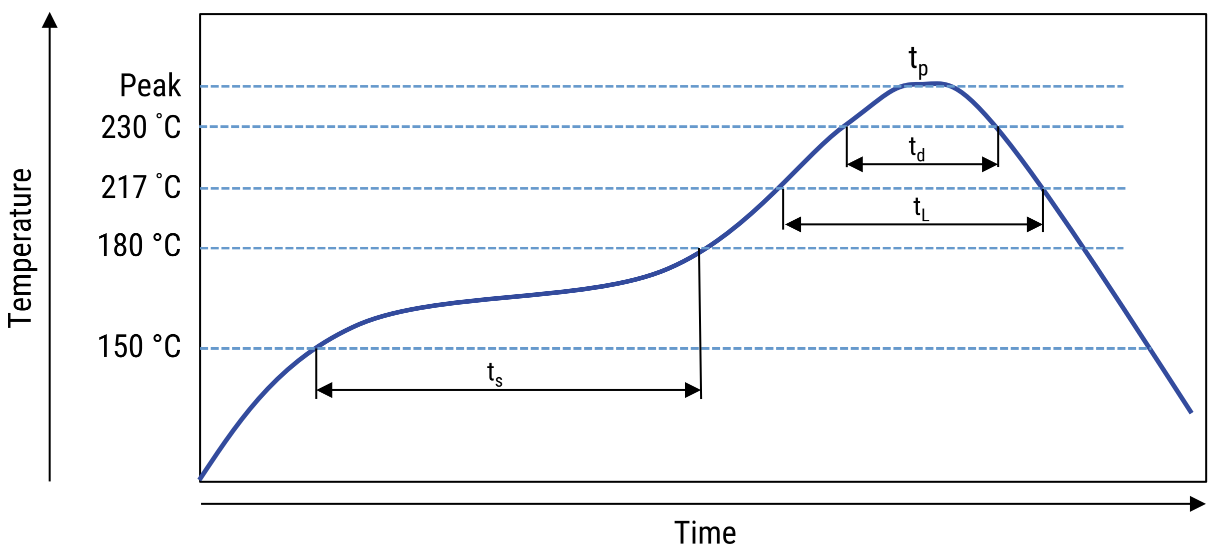


Re-Flow Soldering

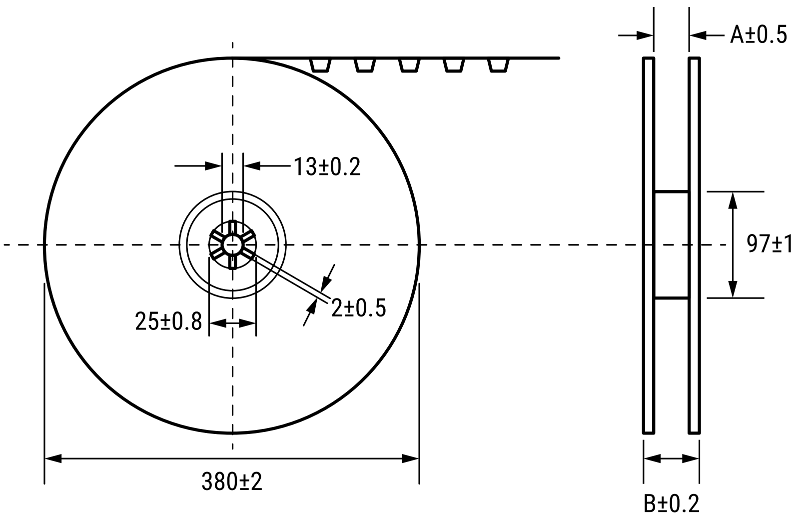
The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Time Period	Preheat t_s	t_L	t_d	t_p	Reflow Number
Temperature (°C)	150 – 180	≥ 217	≥ 230	260	1
				250	1 or 2
Time (seconds)	60 - 120	≤ 50	≤ 40	≤ 5	–

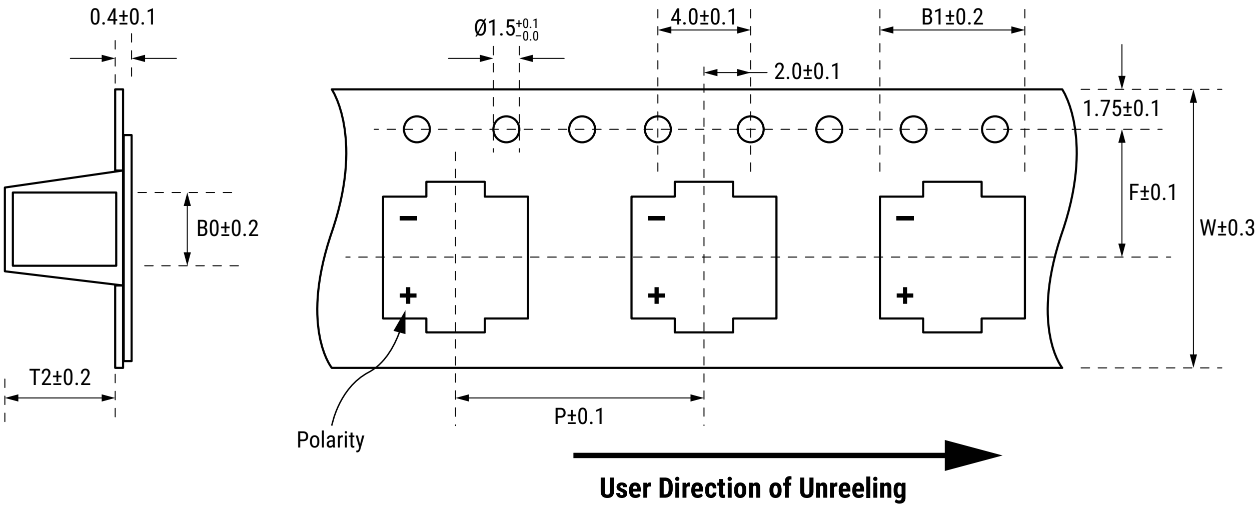


Lead Taping & Packaging



Size Code	Diameter (mm)	Length (mm)	Reel Quantity/SPQ	Box Quantity	Reel	
					A	B
					±0.5	±0.2
BC	5	6	1,000	10,000	17	21
BG	5	7	1,000	10,000	17	21
EB	6.3	5.7	1,000	10,000	18	22
EG	6.3	7	1,000	10,000	18	22
EK	6.3	8	1,000	10,000	18	22
EN	6.3	9.7	800	8,000	18	22
KE	8	6.7	1,000	6,000	26	30
KG	8	7	1,000	6,000	26	30
KH	8	7.5	500	3,000	26	30
KN	8	9.7	500	3,000	26	30
KS	8	12.2	400	2,400	26	30
MN	10	10	500	3,000	26	30
MS	10	12.2	400	2,400	26	30
MU	10	12.6	400	2,400	26	30
MS (Anti-Vibration)	10	12.4	400	2,400	26	30

Taping for Automatic Insertion Machines



Size Code	Diameter	Length	W	P	F	B1	B0	T2
	(mm)	(mm)	±0.3	±0.1	±0.1	±0.2	±0.2	±0.2
BC	5	6.0	16.0	12.0	7.5	5.6	5.6	7.1
BG	5	7.0	16.0	12.0	7.5	5.6	5.6	7.1
EB	6.3	5.7	16.0	12.0	7.5	7.0	7.0	7.6
EG	6.3	7.0	16.0	12.0	7.5	7.0	7.0	7.6
EK	6.3	8.0	16.0	12.0	7.5	7.0	7.0	7.6
EN	6.3	9.7	16.0	12.0	7.5	7.0	7.0	9.6
KE	8	6.7	24.0	12.0	11.5	8.6	8.6	6.8
KG	8	7.0	24.0	12.0	11.5	8.6	8.6	8.4
KH	8	7.5	24.0	12.0	11.5	8.6	8.6	8.4
KN	8	9.7	24.0	16.0	11.5	8.6	8.6	10.3
KS	8	12.2	24.0	16.0	11.5	8.6	8.6	12.5
MN	10	10.0	24.0	16.0	11.5	10.7	10.7	10.1
MS	10	12.2	24.0	16.0	11.5	10.7	10.7	12.5
MS (Anti-Vbration)	10	12.4	24.0	16.0	11.5	11.2	10.7	12.7
MU	10	12.6	24.0	16.0	11.5	10.7	10.7	13.1

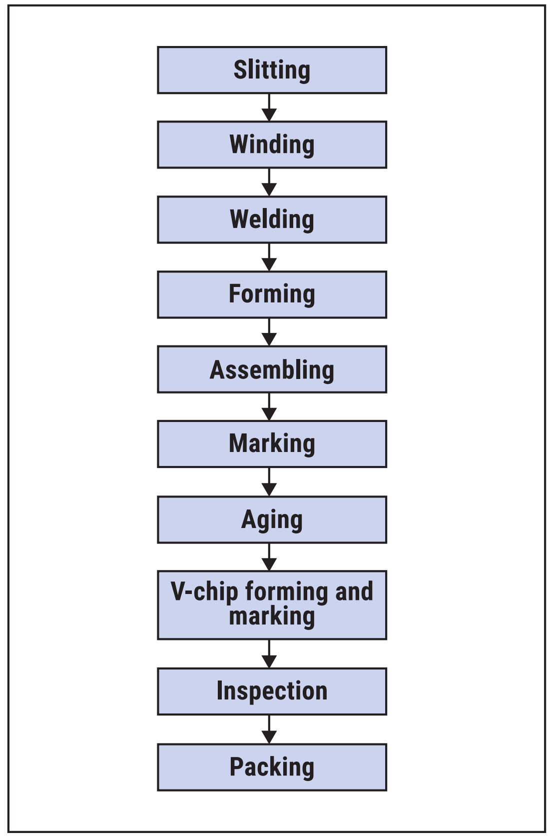
Construction Data

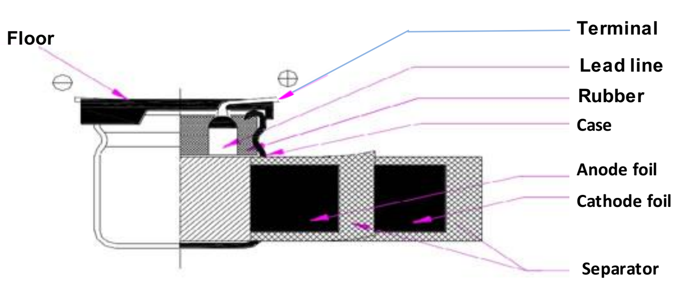
The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.

The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding





A767 105°C

Overview

KEMET's Surface Mount Solid Polymer Aluminum Capacitors offer longer life and greater stability across a wide range of temperatures. This highly conductive solid polymer electrolyte eliminates the risk of drying out and, due to its low ESR properties, is able to withstand higher ripple currents during normal operation. This series is ideally suited for industrial and commercial applications.

Applications

Typical applications include industrial power supplies, switch power supplies, and industrial control systems.

Benefits

- Surface mount form factor
- Ultra low impedance
- High ripple current
- High voltage
- 105°C/2,000 hours
- RoHS compliant
- Halogen-free

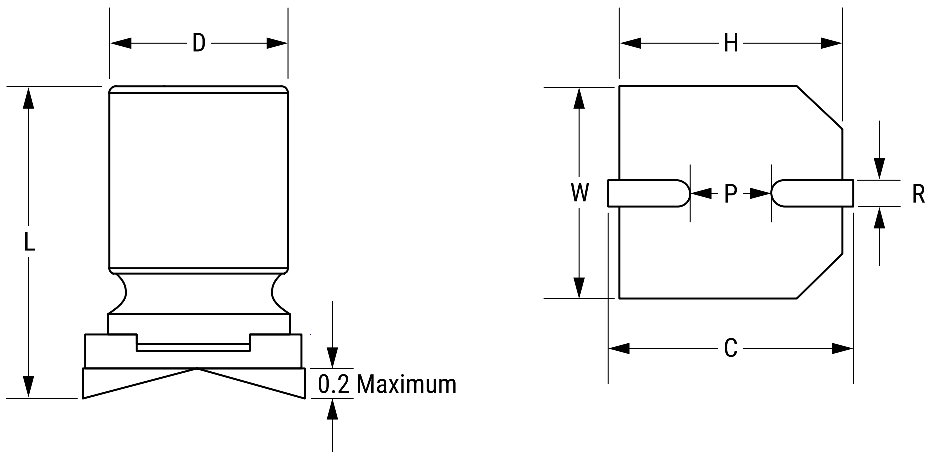
Part Number System

A	767	EB	226	M	1H	LA	E	050
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Surface Mount Solid Polymer Aluminum Capacitors 105°C 2,000 hours High Voltage	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	35 = 1V 50 = 1H 63 = 1J 80 = 1K 100 = 2A	LA = Tape & Reel	E = Standard/ESR	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

Packaging Type	Packaging Code
Standard Packaging Options	
Tape & Reel	LA
Contact KEMET for other Lead and Packaging options	

Dimensions – Millimeters



Size Code	D		L		W		H		C		R	P
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance		Nominal
EB	6.3	±0.5	5.7	±0.3	6.6	±0.2	6.6	±0.2	7.3	±0.2	0.5 – 0.9	2.0
KN	8	±0.5	9.7	±0.3	8.3	±0.2	8.3	±0.2	9.0	±0.2	0.8 – 1.1	3.1
KS	8	±0.5	12.2	±0.3	8.3	±0.2	8.3	±0.2	9.0	±0.2	0.8 – 1.1	3.2
MU	10	±0.5	12.6	±0.3	10.3	±0.2	10.3	±0.2	11.0	±0.2	0.8 – 1.1	4.6

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant, and Halogen-Free.

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and make any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as lead-free (LF) or lead-free wires (LFW) on the label.

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	4.7 – 220 µF
Rated Voltage	35 – 100 VDC
Operating Temperature	−55°C to +105°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	2,000 hours (see conditions in Test Method & Performance)
Leakage Current	≤ Specified Value
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
Coefficient	0.05	0.30	0.70	1.00

Test Method & Performance

Conditions	Load Life Test	Shelf Life Test
Temperature	105°C	105°C
Test Duration	2,000 hours	168 hours
Ripple Current	No ripple current applied	No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 1,000 hours at 60°C, 90%~95% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Surge Voltage (Rated Voltage x 1.15 (V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles each consisting of charge with the surge voltages specified at 105°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Resistance to Soldering Heat	**Measurement for solder temperature profile at capacitor top and terminal.**	
Capacitance Change	Within ±10% of the initial value	
Dissipation Factor	Does not exceed 130% of the specified value	
ESR	Does not exceed 130% of the specified value	
Leakage Current	Does not exceed specified value	

Shelf Life & Re-Ageing

Shelf Life
Solderability is 12 months after manufacturing date.

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

• This series should not be stored in high temperatures or where there is a high level of humidity.
• The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
• Do not store in damp conditions such as water, saltwater spray or oil spray.
• Do not store in an environment of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.)
•Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 12 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

Note: The JEDEC-J-STD-020 standard does not apply.

Floor Life
The Capacitor should be soldered within 4 weeks after removal from sealed bag. Reseal the unused capacitors into plastic bags. All parts manufactured from week 1 of year 2022 are packed in sealed plastic bags.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 105°C for a period of 120 minutes through a 1 kΩ series resistor.
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Table 1 – Ratings & Part Number Reference

VDC	VDC Surge Voltage	Rated Capacitance 120 Hz 20°C (µF)	Case Size D x L (mm)	ESR 100 kHz 20°C (mΩ)	RC 100 kHz 105°C (mA)	LC 20°C 2 Minutes (µA)	KEMET Part Number
35	40.2	10	6.3 x 5.7	85	800	300	A767EB106M1VLAE085
35	40.2	18	6.3 x 5.7	85	800	300	A767EB186M1VLAE085
35	40.2	22	6.3 x 5.7	50	1,300	300	A767EB226M1VLAE050
35	40.2	33	8 x 9.7	31	1,900	300	A767KN336M1VLAE031
35	40.2	47	8 x 9.7	31	1,900	329	A767KN476M1VLAE031
35	40.2	56	8 x 9.7	31	1,900	392	A767KN566M1VLAE031
35	40.2	82	8 x 9.7	31	3,600	574	A767KN826M1VLAE031
35	40.2	100	10 x 12.6	29	2,500	700	A767MU107M1VLAE029
35	40.2	150	10 x 12.6	28	2,600	1,050	A767MU157M1VLAE028
35	40.2	180	10 x 12.6	28	2,600	1,260	A767MU187M1VLAE028
35	40.2	220	10 x 12.6	28	2,600	1,540	A767MU227M1VLAE028
50	57.5	18	8 x 9.7	50	1,300	300	A767KN186M1HLAE050
50	57.5	22	8 x 9.7	50	1,500	300	A767KN226M1HLAE050
50	57.5	33	8 x 9.7	45	1,800	330	A767KN336M1HLAE045
50	57.5	47	8 x 9.7	29	3,300	470	A767KN476M1HLAE029
50	57.5	56	8 x 9.7	29	2,800	560	A767KN566M1HLAE029
50	57.5	82	10 x 12.6	27	3,300	820	A767MU826M1HLAE027
50	57.5	100	10 x 12.6	27	2,500	1,000	A767MU107M1HLAE027
63	72	4.7	6.3 x 5.7	80	1,265	59	A767EB475M1JLAE080
63	72	22	8 x 9.7	45	1,800	300	A767KN226M1JLAE045
63	72	33	8 x 9.7	42	1,950	415	A767KN336M1JLAE042
63	72	47	8 x 12.2	36	2,200	592	A767KS476M1JLAE036
63	72	68	10 x 12.6	30	2,450	856	A767MU686M1JLAE030
63	72	100	10 x 12.6	28	2,550	1,260	A767MU107M1JLAE028
80	92	22	8 x 9.7	45	2,100	352	A767KN226M1KLAE045
80	92	33	8 x 12.2	45	2,100	528	A767KS336M1KLAE045
80	92	47	10 x 12.6	40	2,500	752	A767MU476M1KLAE040
100	115	10	8 x 12.2	45	1,700	300	A767KS106M2ALAE045
100	115	22	10 x 12.6	38	2,250	440	A767MU226M2ALAE038
VDC	**VDC Surge**	**Rated Capacitance**	**Case Size**	**ESR**	**RC**	**LC**	**KEMET Part Number**

(1)Electrical Parameters code. See Part Number System for available options.

Installing

Solid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that electrolytic capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

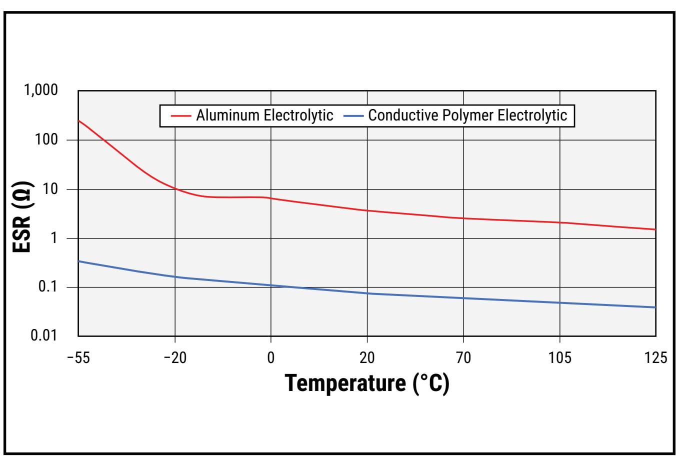
Temperature Stability Characteristics

table characteristics in a very low temperature range allows for less circuits in the design.

Due to a solid polymer electrolyte, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

The ESR of polymer capacitors is nearly constant within its operating temperature range, while the ESR of a standard electrolytic capacitor noticeably changes with temperature.

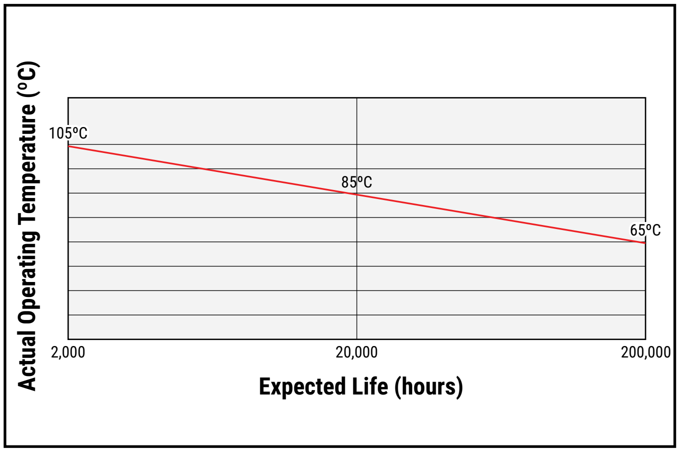
Temperature Stability Characteristics



Expected Life Calculation Chart

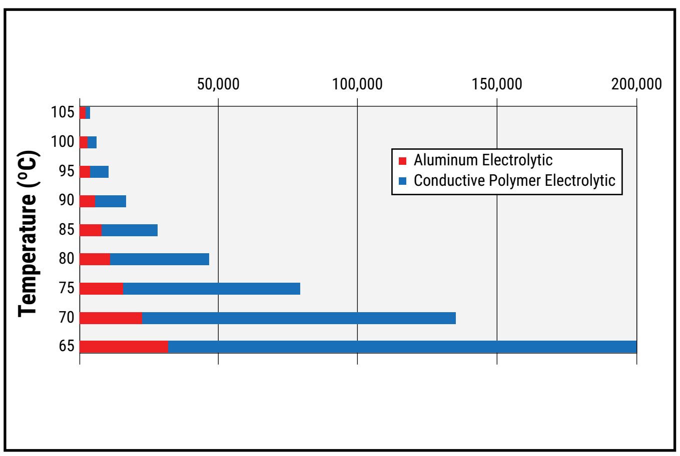
Expected life depends on operating temperature according to the following formula:
$L = Lo \times 10^{(To-T)/20}$
Where:
L: Expected life
Lo: Life at maximum permissible operating temperature with rated operating voltage applied (hours)
T: Actual operating temperature
To: Maximum permissible operating temperature

Expected Life Calculation Chart



The effect of derating temperature can be seen in this graph.
In this example, the life expectancy of a 2,000 hour polymer capacitor is significantly greater than that of a 2,000 hour standard electrolytic capacitor.

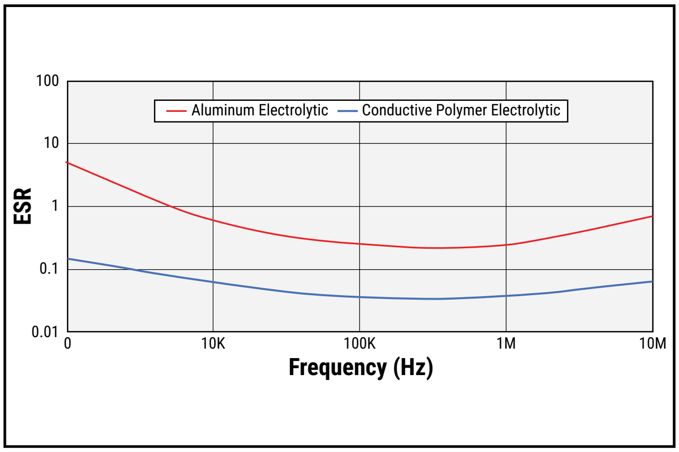
Capacitor Life (H)



Stability of ESR across Frequency Range

Due to a solid polymer electrolyte, the ESR curve of a solid polymer aluminum capacitor, is lower and more stable than that of a standard electrolytic capacitor.

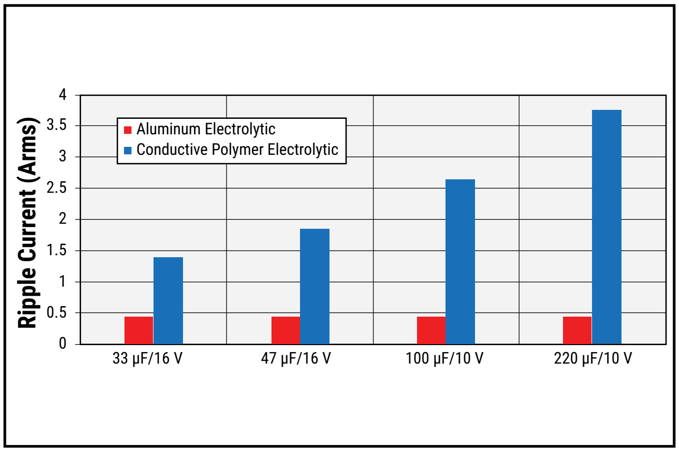
Stable ESR Values across Frequency



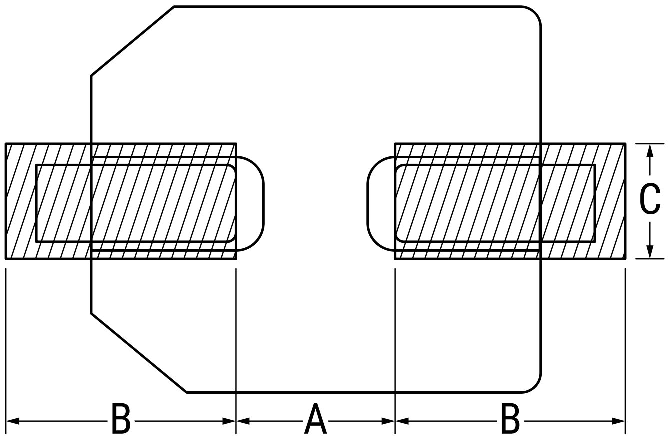
High Resistance to Ripple Current

As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation.

Allowable Ripple Current (100 kHz 105°C)

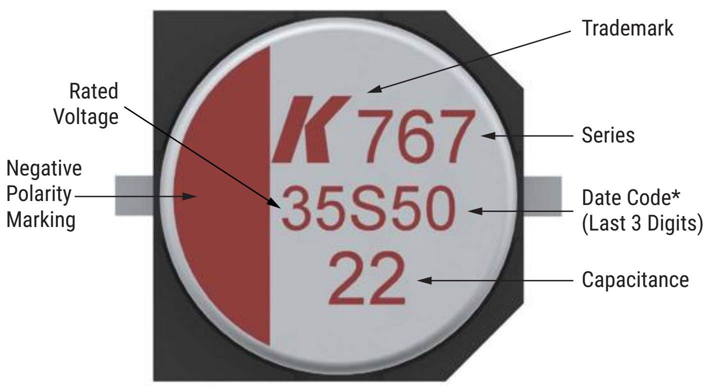


Landing Pad – Millimeters



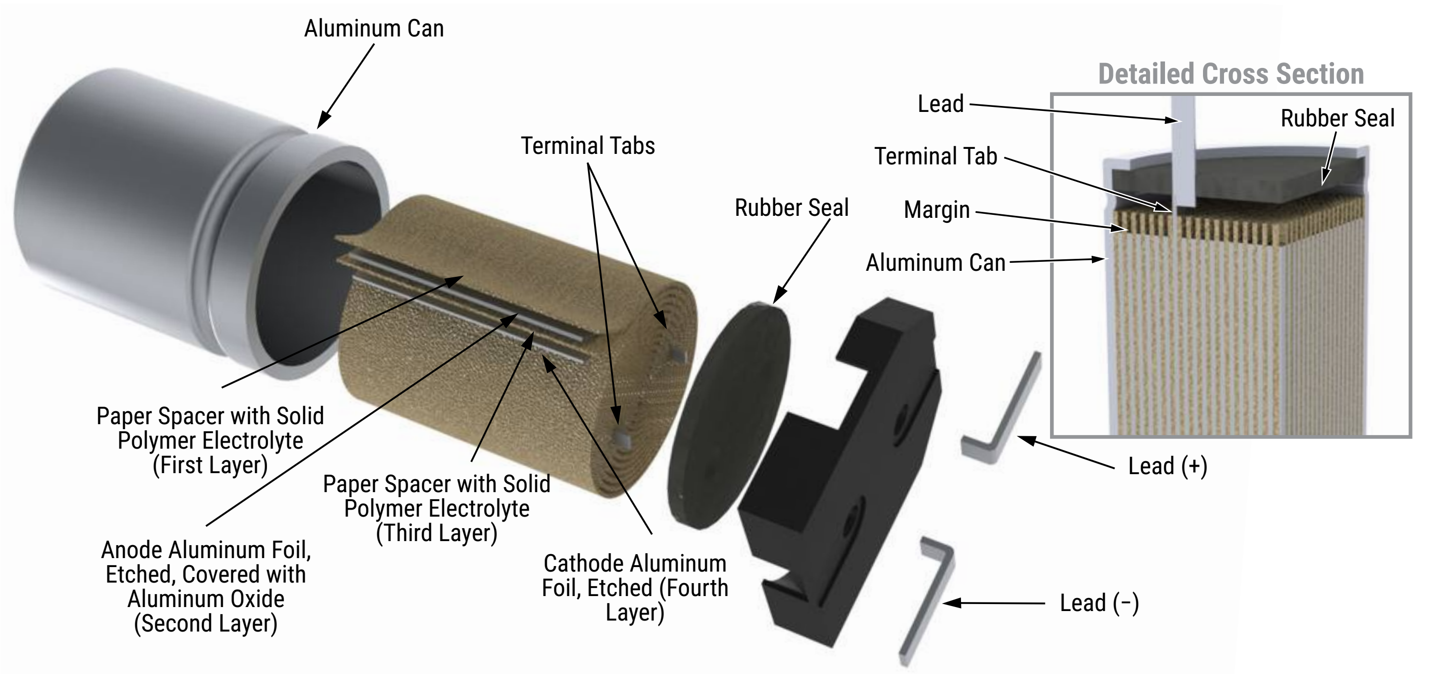
Diameter	A	B	C
5	1.4	3	1.6
6.3	1.9	3.5	1.6
8	3.1	4.2	2.2
10	4.5	4.4	2.2

Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	S = 2019
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year
Year Code	
S	2019
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction

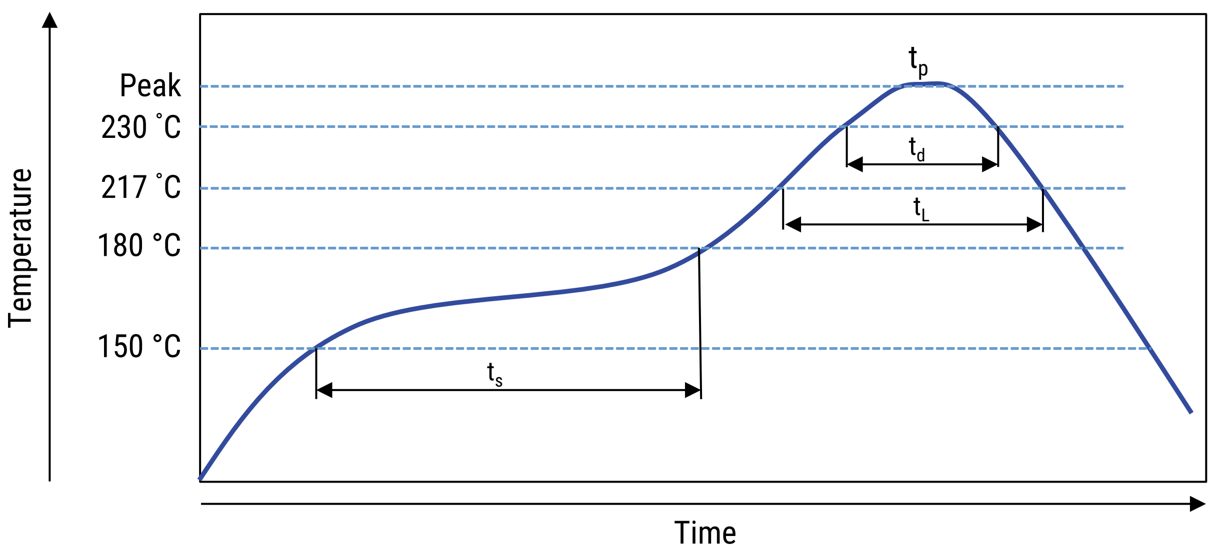


Re-Flow Soldering

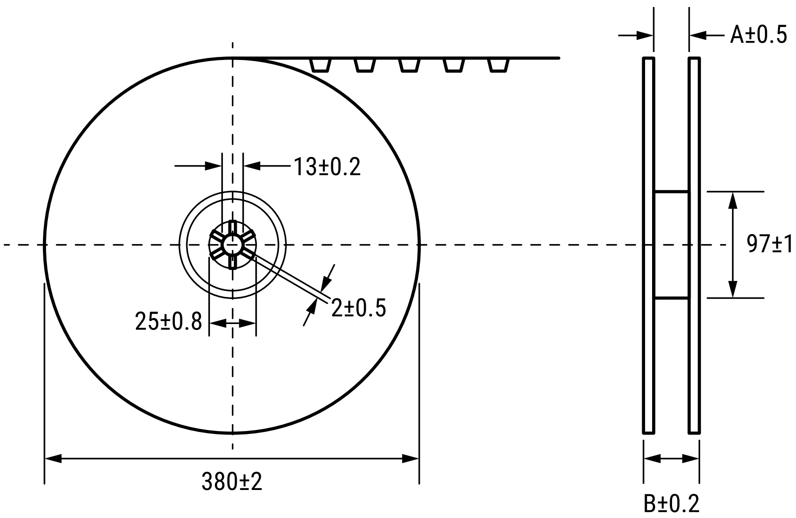
The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Time Period	Preheat t_s	t_L	t_d	t_p	Reflow Number
Temperature (°C)	150 – 180	≥ 217	≥ 230	260	1
				250	1 or 2
Time (seconds)	60 - 120	≤ 50	≤ 40	≤ 5	–

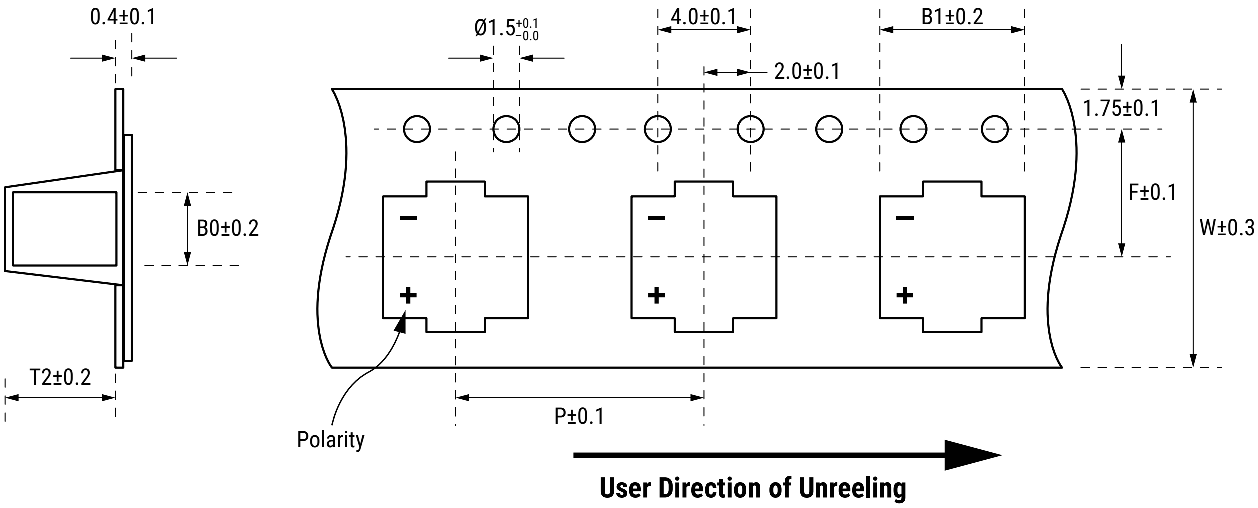


Lead Taping & Packaging



Size Code	Diameter (mm)	Length (mm)	Reel Quantity/SPQ	Box Quantity	Reel	
					A	B
					±0.5	±0.2
BC	5	6	1,000	10,000	17	21
BG	5	7	1,000	10,000	17	21
EB	6.3	5.7	1,000	10,000	18	22
EG	6.3	7	1,000	10,000	18	22
EK	6.3	8	1,000	10,000	18	22
EN	6.3	9.7	800	8,000	18	22
KE	8	6.7	1,000	6,000	26	30
KG	8	7	1,000	6,000	26	30
KH	8	7.5	500	3,000	26	30
KN	8	9.7	500	3,000	26	30
KS	8	12.2	400	2,400	26	30
MN	10	10	500	3,000	26	30
MS	10	12.2	400	2,400	26	30
MU	10	12.6	400	2,400	26	30
MS (Anti-Vibration)	10	12.4	400	2,400	26	30

Taping for Automatic Insertion Machines



Size Code	Diameter	Length	W	P	F	B1	B0	T2
	(mm)	(mm)	±0.3	±0.1	±0.1	±0.2	±0.2	±0.2
BC	5	6	16.0	12.0	7.5	5.6	5.6	7.1
BG	5	7	16.0	12.0	7.5	5.6	5.6	7.1
EB	6.3	5.7	16.0	12.0	7.5	7.0	7.0	7.6
EG	6.3	7.0	16.0	12.0	7.5	7.0	7.0	7.6
EK	6.3	8.0	16.0	12.0	7.5	7.0	7.0	7.6
EN	6.3	9.7	16.0	12.0	7.5	7.0	7.0	9.6
KE	8	6.7	24.0	12.0	11.5	8.6	8.6	6.8
KH	8	7.5	24.0	12.0	11.5	8.6	8.6	8.4
KN	8	9.7	24.0	16.0	11.5	8.6	8.6	10.3
KS	8	12.2	24.0	16.0	11.5	8.6	8.6	12.5
MN	10	10.0	24.0	16.0	11.5	10.7	10.7	10.1
MS	10	12.2	24.0	16.0	11.5	10.7	10.7	12.5
MS (Anti-Vbration)	10	12.4	24.0	16.0	11.5	11.2	10.7	12.7
MU	10	12.6	24.0	16.0	11.5	10.7	10.7	13.1

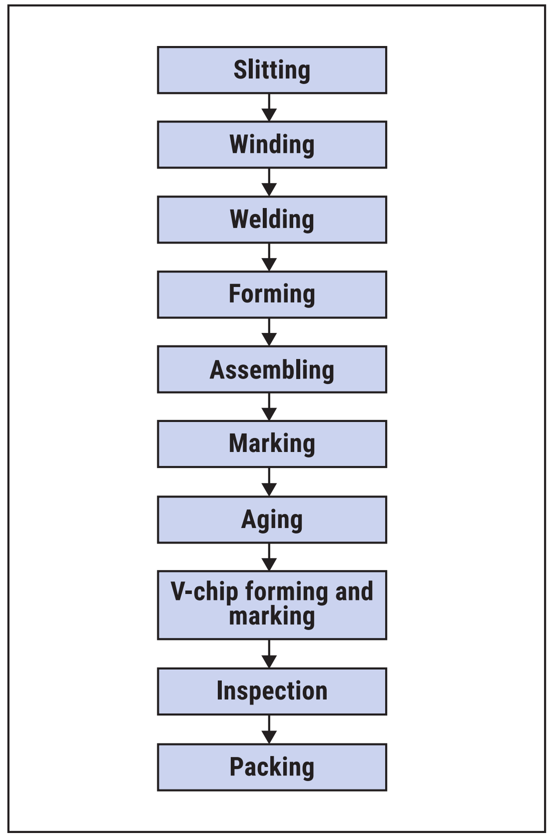
Construction Data

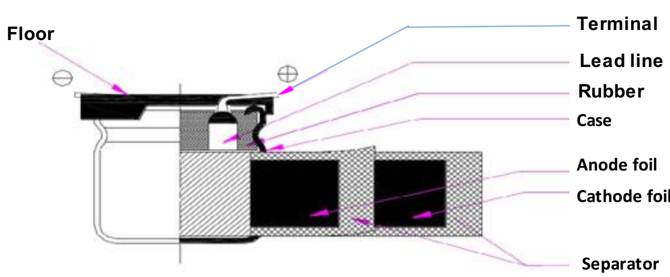
The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.

The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to a variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding





Radial Solid Polymer Aluminum Capacitors

A759 125°C

Overview

KEMET's Radial Solid Polymer Aluminum Capacitors offer longer life and greater stability across a wide range of temperatures. This highly conductive solid polymer electrolyte eliminates the risk of drying out and, due to its low ESR properties, is able to withstand higher ripple currents during normal operation. This series is ideally suited for industrial and commercial applications.

Applications

Typical applications include long life LED drivers, professional power amplifiers, industrial power supplies, DC/DC converters, voltage regulators, and decoupling.

Benefits

- Through-hole form factor
- High voltage
- Low impedance
- High ripple current
- 125°C/2,000 hours
- RoHS compliant
- Halogen-free

Part Number System

A	759	BQ	106	M	1V	AA	E	090
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Radial Solid Polymer Aluminum Capacitors 125°C 2,000 hours	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	6.3 = 0J 10 = 1A 16 = 1C 20 = 1D 25 = 1E 35 = 1V 50 = 1H 63 = 1J 80 = 1K 100 = 2A 160 = 2C 250 = 2E	See Ordering Options Table	E = Standard/ESR	Last 3 digits represent significant figures for ESR values. (mΩ)

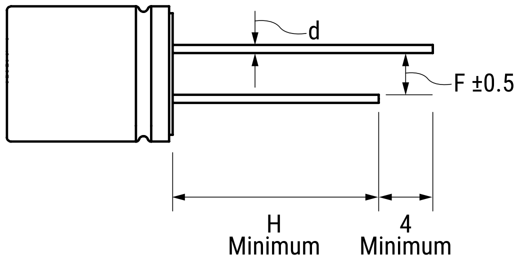
Ordering Options Table

Diameter	Packaging Type	Lead Type	Lead Length (mm)	Lead and Packaging Code
Standard Bulk Packaging Options				
5 – 22	Bulk (bag)	Long Lead (Loose Standard Leads)	15 Minimum	AA
5 – 18	Bulk (bag)	Cut Leads	5[1]	BA
5 – 18	Bulk (bag)	Formed Leads	5[1]	CA
Standard Auto-Insertion Packaging Options				
5	Ammo Tape and Box	Formed to 2.5 mm	H_0 = 16±0.5	FA
5 – 8	Ammo Tape and Box	Formed to 5 mm	H_0 = 16±0.5	DA
6 – 8	Ammo Tape and Box	Straight	H = 18.5±0.5 (for 8 x 12 H = 20±0.5)	EA
10 – 13	Ammo Tape and Box	Straight	H = 18.5±0.5	EA

Contact KEMET for other Lead and Packaging options
[1]Contact KEMET for custom Lead Length and options 3 to 10 mm

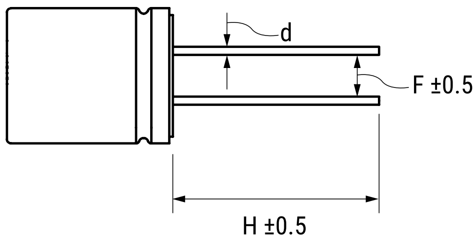
Size Code	Dimensions DxL	Lead and Packaging Code (SPQ)			
		AA Bulk (Bag)	BA Bulk (Bag)	CA Bulk (Bag)	DA, EA, FA Ammo, Tape and Box
BG	5x7	1,000	1,000	1,000	2,000
BK	5x8	1,000	1,000	1,000	2,000
BM	5x9	1,000	1,000	1,000	2,000
BQ	5x11	1,000	1,000	1,000	2,000
EA	6.3x5	1,000	1,000	1,000	1,500
EK	6.3x8	1,000	1,000	1,000	1,500
EM	6.3x9	1,000	1,000	1,000	1,500
EQ	6.3x11	1,000	1,000	1,000	1,500
KK	8x8	500	500	500	1,000
KR	8x11.5	500	500	500	1,000
KS	8x12	500	500	500	1,000
KV	8x14	500	500	500	1,000
KW	8x16	500	500	500	1,000
MS	10x12	250	250	250	600
MU	10x12.5	250	250	250	600
MV	10x14	250	250	250	600
MW	10x16	250	250	250	600

Long Lead (Loose Standard Leads)



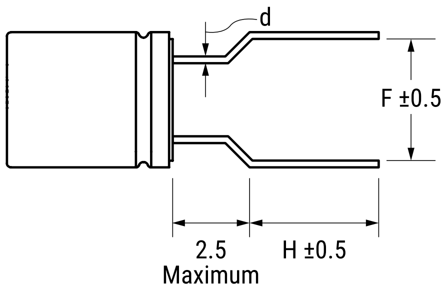
	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	2	2.5	3.5	5	5	7.5
H	15	15	15	15	15	15

Cut Lead



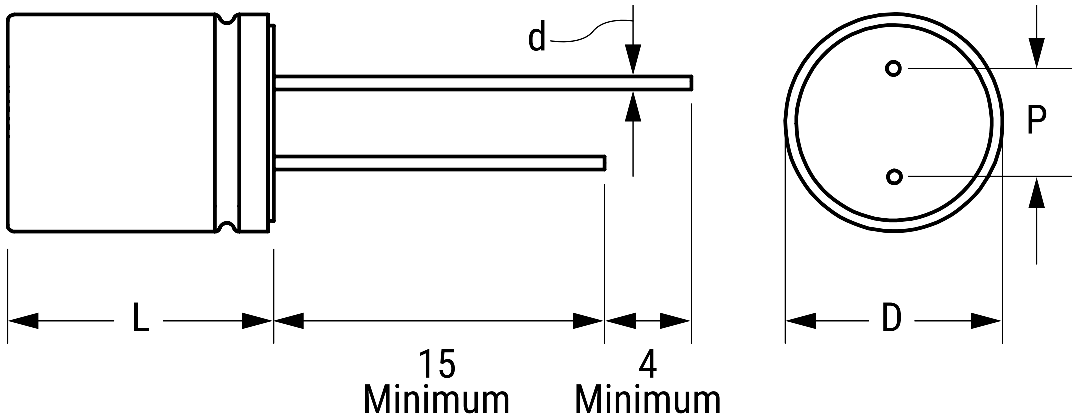
	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	2	2.5	3.5	5	5	7.5
H	According to customer requirement 3 – 10 mm					

Formed Lead



	Diameter					
	5	6.3	8	10	13	18
d	0.5	0.5	0.6	0.6	0.6	0.8
F	5	5	5	5	5	5
H	According to customer requirement 3 – 10 mm					

Dimensions – Millimeters



Size Code	D		L		d		P		Sleeve	Safety Vent
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance		
BQ	5	±0.5	11	±1.0	0.5	±0.05	2	±0.5		
EA	6.3	±0.5	5	±1.0	0.45	±0.05	2.5	±0.5		
EK	6.3	±0.5	8	±1.0	0.5	±0.05	2.5	±0.5		
EQ	6.3	±0.5	11	±1.0	0.5	±0.05	2.5	±0.5		
KC	8	±0.5	6	±1.0	0.45	±0.05	3.5	±0.5		
KK	8	±0.5	8	±1.0	0.6	±0.05	3.5	±0.5		
KR	8	±0.5	11.5	±1.5	0.6	±0.05	3.5	±0.5		
KS	8	±0.5	12	±1.0	0.6	±0.05	3.5	±0.5		
MS	10	±0.5	12	±1.0	0.6	±0.05	5	±0.5		Yes
MU	10	±0.5	12.5	±1.5	0.6	±0.05	5	±0.5		Yes
MW	10	±0.5	16	±2.0	0.6	±0.05	5	±0.5		Yes
MX	10	±0.5	18	±2.0	0.6	±0.05	5	±0.5	PET	Yes
MY	10	±0.5	20	±2.0	0.6	±0.05	5	±0.5	PET	Yes
PY	13	±0.5	20	±2.0	0.6	±0.05	5	±0.5	PET	Yes
SZ	18	±0.5	31	±2.0	0.8	±0.05	7.5	±0.5	PET	Yes
TC	22	±0.5	45	±2.0	0.8	±0.05	10	±0.5	PET	Yes

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	2.2 – 2,200 µF
Rated Voltage	6.3 – 250 VDC
Operating Temperature	−55°C to +125°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	2,000 hours (see conditions in Test Method & Performance)
Leakage Current	I ≤ 0.15 CV or 120 µA, whichever is greater
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Dissipation Factor (tan δ)

Rated Voltage (V)	35 – 250
tan δ (maximum) at 120 Hz/20°C	0.12

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
Coefficient	0.05	0.30	0.70	1.00

Test Method & Performance

Conditions	Load Life Test	Shelf Life Test
Temperature	125°C	125°C
Test Duration	2,000 hours	96 hours
Ripple Current	No ripple current applied	No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 1,000 hours at 60°C, 90%~95% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Surge Voltage (Rated Voltage x 1.15 (V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles, each consisting of charge with the surge voltages specified at 105°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes, 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	

Shelf Life & Re-Ageing

Shelf Life
Solderability is 12 months

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

- This series should not be stored in high temperatures or where there is a high level of humidity.
- The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
- Do not store in damp conditions such as water, saltwater spray or oil spray.
- Do not store in an environment full of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.)
- Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 24 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 125°C for a period of 120 minutes through a 1 kΩ series resistor.

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant, and Halogen-Free.

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and makes any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free or LFW = Lead-free wires on the label.

Table 1 – Ratings & Part Number Reference

VDC	VDC Surge Voltage	Rated Capacitance 120 Hz 20°C (µF)	Case Size D x L (mm)	ESR 100 kHz 20°C (mΩ)	RC 100 kHz 105°C (mA)	RC 100 kHz 125°C (mA)	LC 20°C 2 minutes (µA)	KEMET Part Number
6.3	7.245	220	6.3 x 8	18	3098	1791	207.9	A759EK227M0J(1)E018
6.3	7.245	470	6.3 x 8	16	4100	2370	444.15	A759EK477M0J(1)E016
6.3	7.245	680	8 x 12	14	4844	2800	642.6	A759KS687M0J(1)E014
6.3	7.245	1000	8 x 12	13	5363	3100	945	A759KS108M0J(1)E013
6.3	7.245	1500	10 x 12	13	7093	4100	1417.5	A759MS158M0J(1)E013
6.3	7.245	2200	10 x 12	13	7785	4500	2079	A759MS228M0J(1)E013
10	11.5	220	6.3 x 8	18	1903	1100	330	A759EK227M1A(1)E018
10	11.5	330	6.3 x 8	18	2699	1560	495	A759EK337M1A(1)E018
10	11.5	470	8 x 12	14	4844	2800	705	A759KS477M1A(1)E014
10	11.5	820	8 x 12	13	5190	3000	1230	A759KS827M1A(1)E013
10	11.5	1000	10 x 12	12	7093	4100	1500	A759MS108M1A(1)E012
10	11.5	1500	10 x 12	12	7785	4500	2250	A759MS158M1A(1)E012
16	18.4	100	6.3 x 8	18	1903	1100	240	A759EK107M1C(1)E018
16	18.4	220	8 x 12	15	4429	2560	528	A759KS227M1C(1)E015
16	18.4	330	8 x 12	15	4429	2560	792	A759KS337M1C(1)E015
16	18.4	470	10 x 12	15	5363	3100	1128	A759MS477M1C(1)E015
16	18.4	560	10 x 12	15	6055	3500	1344	A759MS567M1C(1)E015
25	28.75	100	8 x 12	25	1817	1050	375	A759KS107M1E(1)E025
25	28.75	150	8 x 12	25	1990	1150	562.5	A759KS157M1E(1)E025
25	28.75	220	10 x 12	22	3633	2100	825	A759MS227M1E(1)E022
25	28.75	220	8 x 12	25	2699	1560	825	A759KS227M1E(1)E025
25	28.75	330	10 x 12	22	4429	2560	1237.5	A759MS337M1E(1)E022
25	28.75	470	10 x 12	20	4844	2800	1762.5	A759MS477M1E(1)E020
35	40.3	10	5 x 11	90	340	200	120	A759BQ106M1V(1)E090
35	40.3	22	5 x 11	80	600	350	120	A759BQ226M1V(1)E080
35	40.3	33	5 x 11	75	690	400	173	A759BQ336M1V(1)E075
35	40.3	100	8 x 12	31	4290	2500	525	A759KS107M1V(1)E031
35	40.3	150	10 x 12	30	4630	2700	788	A759MS157M1V(1)E030
35	40.3	180	8 x 11.5	24	3,400	2,000	1260	A759KR187M1V(1)E024
35	40.3	220	8 x 11.5	24	3,400	2,000	1540	A759KR227M1V(1)E024
35	40.3	270	10 x 12.5	22	3,740	2,200	1890	A759MU277M1V(1)E022
35	40.3	330	10 x 12.5	22	3,740	2,200	2310	A759MU337M1V(1)E022
50	57.5	10	5 x 11	105	380	220	120	A759BQ106M1H(1)E105
50	57.5	22	5 x 11	75	560	310	165	A759BQ226M1H(1)E075
50	57.5	39	8 x 12	42	1630	950	293	A759KS396M1H(1)E042
50	57.5	68	10 x 12	32	2300	1440	510	A759MS686M1H(1)E032
50	57.5	100	10 x 12	31	2830	1650	750	A759MS107M1H(1)E031
50	57.5	440	10 x 18	28	6010	3500	3300	A759MX447M1H(1)E028
50	57.5	680	13 x 20	26	6520	3800	5100	A759PY687M1H(1)E026
VDC	VDC Surge	Rated Capacitance	Case Size	ESR	RC	RC	LC	Part Number

(1) Please see packaging codes for options.
(2) Electrical Parameters code. See Part Number System for available options.

Table 1 – Ratings & Part Number Reference cont.

VDC	VDC Surge Voltage	Rated Capacitance 120 Hz 20°C (µF)	Case Size D x L (mm)	ESR 100 kHz 20°C (mΩ)	RC 100 kHz 105°C (mA)	RC 100 kHz 125°C (mA)	LC 20°C 2 minutes (µA)	KEMET Part Number
63	72.5	10	6.3 x 5	60	1,658	975	126	A759EA106M1J(1)E060
63	72.5	12	6.3 x 5	60	1,658	975	151	A759EA126M1J(1)E060
63	72.5	22	6.3 x 8	54	1,998	1,175	277	A759EK226M1J(1)E054
63	72.5	22	8 x 6	54	1,998	1,175	277	A759KC226M1J(1)E054
63	72.5	27	6.3 x 8	54	1,998	1,175	340	A759EK276M1J(1)E054
63	72.5	27	8 x 6	54	1,998	1,175	340	A759KC276M1J(1)E054
63	72.5	33	8 x 8	36	2,720	1,600	416	A759KK336M1J(1)E036
63	72.5	39	8 x 8	36	2,720	1,600	491	A759KK396M1J(1)E036
63	72.5	47	8 x 12	68	1630	950	444	A759KS476M1J(1)E068
63	72.5	68	10 x 12	47	1970	1150	643	A759MS686M1J(1)E047
63	72.5	82	10 x 12	50	2500	1380	775	A759MS826M1J(1)E050
63	72.5	150	10 x 16	48	2610	1520	1418	A759MW157M1J(1)E048
63	72.5	220	10 x 20	45	3600	2100	2079	A759MY227M1J(1)E045
63	72.5	330	13 x 20	42	4030	2350	3119	A759PY337M1J(1)E042
80	92	10	8 x 8	75	952	550	120	A759KK106M1K(1)E075
80	92	18	8 x 8	75	1,055	610	216	A759KK186M1K(1)E075
80	92	33	8 x 12	55	1,839	1,063	396	A759KS336M1K(1)E055
80	92	47	8 x 12	45	2,163	1,250	564	A759KS476M1K(1)E045
80	92	56	10 x 12	45	2,630	1,520	672	A759MS566M1K(1)E045
100	115	4.7	6.3 x 11	160	510	300	120	A759EQ475M2A(1)E160
100	115	15	8 x 12	52	1,850	680	225	A759KS156M2A(1)E052
100	115	22	10 x 12	45	2,300	720	330	A759MS226M2A(1)E045
160	184	10	8 x 12	110	1,350	550	240	A759KS106M2C(1)E110
160	184	15	10 x 12	94	1,580	685	360	A759MS156M2C(1)E094
160	184	18	10 x 12	90	1,944	720	432	A759MS186M2C(1)E090
250	287.5	2.2	8 x 8	685	210	70	120	A759KK225M2E(1)E685
250	287.5	3.3	8 x 12	512	450	175	124	A759KS335M2E(1)E512
250	287.5	4.7	8 x 12	496	650	210	176	A759KS475M2E(1)E496
250	287.5	6.8	10 x 12	482	780	250	255	A759MS685M2E(1)E482
250	287.5	8.2	10 x 12	458	950	315	308	A759MS825M2E(1)E458
250	287.5	82	18 x 31	150	3,200	1,750	3075	A759SZ826M2E(1)E150
250	287.5	220	22 x 45	250	1,800	1,000	8250	A759TC227M2E(1)E250
VDC	**VDC Surge**	**Rated Capacitance**	**Case Size**	**ESR**	**RC**	**RC**	**LC**	**Part Number**

(1) Please see packaging codes for options.
(2) Electrical Parameters code. See Part Number System for available options.

Installing

Solid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that electrolytic capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

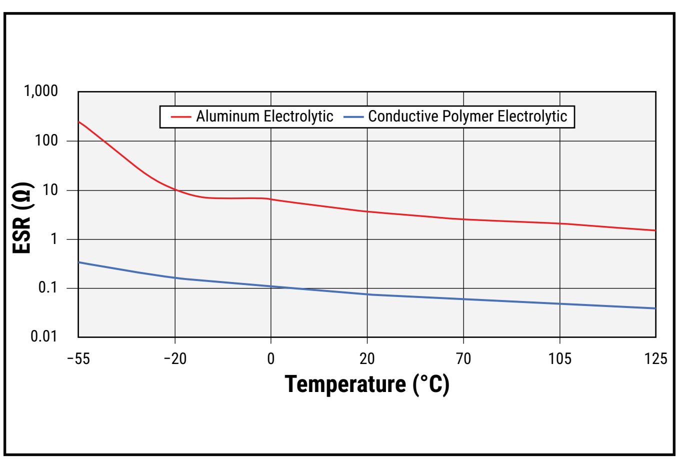
Temperature Stability Characteristics

Stable characteristics in a very low temperature range allows for less circuits in the design.

Due to a solid polymer electrolyte, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

The ESR of polymer capacitors is nearly constant within its operating temperature range, while the ESR of a standard electrolytic capacitor noticeably changes with temperature.

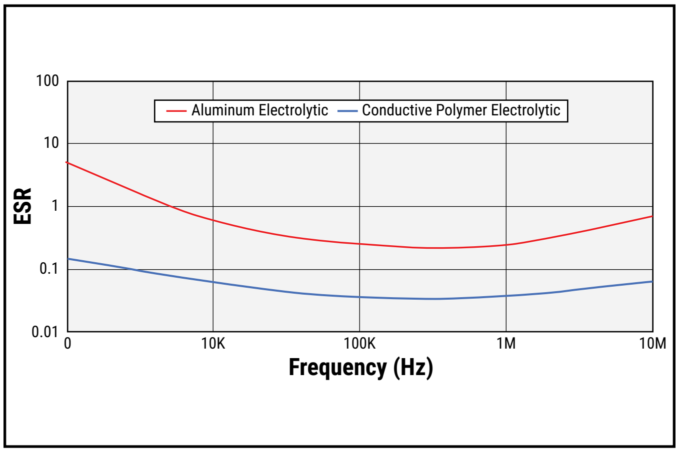
Temperature Stability Characteristics



Stability of ESR across Frequency Range

Due to a solid polymer electrolyte, the ESR curve of a solid polymer aluminum capacitor, is lower and more stable than that of a standard electrolytic capacitor.

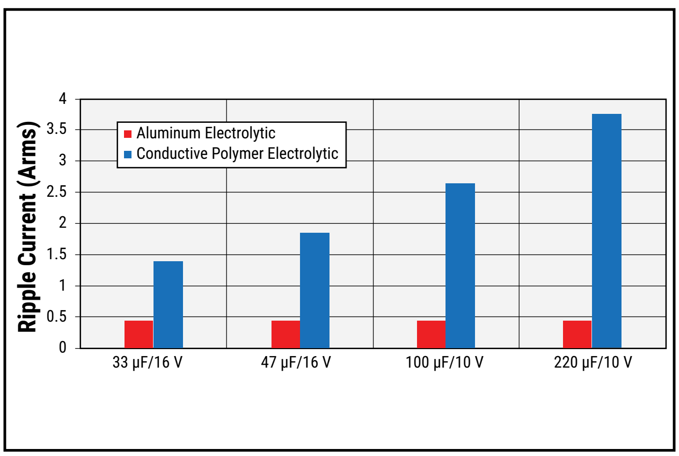
Stable ESR Values across Frequency



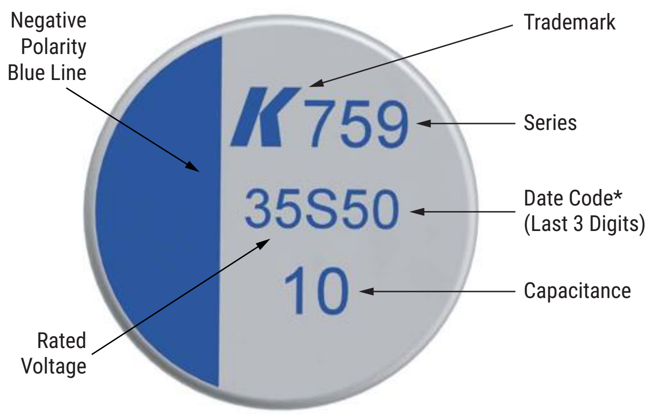
High Resistance to Ripple Current

As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation.

Allowable Ripple Current (100 kHz 105°C)



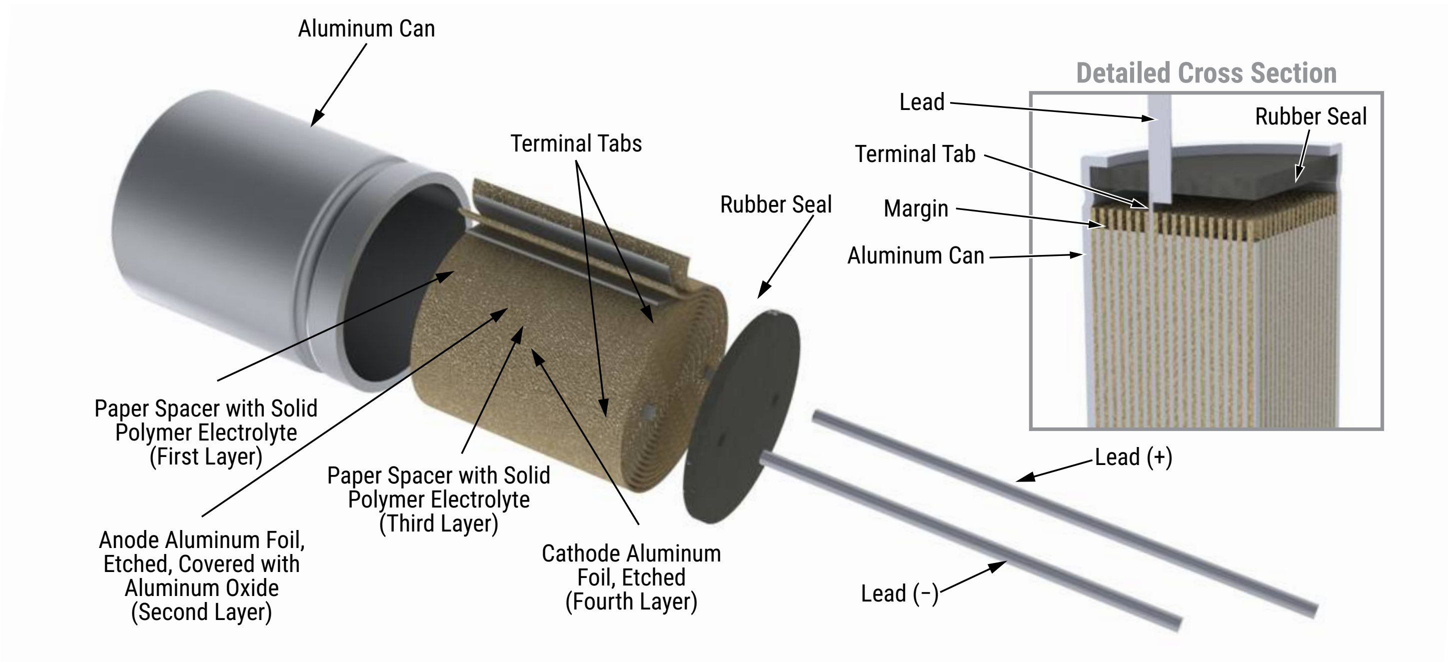
Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	S = 2019
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year
Year Code	
S	2019
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Note: Sizes utilzing PET sleeve have printing on the sleeve rather than the top. The sleeve color can vary but is normally a blue/purple color.

Construction



Flow Soldering (not suitable for SMD parts)

The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors' terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Flow Soldering

	Temperature (°C)	Maximum Time (Seconds)	Maximum Repetitions
Pre-heat	< 120	< 120	1
Solder	260±5°C	< 10	2

Taping for Automatic Insertion Machines

Fig. 1 (Diameter Φ5) 5 mm formed to 2.5 mm FA

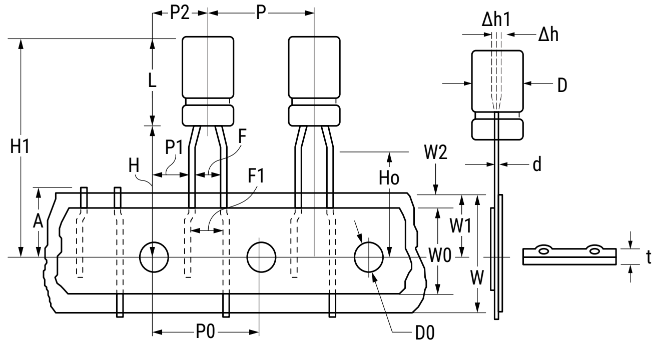


Fig. 2 (Diameter for Φ5 to Φ8) 5 – 8 mm formed to 5 mm DA

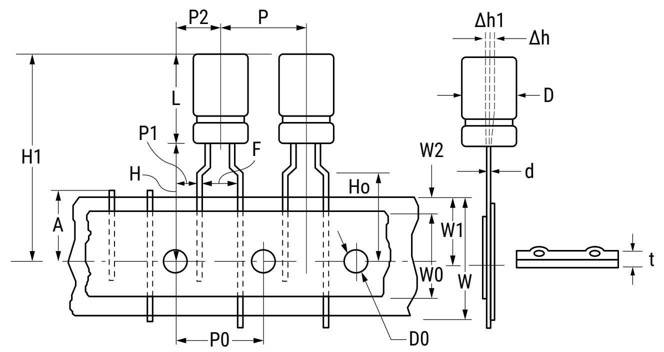


Fig. 3 (Diameter for Φ6 to Φ8) 6 – 8 mm EA

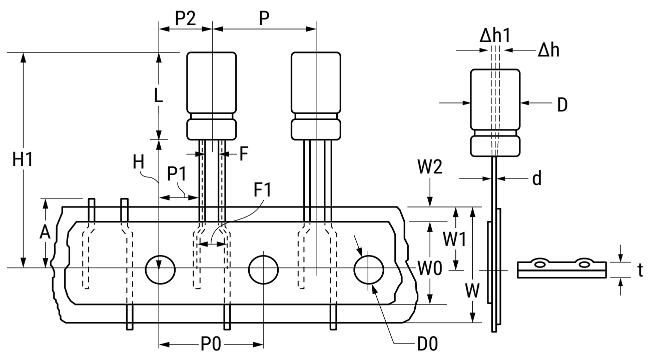
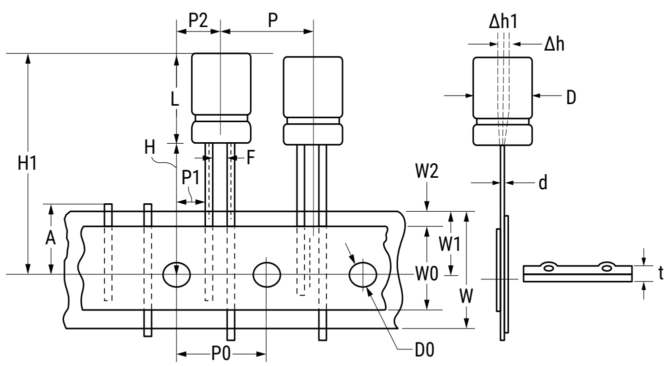


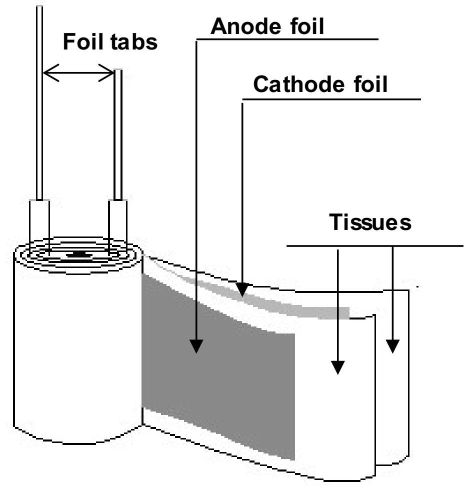
Fig. 4 (Diameter for Φ10) 10 mm EA



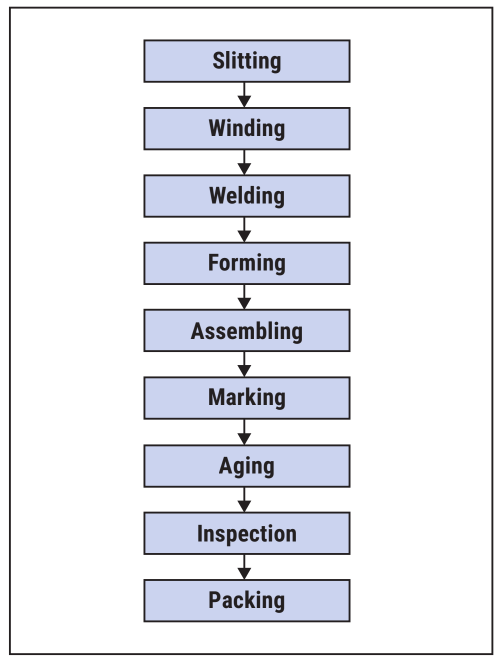
<table>
<tr><th>Dimensions (mm)</th><th>D</th><th>L</th><th>d</th><th>P</th><th>P0</th><th>P1</th><th>P2</th><th>F</th><th>W</th><th>W0</th><th>W1</th><th>W2</th><th>H</th><th>Ho</th><th>D0</th><th>A</th><th>H1</th><th>Δh</th><th>Δh1</th><th>t</th></tr>
<tr><td>Tolerance</td><td>±0.5</td><td></td><td>±0.02</td><td>±1.0</td><td>±0.2</td><td>±0.7</td><td>±1.0</td><td>±0.5</td><td>±0.5</td><td>Min.</td><td>±0.5</td><td>Max.</td><td>±0.75</td><td>±0.5</td><td>±0.2</td><td>Max.</td><td>Max.</td><td>±2</td><td>±1</td><td>±0.3</td></tr>
<tr><td rowspan="2">Formed to 2.5 mm</td><td rowspan="2">5</td><td>7.0</td><td rowspan="2">0.5</td><td rowspan="2">12.7</td><td rowspan="2">12.7</td><td rowspan="2">5.1</td><td rowspan="2">6.35</td><td rowspan="2">2.5</td><td rowspan="2">18</td><td rowspan="2">12.5</td><td rowspan="2">9</td><td rowspan="2">1.5</td><td rowspan="2">17.5</td><td rowspan="2">16</td><td rowspan="14">4</td><td rowspan="14">11</td><td rowspan="9">32.5</td><td rowspan="14">0</td><td rowspan="14">0</td><td rowspan="14">0.7</td></tr>
<tr><td>9–11</td></tr>
<tr><td rowspan="4">Formed to 5 mm</td><td>5</td><td>7–11</td><td rowspan="3">0.5</td><td rowspan="4">12.7</td><td rowspan="4">12.7</td><td rowspan="4">3.85</td><td rowspan="4">6.35</td><td rowspan="4">5</td><td rowspan="4">18</td><td rowspan="4">12.5</td><td rowspan="4">9</td><td rowspan="4">1.5</td><td rowspan="4">18.5</td><td rowspan="4">16</td></tr>
<tr><td>6.3</td><td>8–11</td></tr>
<tr><td rowspan="2">8</td><td>8.0</td></tr>
<tr><td>12.0</td><td>0.6</td></tr>
<tr><td rowspan="3">Straight leads
6 – 8 mm</td><td>6.3</td><td>8–11</td><td rowspan="2">0.5</td><td rowspan="3">12.7</td><td rowspan="3">12.7</td><td rowspan="3">5.4</td><td rowspan="3">6.35</td><td>2.5</td><td rowspan="3">18</td><td rowspan="3">12.5</td><td rowspan="3">9</td><td rowspan="3">1.5</td><td rowspan="2">18.5</td><td rowspan="8">--</td></tr>
<tr><td rowspan="2">8</td><td>8.0</td><td rowspan="2">3.5</td></tr>
<tr><td>12.0</td><td>0.6</td><td>20</td></tr>
<tr><td rowspan="5">Straight leads
10 – 13 mm</td><td rowspan="4">10</td><td>12</td><td rowspan="5">0.6</td><td rowspan="4">12.7</td><td rowspan="4">12.7</td><td rowspan="4">3.85</td><td rowspan="4">6.35</td><td rowspan="5">5</td><td rowspan="5">18</td><td rowspan="5">12.5</td><td rowspan="5">9</td><td rowspan="5">1.5</td><td rowspan="5">18.5</td><td>33</td></tr>
<tr><td>16.0</td><td>36</td></tr>
<tr><td>18.0</td><td rowspan="2">41</td></tr>
<tr><td>20.0</td></tr>
<tr><td>13</td><td>20.0</td><td>15</td><td>15</td><td>5</td><td>7.5</td><td>40.5</td></tr>
</table>

Construction Data

The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.



The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.



Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

Surface Mount Solid Polymer Aluminum Capacitors

A768 125°C

Overview

KEMET’s Surface Mount Solid Polymer Aluminum Capacitors offer longer life and greater stability across a wide range of temperatures. This highly conductive solid polymer electrolyte eliminates the risk of drying out and, due to its low ESR properties, is able to withstand higher ripple currents during normal operation. This series is ideally suited for automotive and industrial applications. This series is AEC-Q200 qualified for voltages up to 63 V and upon request for 80 V. Anti-Vibration version is available for 10 mm diameter. See Part Number system to order AEC-Q200 qualified parts. If CV/Size is not available please [contact your local Sales Representative for more information.]

Applications

Typical applications include long life LED drivers, professional power amplifiers, industrial power supplies, DC/DC converters, voltage regulators, and decoupling. For voltages ≤ 63 V, this series is used for automotive powertrain.

Benefits

- Surface mount form factor
- Ultra low impedance
- High ripple current
- High voltage
- High temperature; 125°C/2,000 hours
- High vibration resistance up to 30 g
- RoHS compliant
- Halogen-free

Standard

Anti-Vibration

Part Number System

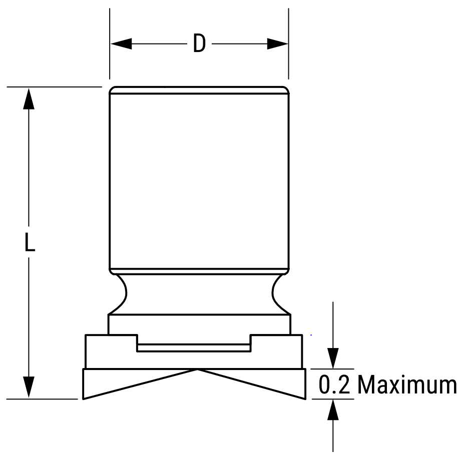
A	768	EB	127	M	1D	LA	E	034
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Surface Mount Solid Polymer Aluminum Capacitors 125°C 2,000 hours High Temperature	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	16 = 1C 20 = 1D 25 = 1E 35 = 1V 40 = 1G 50 = 1H 63 = 1J 80 = 1K	LA = Tape & Reel	E = Standard/ESR S = Automotive V = Automotive + Anti-Vibration AEC-Q200 available up to 63 V (80 V upon request)	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

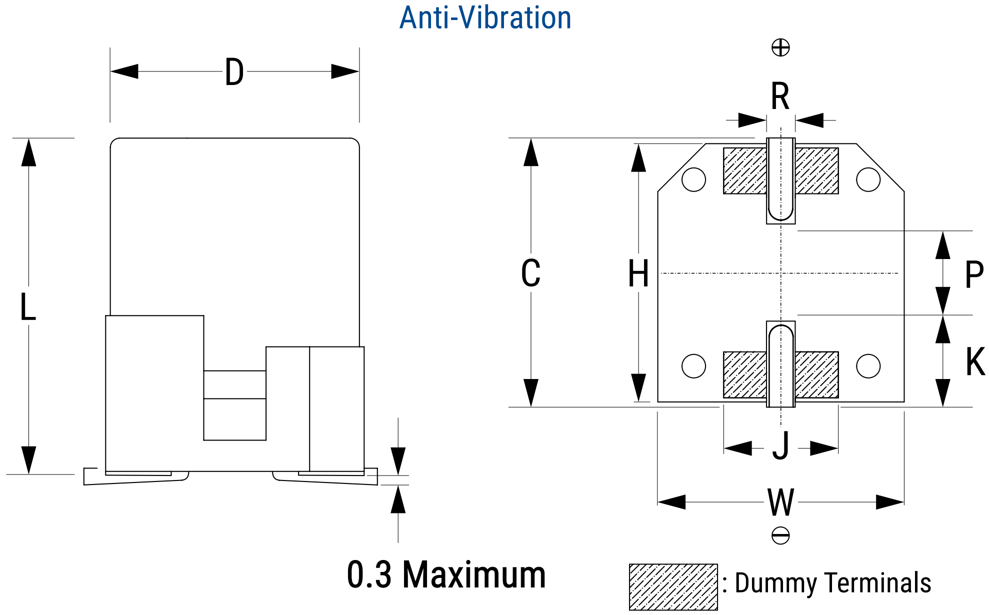
Packaging Type	Packaging Code
Standard Packaging Options	
Tape & Reel	LA
Contact KEMET for other Lead and Packaging options	

Dimensions – Millimeters

Standard



Anti-Vibration



Size Code	D		L		W		H		C		R	P	J	K
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Range	Nominal	Nominal	Nominal
EB	6.3	±0.5	5.7	±0.3	6.6	±0.2	6.6	±0.2	7.3	±0.2	0.5 – 0.8	2.0	-	-
KE	8	±0.5	6.7	±0.3	8.3	±0.2	8.3	±0.2	9	±0.2	0.8 – 1.1	3.1	-	-
KS	8	±0.5	12.2	±0.3	8.3	±0.2	8.3	±0.2	9	±0.2	0.8 – 1.1	3.2	-	-
MS	10	±0.5	12.2	±0.5	10.3	±0.2	10.3	±0.2	11	±0.2	0.8 – 1.1	4.6	-	-
MS (Anti-Vibration)	10	±0.5	12.4	±0.5	10.3	±0.2	10.8	±0.2	11	±0.2	0.7 – 1.1	4.6	4.4	3.2

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant, and Halogen-Free.

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and make any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free or LFW = Lead-free wires on the label.

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	18 – 1,000 µF
Rated Voltage	16 – 80 VDC
Operating Temperature	−55°C to +125°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	2,000 hours (see conditions in Test Method & Performance)
Leakage Current	I = 0.2 CV
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
Coefficient	0.05	0.30	0.70	1.00

Test Method & Performance

Conditions	Load Life Test	Shelf Life Test
Temperature	125°C	125°C
Test Duration	2,000 hours	168 hours
Ripple Current	No ripple current applied	No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 1,000 hours at 60°C, 90%~95% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Surge Voltage (Rated Voltage x 1.15(V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles, each consisting of charge with the surge voltages specified at 125°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes, 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Resistance to Soldering Heat	**Measurement for solder temperature profile at capacitor top and terminal.**	
Capacitance Change	Within ±10% of the initial value	
Dissipation Factor	Does not exceed 130% of the specified value	
ESR	Does not exceed 130% of the specified value	
Leakage Current	Does not exceed specified value	

Test Method & Performance – Anti-Vibration Version

Anti-Vibration Version	
Vibration Test Specifications	1.5 mm displacement amplitude or 30 g maximum acceleration. Vibration applied for three 4-hour sessions at 10 – 2,000 Hz (capacitor on PCB).
Capacitance Change	Within ±20% of the initial value
Dissipation Factor	Does not exceed 150% of the specified value
ESR	Does not exceed 150% of the specified value
Leakage Current	Does not exceed specified value

Shelf Life & Re-Ageing

Shelf Life
Solderability is 12 months after manufacturing date.

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

• This series should not be stored in high temperatures or where there is a high level of humidity.
• The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
• Do not store in damp conditions such as water, saltwater spray or oil spray.
• Do not store in an environment of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.)
•Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 12 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

Note: The JEDEC-J-STD-020 standard does not apply.

Floor Life
The Capacitor should be soldered within 4 weeks after removal from sealed bag. Reseal the unused capacitors into plastic bags. All parts manufactured from week 1 of year 2022 are packed in sealed plastic bags.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 125°C for a period of 120 minutes through a 1 kΩ series resistor.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Surge Voltage	Rated Capacitance	ESR	Ripple Current	Leakage Current	Case Size	KEMET Part Number		Case Size
(VDC)	(VDC)	120 Hz 20°C (µF)	100 kHz 20°C (mΩ)	100 kHz 125°C (mA)	20°C 2 min (µA)	D x L (mm)	() Represents Part Number Options	Anti-Vibration Version	D x L (mm) Anti-Vibration
16	18.40	470	17	2,500	1,504	8 × 12.2	A768KS477M1CLA(1)017	-	-
16	18.40	560	17	2,500	1,792	8 × 12.2	A768KS567M1CLA(1)017	-	-
16	18.40	680	15	2,700	2,176	10 × 12.2	A768MS687M1CLA(1)015	A768MS687M1CLAV015	10 × 12.4
16	18.40	1000	15	2,700	3,200	10 × 12.2	A768MS108M1CLA(1)015	A768MS108M1CLAV015	10 × 12.4
20	23.00	120	34	1,300	480	6.3 × 5.7	A768EB127M1DLA(1)034	-	-
20	23.00	180	29	1,600	720	8 × 6.7	A768KE187M1DLA(1)029	-	-
20	23.00	220	29	1,600	880	8 × 6.7	A768KE227M1DLA(1)029	-	-
20	23.00	390	17	2,400	1,560	8 × 12.2	A768KS397M1DLA(1)017	-	-
20	23.00	680	15	2,600	2,720	10 × 12.2	A768MS687M1DLA(1)015	A768MS687M1DLAV015	10 × 12.4
25	28.75	47	42	1,175	235	6.3 × 5.7	A768EB476M1ELA(1)042	-	-
25	28.75	56	40	1,200	280	6.3 × 5.7	A768EB566M1ELA(1)040	-	-
25	28.75	82	36	1,255	410	6.3 × 5.7	A768EB826M1ELA(1)036	-	-
25	28.75	100	36	1,255	500	6.3 × 5.7	A768EB107M1ELA(1)036	-	-
25	28.75	150	29	1,600	750	8 × 6.7	A768KE157M1ELA(1)029	-	-
25	28.75	180	29	1,600	900	8 × 6.7	A768KE187M1ELA(1)029	-	-
25	28.75	330	19	2,325	1,650	8 × 12.2	A768KS337M1ELA(1)019	-	-
25	28.75	390	19	2,325	1,950	8 × 12.2	A768KS397M1ELA(1)019	-	-
25	28.75	470	17	2,500	2,350	10 × 12.2	A768MS477M1ELA(1)017	A768MS477M1ELAV017	10 × 12.4
25	28.75	560	17	2,500	2,800	10 × 12.2	A768MS567M1ELA(1)017	A768MS567M1ELAV017	10 × 12.4
35	40.25	47	42	1,175	329	6.3 × 5.7	A768EB476M1VLA(1)042	-	-
35	40.25	56	42	1,175	392	6.3 × 5.7	A768EB566M1VLA(1)042	-	-
35	40.25	82	36	1,400	574	8 × 6.7	A768KE826M1VLA(1)036	-	-
35	40.25	100	36	1,400	700	8 × 6.7	A768KE107M1VLA(1)036	-	-
35	40.25	180	24	2,000	1,260	8 × 12.2	A768KS187M1VLA(1)024	-	-
35	40.25	220	24	2,000	1,540	8 × 12.2	A768KS227M1VLA(1)024	-	-
35	40.25	270	22	2,200	1,890	10 × 12.2	A768MS277M1VLA(1)022	A768MS277M1VLAV022	10 × 12.4
35	40.25	330	22	2,200	2,310	10 × 12.2	A768MS337M1VLA(1)022	A768MS337M1VLAV022	10 × 12.4
40	46.00	33	45	1,150	264	6.3 × 5.7	A768EB336M1GLA(1)045	-	-
40	46.00	39	45	1,150	312	6.3 × 5.7	A768EB396M1GLA(1)045	-	-
40	46.00	68	38	1,350	544	8 × 6.7	A768KE686M1GLA(1)038	-	-
40	46.00	82	38	1,350	656	8 × 6.7	A768KE826M1GLA(1)038	-	-
40	46.00	150	25	1,950	1,200	8 × 12.2	A768KS157M1GLA(1)025	-	-
40	46.00	220	22	2,200	1,760	10 × 12.2	A768MS227M1GLA(1)022	A768MS227M1GLAV022	10 × 12.4
40	46.00	270	22	2,200	2,160	10 × 12.2	A768MS277M1GLA(1)022	A768MS277M1GLAV022	10 × 12.4
50	57.50	18	48	1,100	180	6.3 × 5.7	A768EB186M1HLA(1)048	-	-
50	57.50	22	48	1,100	220	6.3 × 5.7	A768EB226M1HLA(1)048	-	-
50	57.50	33	42	1,300	330	8 × 6.7	A768KE336M1HLA(1)042	-	-
50	57.50	39	42	1,300	390	8 × 6.7	A768KE396M1HLA(1)042	-	-
50	57.50	82	20	1,900	820	8 × 12.2	A768KS826M1HLA(1)020	-	-
50	57.50	100	24	2,150	1,000	10 × 12.2	A768MS107M1HLA(1)024	A768MS107M1HLAV024	10 × 12.4
50	57.50	100	30	1,900	1,000	8 × 12.2	A768KS107M1HLA(1)030	-	-
50	57.50	120	24	2,150	1,200	10 × 12.2	A768MS127M1HLA(1)024	A768MS127M1HLAV024	10 × 12.4
50	57.50	150	24	2,150	1,500	10 × 12.2	A768MS157M1HLA(1)024	A768MS157M1HLAV024	10 × 12.4
63	72.45	22	54	1,175	277	8 × 6.7	A768KE226M1JLA(1)054	-	-
63	72.45	27	54	1,175	340	8 × 6.7	A768KE276M1JLA(1)054	-	-
63	72.45	47	31	1,800	592	8 × 12.2	A768KS476M1JLA(1)031	-	-
63	72.45	56	31	1,800	706	8 × 12.2	A768KS566M1JLA(1)031	-	-
63	72.45	82	27	2,000	1,033	10 × 12.2	A768MS826M1JLA(1)027	A768MS826M1JLAV027	10 × 12.4
63	72.45	100	27	2,000	1,260	10 × 12.2	A768MS107M1JLA(1)027	A768MS107M1JLAV027	10 × 12.4
80	92.00	33	38	1,600	528	8 × 12.2	A768KS336M1KLA(1)038*	-	-
80	92.00	39	38	1,600	624	8 × 12.2	A768KS396M1KLA(1)038*	-	-
80	92.00	47	34	1,800	752	10 × 12.2	A768MS476M1KLA(1)034*	A768MS476M1KLAV034*	10 × 12.4
80	92.00	56	34	1,800	896	10 × 12.2	A768MS566M1KLA(1)034*	A768MS566M1KLAV034*	10 × 12.4
(VDC)	(VDC)	120 Hz 20°C (µF)	100 kHz 20°C (mΩ)	100 kHz 125°C (mA)	20°C 2 min (µA)	D x L (mm)	() Represents Part Number Options	Anti-Vibration Version	D x L (mm) Anti-Vibration
Rated Voltage	Surge Voltage	Rated Capacitance	ESR	Ripple Current	Leakage Current	Case Size	KEMET Part Number		Case Size

(1)Electrical Parameters code. See Part Number System for available options.
**AEC-Q200 Available Upon Request for 80 V*

Installing

Solid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that electrolytic capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

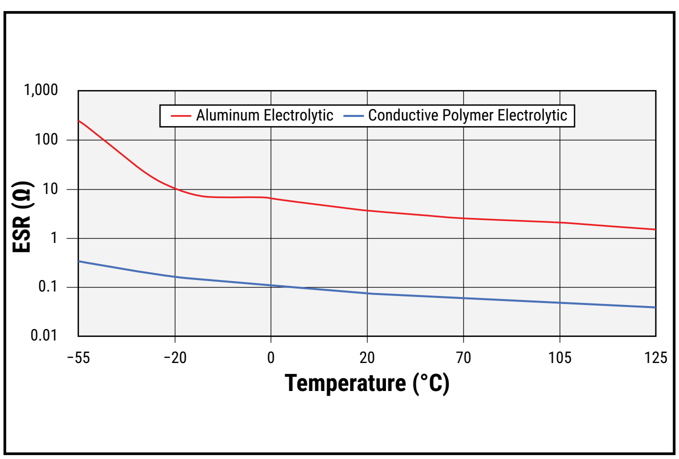
Temperature Stability Characteristics

Stable characteristics in a very low temperature range allows for less circuits in the design.

Due to a solid polymer electrolyte, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

The ESR of polymer capacitors is nearly constant within its operating temperature range, while the ESR of a standard electrolytic capacitor noticeably changes with temperature.

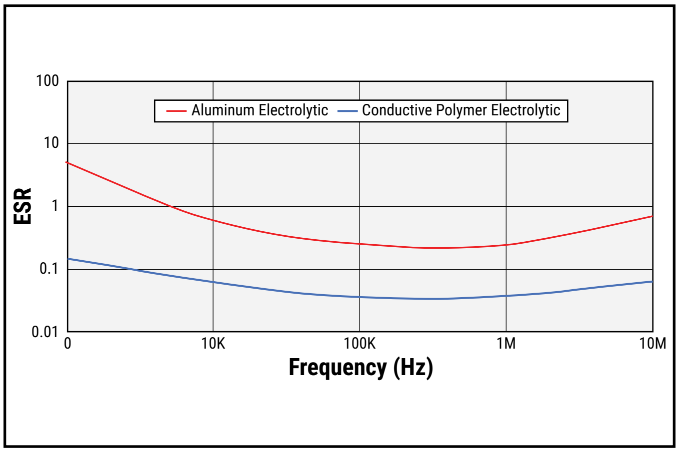
Temperature Stability Characteristics



Stability of ESR across Frequency Range

Due to a solid polymer electrolyte, the ESR curve of a solid polymer aluminum capacitor, is lower and more stable than that of a standard electrolytic capacitor.

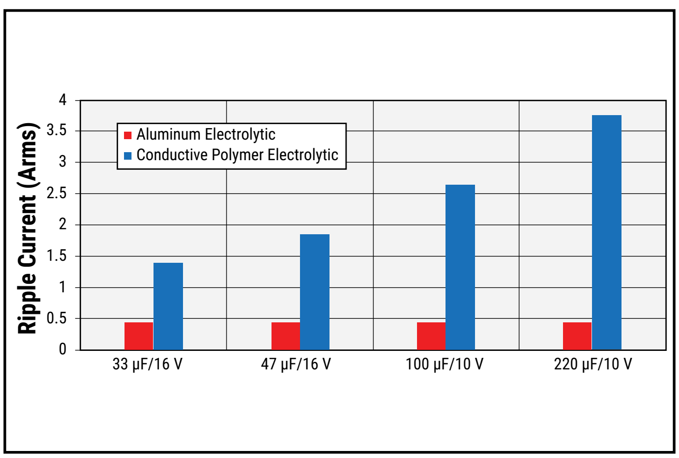
Stable ESR Values across Frequency



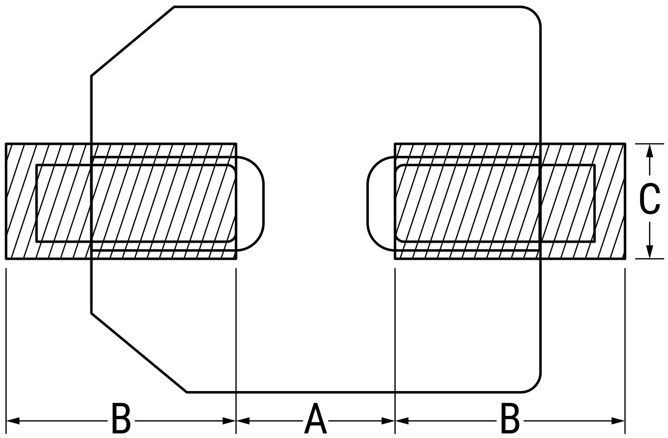
High Resistance to Ripple Current

As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation.

Allowable Ripple Current (100 kHz 105°C)



Landing Pad – Millimeters



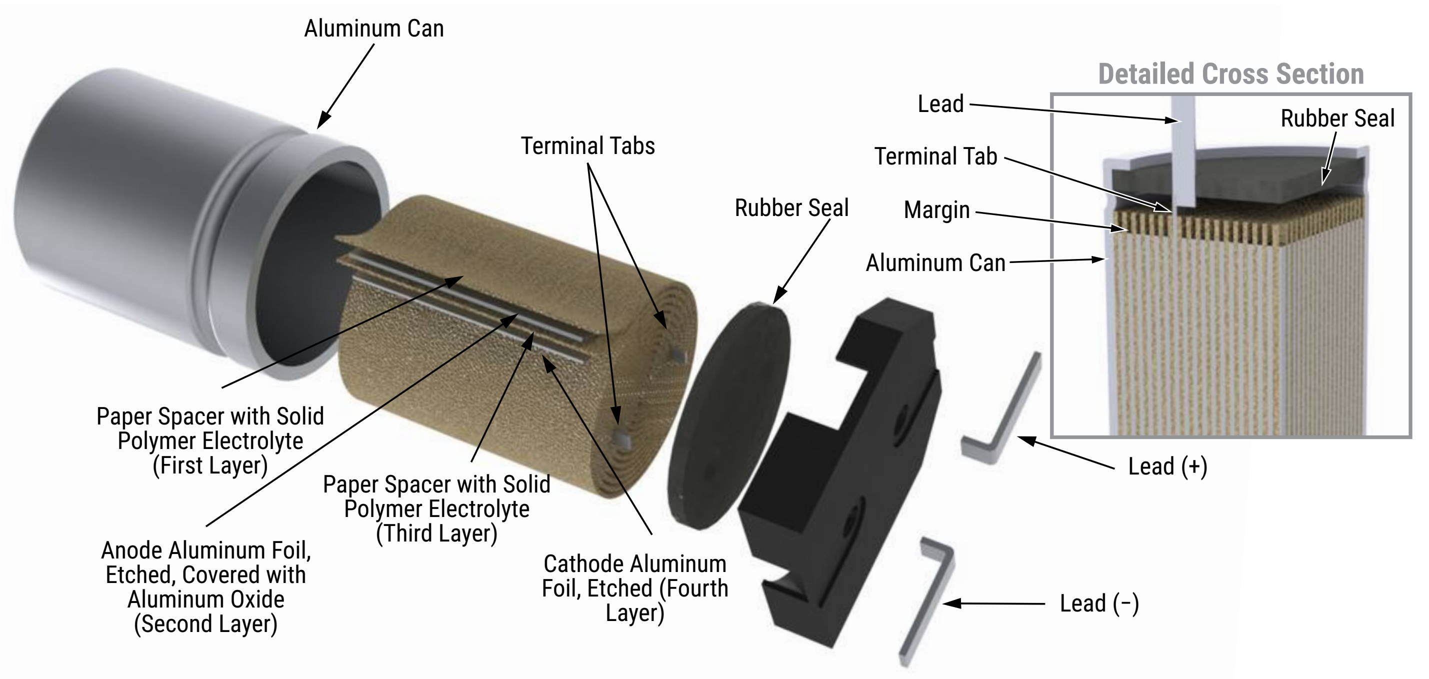
Diameter	A	B	C
5	1.4	3	1.6
6.3	1.9	3.5	1.6
8	3.1	4.2	2.2
10	4.5	4.4	2.2
10 (Anti-Vibration)	4.5	4.4	4.6

Marking

Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	S = 2019
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

Year Code	
S	2019
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction

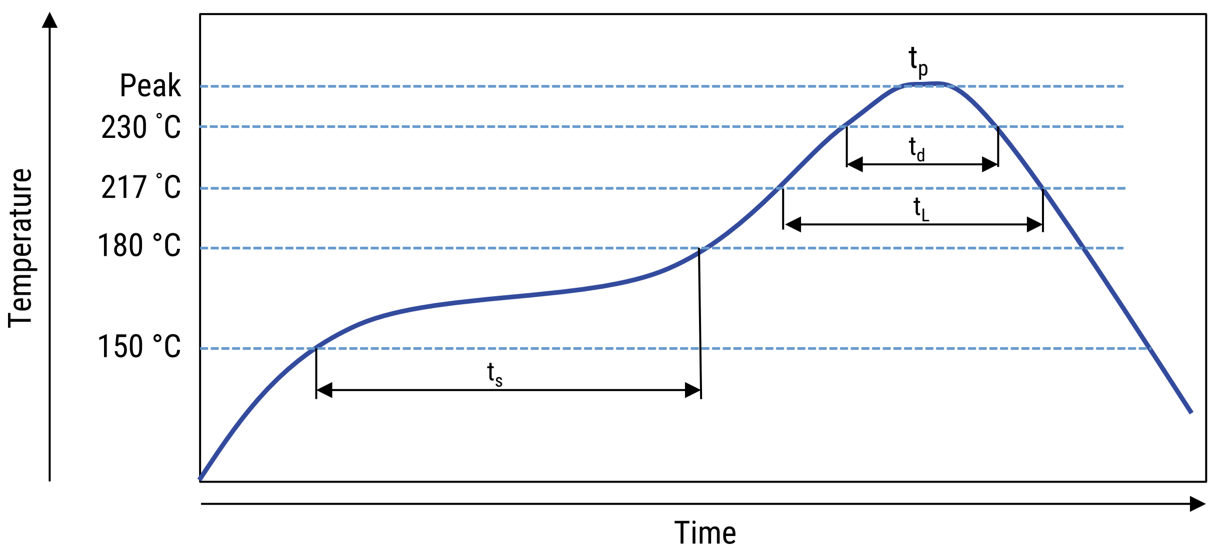


Re-Flow Soldering

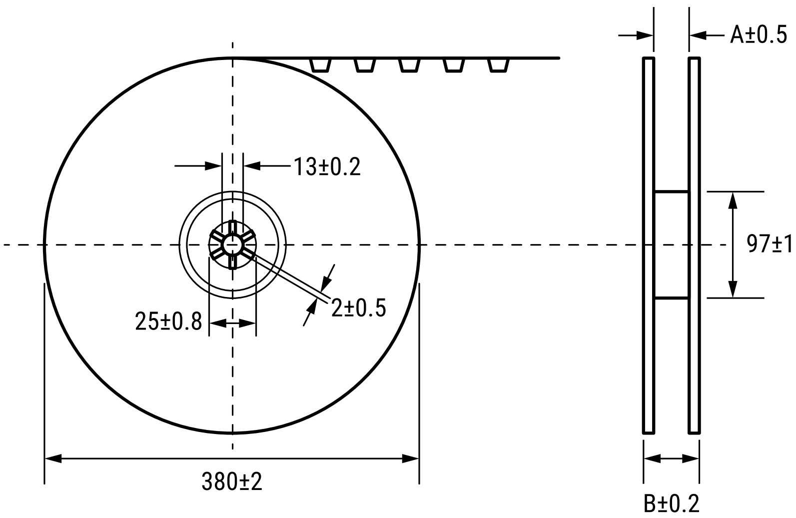
The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Time Period	Preheat t_s	t_L	t_d	t_p	Reflow Number
Temperature (°C)	150 – 180	≥ 217	≥ 230	260	1
				250	1 or 2
Time (seconds)	60 - 120	≤ 50	≤ 40	≤ 5	–

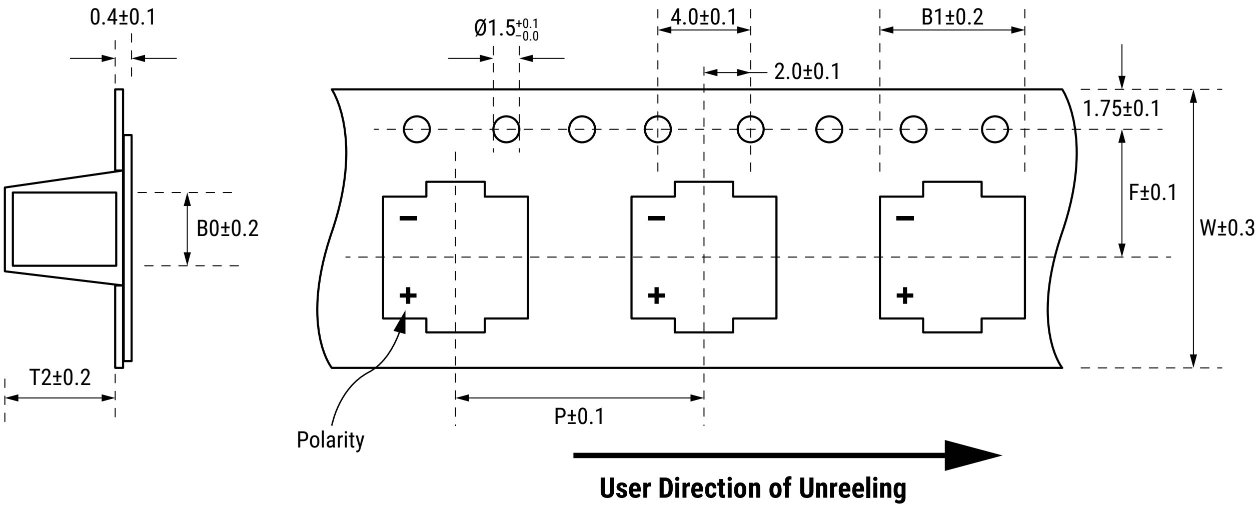


Lead Taping & Packaging



Size Code	Diameter (mm)	Length (mm)	Reel Quantity/SPQ	Box Quantity	Reel	
					A	B
					±0.5	±0.2
BC	5	6	1,000	10,000	17	21
BG	5	7	1,000	10,000	17	21
EB	6.3	5.7	1,000	10,000	18	22
EG	6.3	7	1,000	10,000	18	22
EK	6.3	8	1,000	10,000	18	22
EN	6.3	9.7	800	8,000	18	22
KE	8	6.7	1,000	6,000	26	30
KG	8	7	1,000	6,000	26	30
KH	8	7.5	500	3,000	26	30
KN	8	9.7	500	3,000	26	30
KS	8	12.2	400	2,400	26	30
MN	10	10	500	3,000	26	30
MS	10	12.2	400	2,400	26	30
MU	10	12.6	400	2,400	26	30
MS (Anti-Vibration)	10	12.4	400	2,400	26	30

Taping for Automatic Insertion Machines



Size Code	Diameter	Length	W	P	F	B1	B0	T2
	(mm)	(mm)	±0.3	±0.1	±0.1	±0.2	±0.2	±0.2
BC	5	6	16.0	12.0	7.5	5.6	5.6	7.1
BG	5	7	16.0	12.0	7.5	5.6	5.6	7.1
EB	6.3	5.7	16.0	12.0	7.5	7.0	7.0	7.6
EG	6.3	7.0	16.0	12.0	7.5	7.0	7.0	7.6
EK	6.3	8.0	16.0	12.0	7.5	7.0	7.0	7.6
EN	6.3	9.7	16.0	12.0	7.5	7.0	7.0	9.6
KE	8	6.7	24.0	12.0	11.5	8.6	8.6	6.8
KH	8	7.5	24.0	12.0	11.5	8.6	8.6	8.4
KN	8	9.7	24.0	16.0	11.5	8.6	8.6	10.3
KS	8	12.2	24.0	16.0	11.5	8.6	8.6	12.5
MN	10	10.0	24.0	16.0	11.5	10.7	10.7	10.1
MS	10	12.2	24.0	16.0	11.5	10.7	10.7	12.5
MS (Anti-Vbration)	10	12.4	24.0	16.0	11.5	11.2	10.7	12.7
MU	10	12.6	24.0	16.0	11.5	10.7	10.7	13.1

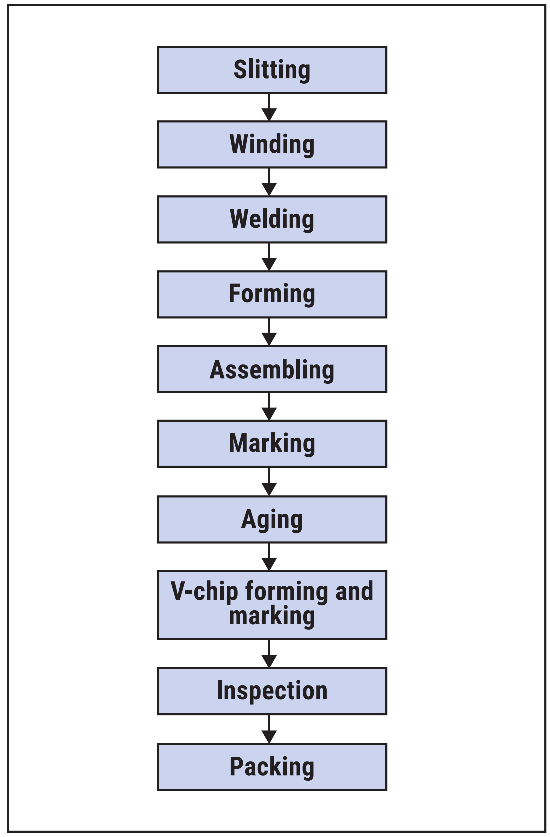
Construction Data

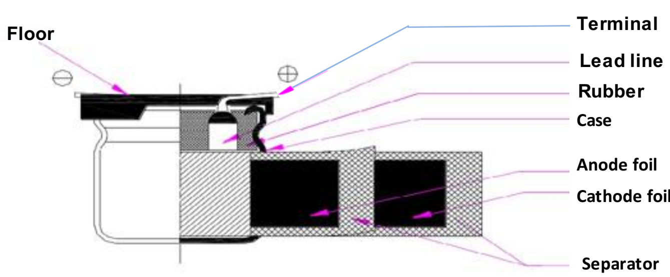
The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.

The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding





Surface Mount Solid Polymer Aluminum Capacitors

A766 105°C

KEMET
a YAGEO company

RoHS REACH COMPLIANT HF Halogen Free

Overview

KEMET's Surface Mount Solid Polymer Aluminum Capacitors offer longer life and greater stability across a wide range of temperatures. This highly conductive solid polymer electrolyte eliminates the risk of drying out and, due to its low ESR properties, is able to withstand higher ripple currents during normal operation. This series is ideally suited for industrial and commercial applications.

Applications

Typical applications include mobile phone chargers, adapters (laptop power supplies), and medical equipment.

Benefits

- Surface mount form factor
- Ultra low impedance
- High ripple current
- Long life
- 105°C/5,000 hours
- RoHS compliant
- Halogen-free

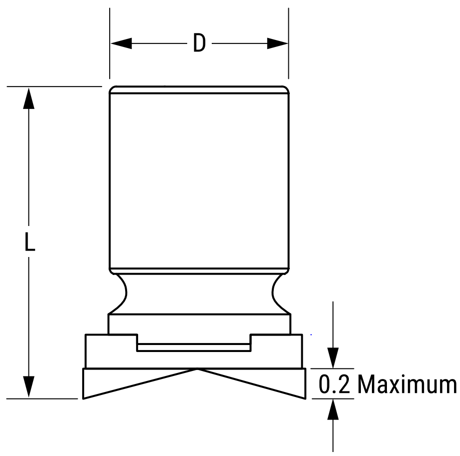
Part Number System

A	766	EB	157	M	0G	LA	E	022
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Surface Mount Solid Polymer Aluminum Capacitors 105°C 5,000 hours Long Life	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	4 = 0G 6.3 = 0J 10 = 1A 16 = 1C 20 = 1D 25 = 1E	LA = Tape & Reel	E = Standard/ESR	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

Packaging Type	Packaging Code
Standard Packaging Options	
Tape & Reel	LA
Contact KEMET for other Lead and Packaging options	

Dimensions – Millimeters



Size Code	D		L		W		H		C		R	P
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance		Nominal
EB	6.3	±0.5	5.7	±0.3	6.6	±0.2	6.6	±0.2	7.3	±0.2	0.5 – 0.8	2.0
KE	8	±0.5	6.7	±0.3	8.3	±0.2	8.3	±0.2	9	±0.2	0.8 – 1.1	3.1
KS	8	±0.5	12.2	±0.3	8.3	±0.2	8.3	±0.2	9	±0.2	0.8 – 1.1	3.2

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant, and Halogen-Free.

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and make any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free or LFW = Lead-free wires on the label.

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	10 – 560 µF
Rated Voltage	4 – 25 VDC
Operating Temperature	−55°C to +105°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	5,000 hours (see conditions in Test Method & Performance)
Leakage Current	≤ Specified Value
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
Coefficient	0.05	0.30	0.70	1.00

Test Method & Performance

Conditions	Load Life Test	Shelf Life Test
Temperature	105°C	105°C
Test Duration	5,000 hours	168 hours
Ripple Current	No ripple current applied	No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 1,000 hours at 60°C, 90%~95% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Surge Voltage (Rated Voltage x 1.15(V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles, each consisting of charge with the surge voltages specified at 105°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes, 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Resistance to Soldering Heat	**Measurement for solder temperature profile at capacitor top and terminal.**	
Capacitance Change	Within ±10% of the initial value	
Dissipation Factor	Does not exceed 130% of the specified value	
ESR	Does not exceed 130% of the specified value	
Leakage Current	Does not exceed specified value	

Shelf Life & Re-Ageing

Shelf Life
Solderability is 12 months after manufacturing date.

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

• This series should not be stored in high temperatures or where there is a high level of humidity.
• The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
• Do not store in damp conditions such as water, saltwater spray or oil spray.
• Do not store in an environment of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.)
•Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 12 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.
Note: The JEDEC-J-STD-020 standard does not apply.

Floor Life
The Capacitor should be soldered within 4 weeks after removal from sealed bag. Reseal the unused capacitors into plastic bags. All parts manufactured from week 1 of year 2022 are packed in sealed plastic bags.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 105°C for a period of 120 minutes through a 1 kΩ series resistor.

Table 1 – Ratings & Part Number Reference

VDC	VDC Surge Voltage	Rated Capacitance 120 Hz 20°C (µF)	Case Size D x L (mm)	ESR 100 kHz 20°C (mΩ)	RC 100 kHz 105°C (mA)	LC 20°C 2 Minutes (µA)	KEMET Part Number
4	4.6	150	6.3 × 5.7	22	2,570	120	A766EB157M0GLAE022
4	4.6	270	8 × 6.7	22	3,220	216	A766KE277M0GLAE022
4	4.6	560	8 × 6.7	22	3,220	448	A766KE567M0GLAE022
6.3	7.2	120	6.3 × 5.7	22	2,570	151.2	A766EB127M0JLAE022
6.3	7.2	220	6.3 × 5.7	22	2,570	277.2	A766EB227M0JLAE022
6.3	7.2	220	8 × 6.7	22	3,220	277.2	A766KE227M0JLAE022
6.3	7.2	390	8 × 6.7	22	3,220	491.4	A766KE397M0JLAE022
10	11.5	68	6.3 × 5.7	30	2,200	136	A766EB686M1ALAE030
10	11.5	120	6.3 × 5.7	27	2,320	240	A766EB127M1ALAE027
10	11.5	150	8 × 6.7	30	2,760	300	A766KE157M1ALAE030
16	18.4	39	6.3 × 5.7	37	2,050	124.8	A766EB396M1CLAE037
16	18.4	68	6.3 × 5.7	30	2,200	217.6	A766EB686M1CLAE030
16	18.4	82	8 × 6.7	30	2,760	262.4	A766KE826M1CLAE030
16	18.4	120	8 × 6.7	27	2,900	384	A766KE127M1CLAE027
16	18.4	270	8 × 12.2	14	4,350	864	A766KS277M1CLAE014
20	23	22	6.3 × 5.7	60	1,450	88	A766EB226M1DLAE060
20	23	47	8 × 6.7	45	1,890	188	A766KE476M1DLAE045
25	28.8	10	8 × 6.7	60	1,500	125	A766KE106M1ELAE060
VDC	**VDC Surge**	**Rated Capacitance**	**Case Size**	**ESR**	**RC**	**LC**	**KEMET Part Number**

(1)Electrical Parameters code. See Part Number System for available options.

Installing

Solid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that electrolytic capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

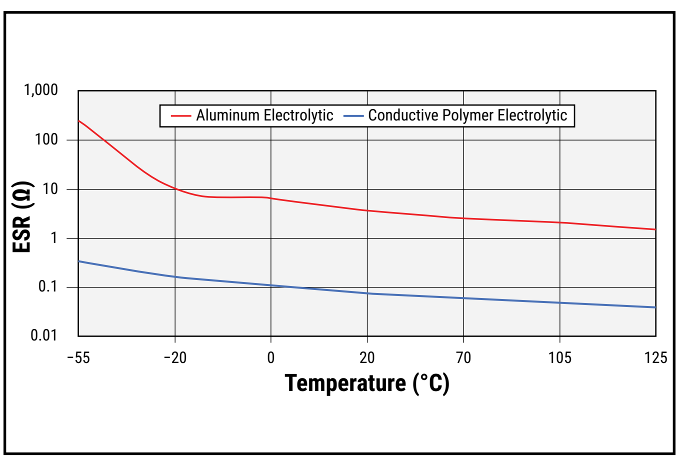
Temperature Stability Characteristics

table characteristics in a very low temperature range allows for less circuits in the design.

Due to a solid polymer electrolyte, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

The ESR of polymer capacitors is nearly constant within its operating temperature range, while the ESR of a standard electrolytic capacitor noticeably changes with temperature.

Temperature Stability Characteristics



Expected Life Calculation Chart

Expected life depends on operating temperature according to the following formula:

$L = Lo \times 10^{(To-T)/20}$

Where:

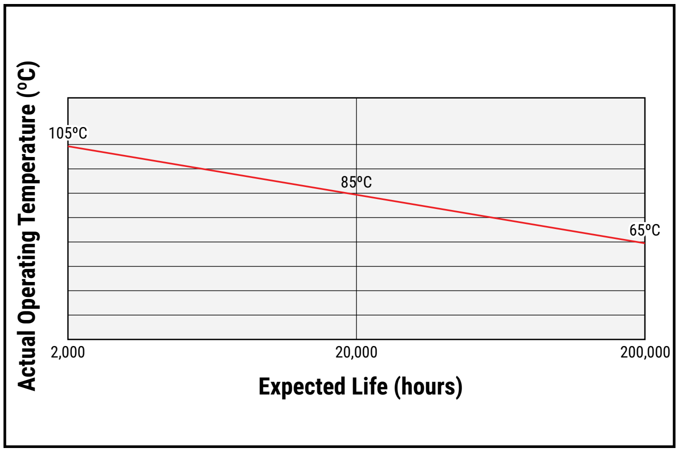
L: Expected life

Lo: Life at maximum permissible operating temperature with rated operating voltage applied (hours)

T: Actual operating temperature

To: Maximum permissible operating temperature

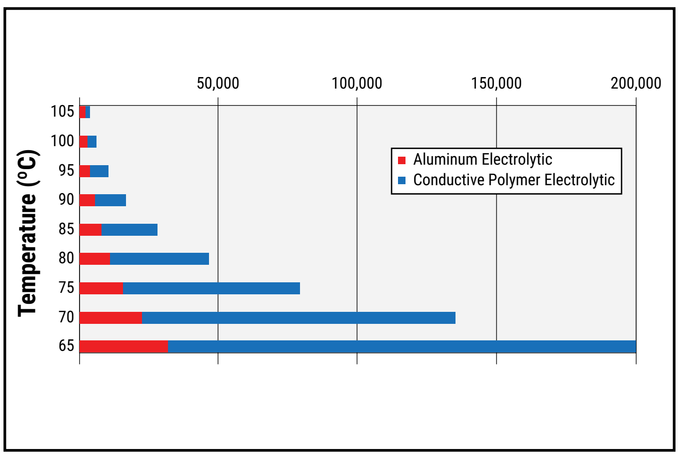
Expected Life Calculation Chart



The effect of derating temperature can be seen in this graph.

In this example, the life expectancy of a 2,000 hour polymer capacitor is significantly greater than that of a 2,000 hour standard electrolytic capacitor.

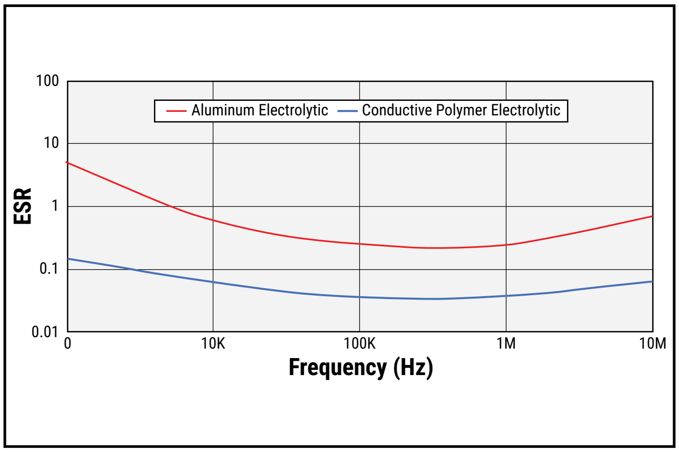
Capacitor Life (H)



Stability of ESR across Frequency Range

Due to a solid polymer electrolyte, the ESR curve of a solid polymer aluminum capacitor, is lower and more stable than that of a standard electrolytic capacitor.

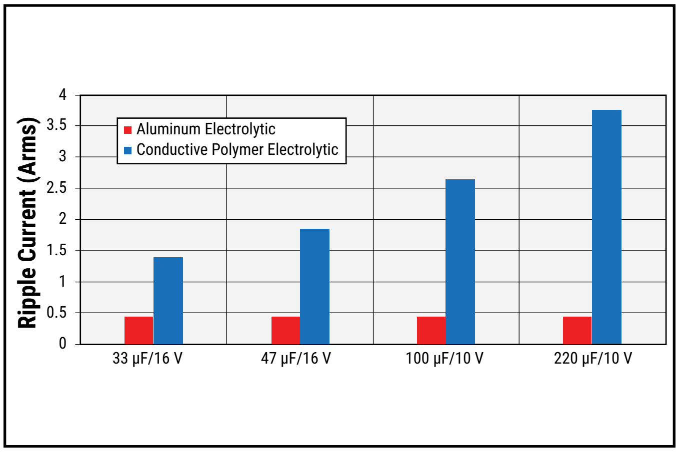
Stable ESR Values across Frequency



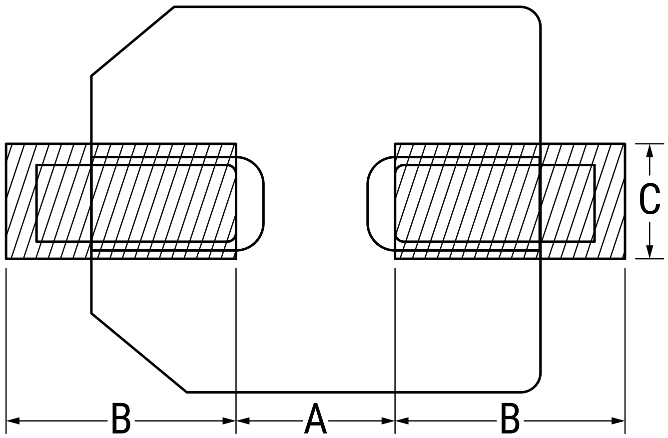
High Resistance to Ripple Current

As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation.

Allowable Ripple Current (100 kHz 105°C)

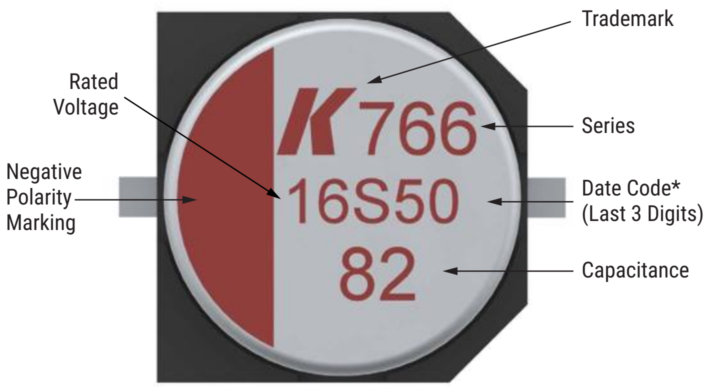


Landing Pad – Millimeters



Diameter	A	B	C
5	1.4	3	1.6
6.3	1.9	3.5	1.6
8	3.1	4.2	2.2
10	4.5	4.4	2.2

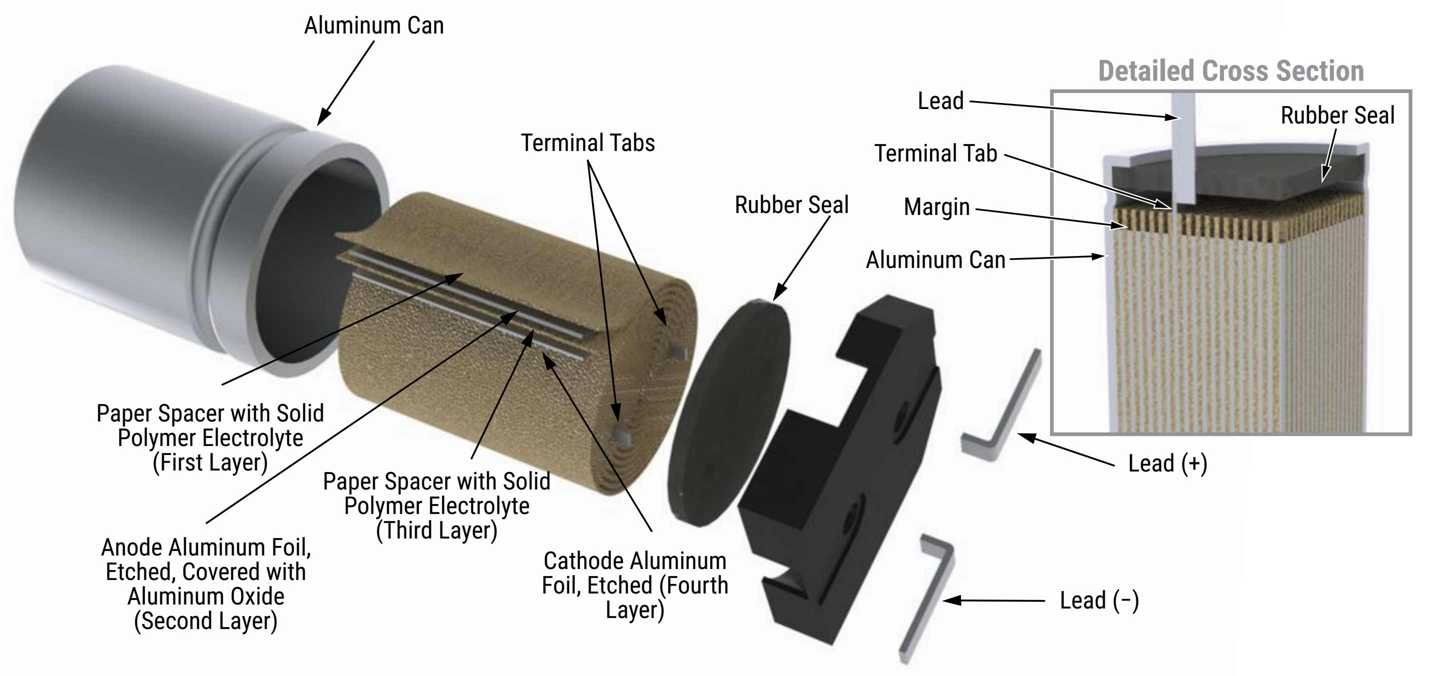
Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	S = 2019
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

Year Code	
S	2019
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction

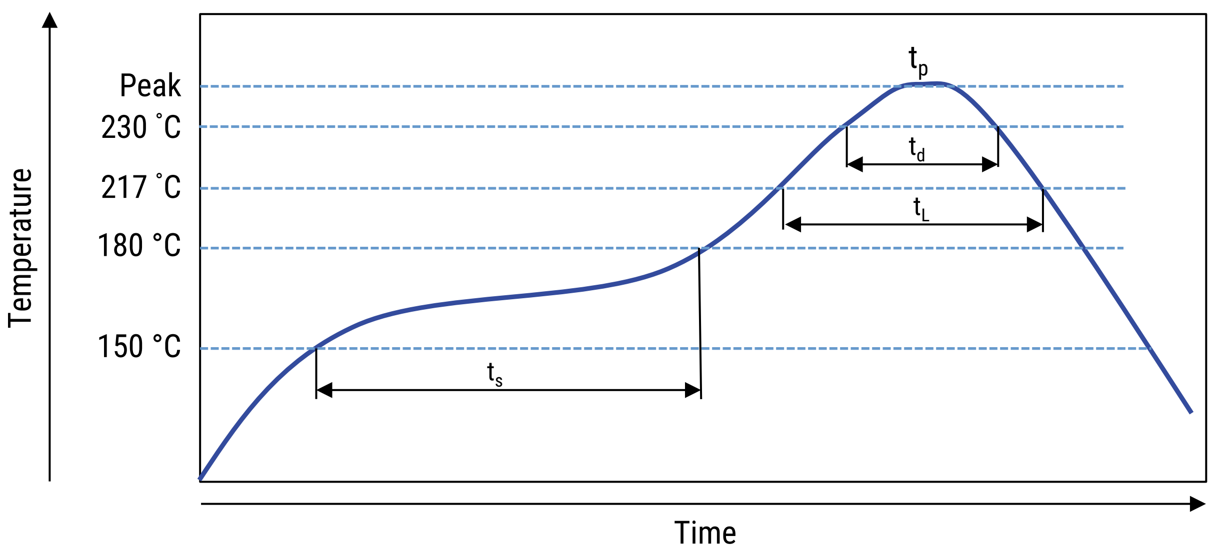


Re-Flow Soldering

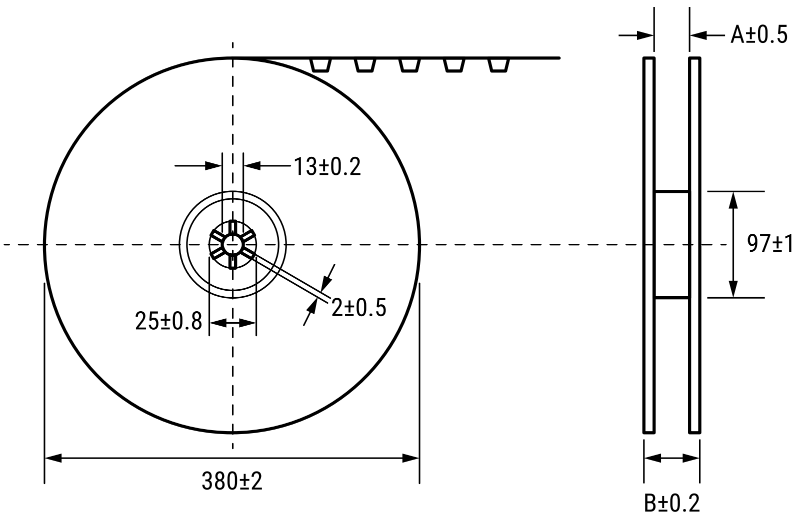
The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

<table>
<tr><th>Time Period</th><th>Preheat t_s</th><th>t_L</th><th>t_d</th><th>t_p</th><th>Reflow Number</th></tr>
<tr><td rowspan="2">Temperature (°C)</td><td rowspan="2">150 – 180</td><td rowspan="2">≥ 217</td><td rowspan="2">≥ 230</td><td>260</td><td>1</td></tr>
<tr><td>250</td><td>1 or 2</td></tr>
<tr><td>Time (seconds)</td><td>60 - 120</td><td>≤ 50</td><td>≤ 40</td><td>≤ 5</td><td>–</td></tr>
</table>

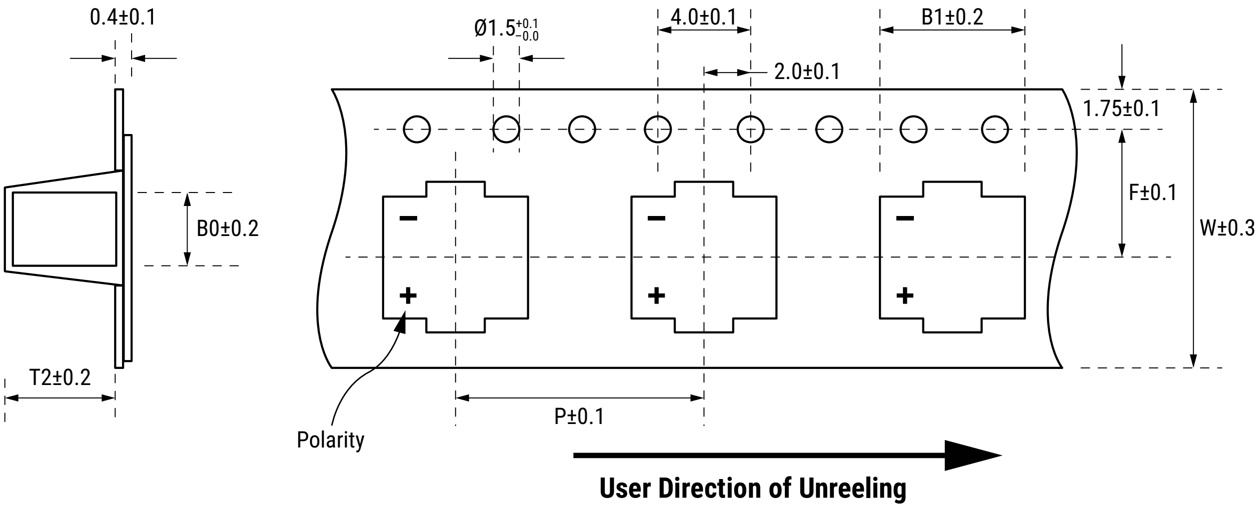


Lead Taping & Packaging



Size Code	Diameter (mm)	Length (mm)	Reel Quantity/SPQ	Box Quantity	Reel	
					A	B
					±0.5	±0.2
BC	5	6	1,000	10,000	17	21
BG	5	7	1,000	10,000	17	21
EB	6.3	5.7	1,000	10,000	18	22
EG	6.3	7	1,000	10,000	18	22
EK	6.3	8	1,000	10,000	18	22
EN	6.3	9.7	800	8,000	18	22
KE	8	6.7	1,000	6,000	26	30
KG	8	7	1,000	6,000	26	30
KH	8	7.5	500	3,000	26	30
KN	8	9.7	500	3,000	26	30
KS	8	12.2	400	2,400	26	30
MN	10	10	500	3,000	26	30
MS	10	12.2	400	2,400	26	30
MU	10	12.6	400	2,400	26	30
MS (Anti-Vibration)	10	12.4	400	2,400	26	30

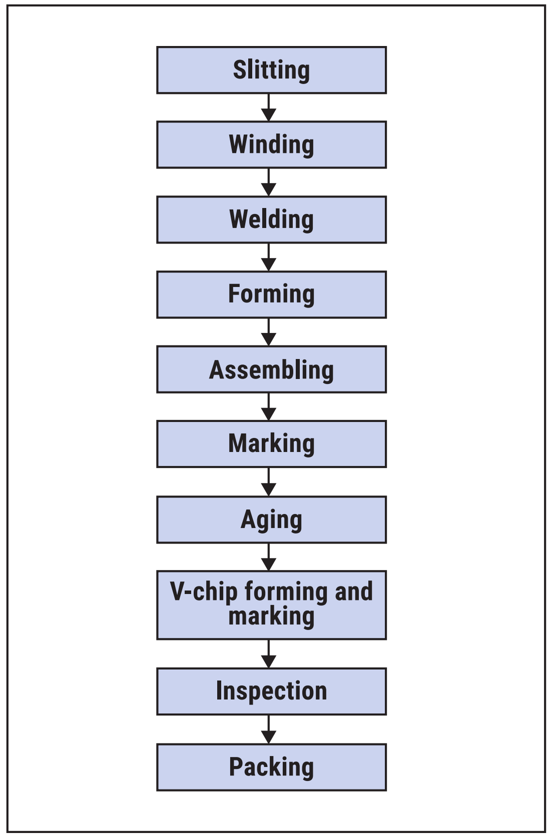
Taping for Automatic Insertion Machines



Size Code	Diameter	Length	W	P	F	B1	B0	T2
	(mm)	(mm)	±0.3	±0.1	±0.1	±0.2	±0.2	±0.2
BC	5	6	16.0	12.0	7.5	5.6	5.6	7.1
BG	5	7	16.0	12.0	7.5	5.6	5.6	7.1
EB	6.3	5.7	16.0	12.0	7.5	7.0	7.0	7.6
EG	6.3	7.0	16.0	12.0	7.5	7.0	7.0	7.6
EK	6.3	8.0	16.0	12.0	7.5	7.0	7.0	7.6
EN	6.3	9.7	16.0	12.0	7.5	7.0	7.0	9.6
KE	8	6.7	24.0	12.0	11.5	8.6	8.6	6.8
KH	8	7.5	24.0	12.0	11.5	8.6	8.6	8.4
KN	8	9.7	24.0	16.0	11.5	8.6	8.6	10.3
KS	8	12.2	24.0	16.0	11.5	8.6	8.6	12.5
MN	10	10.0	24.0	16.0	11.5	10.7	10.7	10.1
MS	10	12.2	24.0	16.0	11.5	10.7	10.7	12.5
MS (Anti-Vbration)	10	12.4	24.0	16.0	11.5	11.2	10.7	12.7
MU	10	12.6	24.0	16.0	11.5	10.7	10.7	13.1

Construction Data

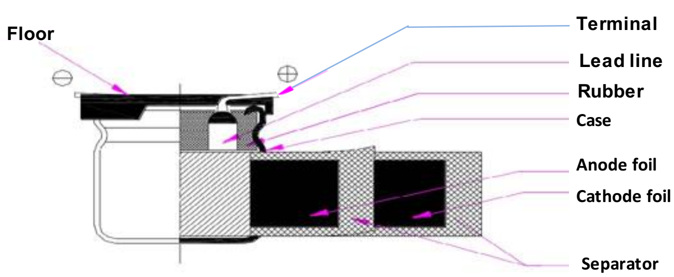
The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.



The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding



Surface Mount Hybrid Aluminum Polymer Capacitors

A780, 125°C, Hybrid Polymer V-Chip, AEC-Q200

Overview

KEMET’s A780 is a surface mount conductive polymer hybrid capacitor with outstanding electrical performance. The A780 winding is housed in a cylindrical aluminum can with a high/quality rubber deck. Low ESR is conditioned by a highly conductive polymer (PEDOT/PSS). The polymer system creates an electrical pathway between the anodic oxide layer and the cathode through a mechanical separator - paper. The A780 winding is impregnated with liquid electrolyte that translates to the self-healing features of the capacitor. Thanks to its mechanical robustness, the A780 is suitable for use in mobile and automotive installations with operation up to +125°C.

Applications

KEMET’s A780 is a series of high-performance surface mount hybrid capacitors. Due to its mechanical robustness, the A780 is suitable for use in mobile and automotive installations with extremely high demands and operation up to +125°C.

Benefits

- Surface mount form factor
- High ripple current for smaller case sizes and higher voltages
- High temperature; 125°C up to 4,000 hours
- Low leakage current
- High vibration resistance up to 30g
- Self-healing behaviours
- Outstanding electrical performance
- AEC-Q200 compliance
- RoHS compliant
- Halogen-Free

Standard

Anti-Vibration

Part Number System

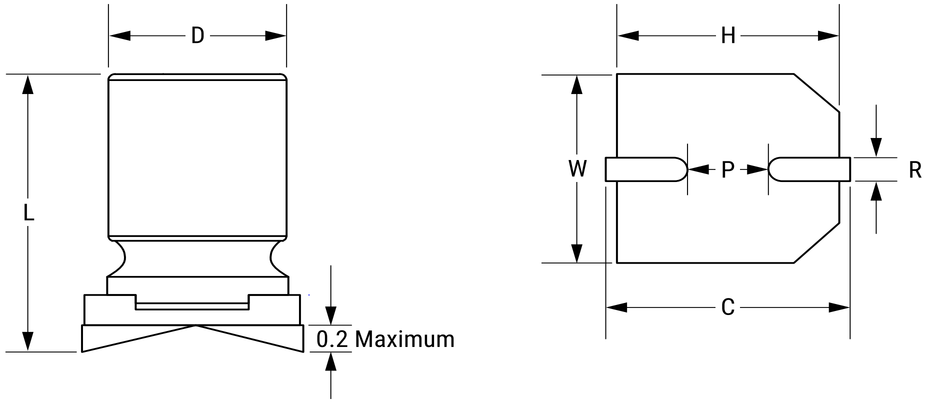
A	780	MS	107	M	1J	LA	S	030
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Surface Mount Hybrid Polymer Aluminum Capacitors 125°C 4,000 hours	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	25 = 1E 35 = 1V 50 = 1H 63 = 1J	LA = Tape & Reel	S = Automotive V = Automotive +Anti-Vibration	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

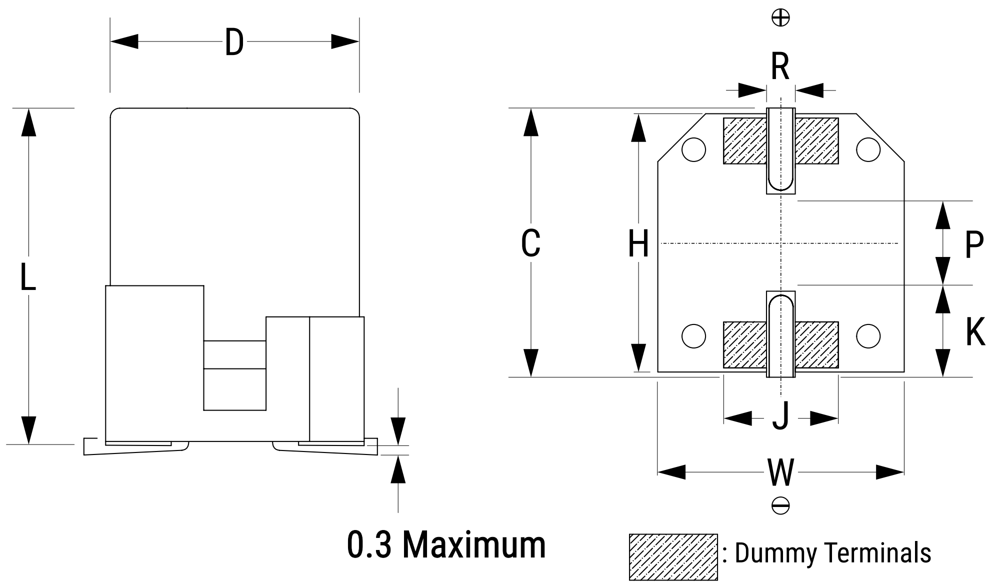
Packaging Type	Packaging Code
Standard Packaging Options	
Tape & Reel	LA
Contact KEMET for other Lead and Packaging options	

Dimensions – Millimeters

Standard



Anti-Vibration



Size Code	D		L		W		H		C		R	P	J	K
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Range	Nominal	Nominal	Nominal
EB	6.3	±0.5	5.7	±0.3	6.6	±0.2	6.6	±0.2	7.3	±0.2	0.5 – 0.8	2	-	-
EN	6.3	±0.5	9.7	±0.3	6.6	±0.2	6.6	±0.2	7.3	±0.2	0.5 – 0.8	2	-	-
KN	8.0	±0.5	9.7	±0.3	8.3	±0.2	8.3	±0.2	9.0	±0.2	0.8 – 1.1	3.1	-	-
KS	8.0	±0.5	12.2	±0.3	8.3	±0.2	8.3	±0.2	9.0	±0.2	0.8 – 1.1	3.1	-	-
MN	10.0	±0.5	10.2	±0.3	10.3	±0.2	10.3	±0.2	11.0	±0.2	0.8 – 1.1	4.6	-	-
MN (Anti-Vibration)	10.0	±0.5	10.4	±0.3	10.3	±0.2	10.8	±0.2	11.2	±0.2	0.7 – 1.1	4.6	4.4	3.2
MS	10.0	±0.5	12.2	±0.5	10.3	±0.2	10.3	±0.2	11.0	±0.2	0.8 – 1.1	4.6	-	-
MS (Anti-Vibration)	10.0	±0.5	12.4	±0.5	10.3	±0.2	10.8	±0.2	11.2	±0.2	0.7 – 1.1	4.6	4.4	3.2

Environmental Compliance

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalogue are produced to help our customers' obligations to guarantee their products and fulfil these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfil the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and makes any necessary changes in its products, whenever needed. Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free or LFW = Lead-free wires on the label.

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	27– 560 µF
Rated Voltage	25 – 63 VDC
Operating Temperature	−55°C to +125°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	4,000 hours at rated temperature (See conditions in Test Method and Performance)
Leakage Current	I = 0.01 CV
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequecy correction factor for permissible ripple current should be calculated following $I_{AC,\,f}$ / $I_{AC,\,100\text{ kHz}}$:

Rated Voltage (V)	Frequency	100 Hz	200 Hz	500 Hz	1 kHz	5 kHz	10 kHZ	50 kHz	100 kHz
25 and 35	Coefficient	0.40	0.50	0.60	0.67	0.79	0.84	0.97	1.00
50 and 63		0.22	0.31	0.42	0.55	0.75	0.82	0.94	1.00

Test Method & Performance

Conditions	Endurance Life Test	High Temperature Storage Test
Temperature	+125°C	+125°C
Test Duration	4,000 hours	1,000 hours
Ripple Current	Rated ripple applied	No ripple current applied
Voltage	Rated voltage	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 200% of the specified value	
ESR	Does not exceed 200% of the specified value	
Leakage Current	Does not exceed the specified value	Does not exceed the specified value after Voltage treatment (Re-age procedure)
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 2,500 hours at 85°C, 85% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 200% of the specified value	
ESR	Does not exceed 200% of the specified value	
Leakage Current	Does not exceed the specified value	
Surge Voltage (Rated Voltage x 1.15(V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles, each consisting of charge with the surge voltages specified at 125°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes, 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed the specified value	
Resistance to Soldering Heat	**Measurement for solder temperature profile at capacitor top and terminal.**	
Capacitance Change	Within ±10% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed the specified value	

Test Method & Performance – Anti-Vibration Version

Anti-Vibration Version	
Vibration Test Specifications	1.5 mm displacement amplitude or 30 g maximum acceleration. Vibration applied for three 4-hour sessions at 10 – 2,000 Hz (capacitor on PCB).
Capacitance Change	Within ±20% of the initial value
Dissipation Factor	Does not exceed 150% of the specified value
ESR	Does not exceed 150% of the specified value
Leakage Current	Does not exceed the specified value

Shelf Life & Re-Ageing

Shelf Life
Solderability is 12 months after manufacturing date.

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

- The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
- Do not store in damp conditions such as water, saltwater spray or oil spray.
- Do not store in an environment containing gases such as hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.
- Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 12 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

MSL 1 rating according to IPC/JEDEC-J-STD-020.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 125°C for a period of 120 minutes through a 1 kΩ series resistor.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Surge Voltage	Rated Capacitance	ESR	Dissipation Factor	Ripple Current[1]	Ripple Current Maximum[2]	Ripple Current Maximum[2]	Leakage Current	Case Size	KEMET Part Number		Case Size
(VDC)	(VDC)	120 Hz 20°C (µF)	100 kHz 20°C (mΩ)	120 Hz 20°C	100 kHz 125°C (mA)	100 kHz 105°C (mA)	100 kHz 125°C (mA)	20°C 2 minute (µA)	D x L (mm)	Standard Version	Anti-Vibration Version	D x L (mm) Anti-Vibration
25	28.75	100	65	0.14	900	-	-	25.0	6.3 x 5.7	A780EB107M1ELAS065	-	-
25	28.75	180	45	0.14	1,150	-	-	45.0	6.3 x 9.7	A780EN187M1ELAS045	-	-
25	28.75	270	30	0.14	1,550	-	-	67.5	8 x 9.7	A780KN277M1ELAS030	-	-
25	28.75	390	25	0.14	1,780	-	-	97.5	8 x 12.2	A780KS397M1ELAS025	-	-
25	28.75	560	22	0.14	2,100	6,900	4,000	140.0	10 × 12.2	A780MS567M1ELAS022	A780MS567M1ELAV022	10 × 12.4
35	40.25	47	70	0.12	880	-	-	16.5	6.3 x 5.7	A780EB476M1VLAS070	-	-
35	40.25	82	45	0.12	1,150	-	-	28.7	6.3 x 9.7	A780EN826M1VLAS045	-	-
35	40.25	150	30	0.12	1,550	-	-	52.5	8 x 9.7	A780KN157M1VLAS030	-	-
35	40.25	180	25	0.12	1,780	-	-	63.0	8 x 12.2	A780KS187M1VLAS025	-	-
35	40.25	270	25	0.12	1,750	-	-	94.5	10 x 10.2	A780MN277M1VLAS025	A780MN277M1VLAV025	10 x 10.4
35	40.25	270	22	0.12	2,100	6,900	4,000	94.5	10 × 12.2	A780MS277M1VLAS022	A780MS277M1VLAV022	10 × 12.4
35	40.25	330	20	0.12	2,200	7,300	4,200	115.5	10 × 12.2	A780MS337M1VLAS020	A780MS337M1VLAV020	10 × 12.4
50	57.50	47	50	0.1	1,080	-	-	23.5	6.3 x 9.7	A780EN476M1HLAS050	-	-
50	57.50	68	35	0.1	1,400	-	-	34.0	8 x 9.7	A780KN686M1HLAS035	-	-
50	57.50	100	31	0.1	1,600	-	-	50.0	8 x 12.2	A780KS107M1HLAS031	-	-
50	57.50	120	30	0.1	1,600	-	-	60.0	10 x 10.2	A780MN127M1HLAS030	A780MN127M1HLAV030	10 x 10.4
50	57.50	150	25	0.10	1,900	6,500	3,700	75.0	10 × 12.2	A780MS157M1HLAS025	A780MS157M1HLAV025	10 × 12.4
63	72.45	27	60	0.08	980	-	-	17.0	6.3 x 9.7	A780EN276M1JLAS060	-	-
63	72.45	39	40	0.08	1,320	-	-	24.6	8 x 9.7	A780KN396M1JLAS040	-	-
63	72.45	56	40	0.08	1,400	5,250	3,000	35.3	8 × 12.2	A780KS566M1JLAS040	-	-
63	72.45	56	30	0.08	1,800	5,950	3,400	35.3	10 × 12.2	A780MS566M1JLAS030	A780MS566M1JLAV030	10 × 12.4
63	72.45	68	35	0.08	1,650	5,510	3,200	42.8	10 × 10.2	A780MN686M1JLAS035	A780MN686M1JLAV035	10 x 10.4
63	72.45	100	30	0.08	1,800	5,950	3,400	63.0	10 × 12.2	A780MS107M1JLAS030	A780MS107M1JLAV030	10 × 12.4

1 Capacitor mounted on PCB, Lop: 4,000 hours
2 Capacitor mounted with low thermal resistance path (heat-sink), Lop: 3,000 hours
KEMET technology allows to achieve enhanced ripple performance by adding a heat sink solution. This component acts as a dissipator of generated heat, granting effective cooling of the capacitor system. (For more information consult "A780 Low Thermal Path Mounting" application note)

Installing

Hybrid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current. Depending on the nature of the circuit, it may be recommended to follow the re-aging procedure before application.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that Hybrid Polymer Aluminum capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

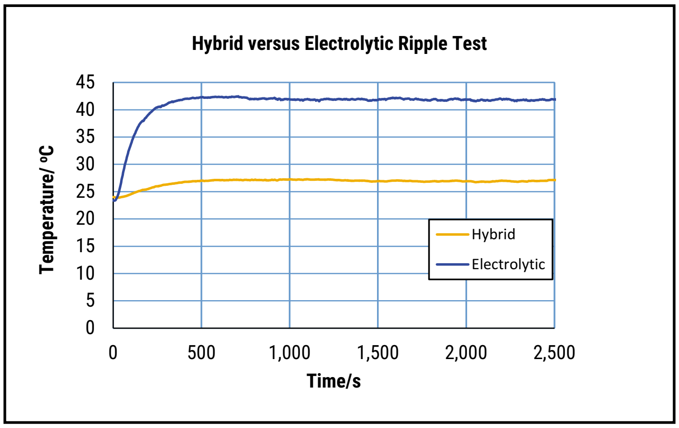
- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

Temperature Stability Characteristics

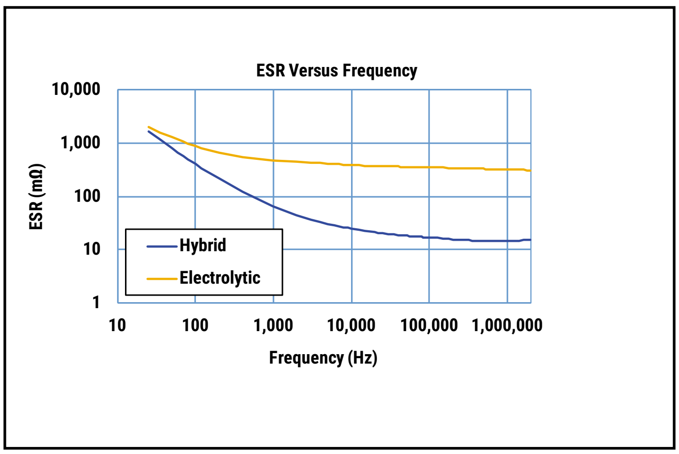
Hybrid Polymer Aluminum Capacitors allow high ripple currents for smaller case sizes and higher voltage comparing with standard electrolytics. The presence of conductive polymer and electrolyte allows for higher temperature robustness and a more stable product performance.

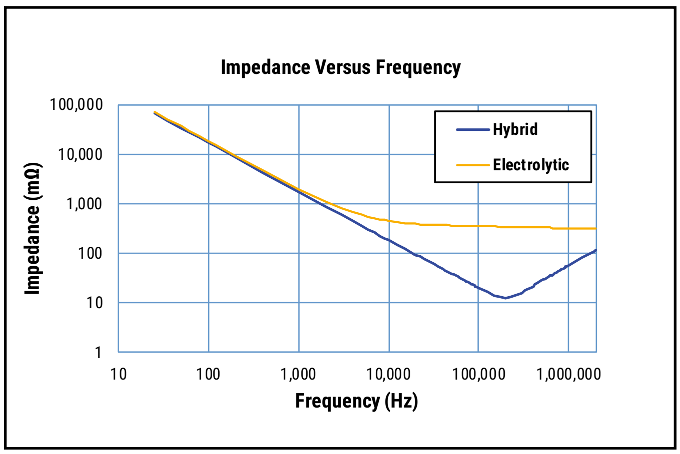
Temperature Stability Characteristics



Electrical Parameters across Frequency Range

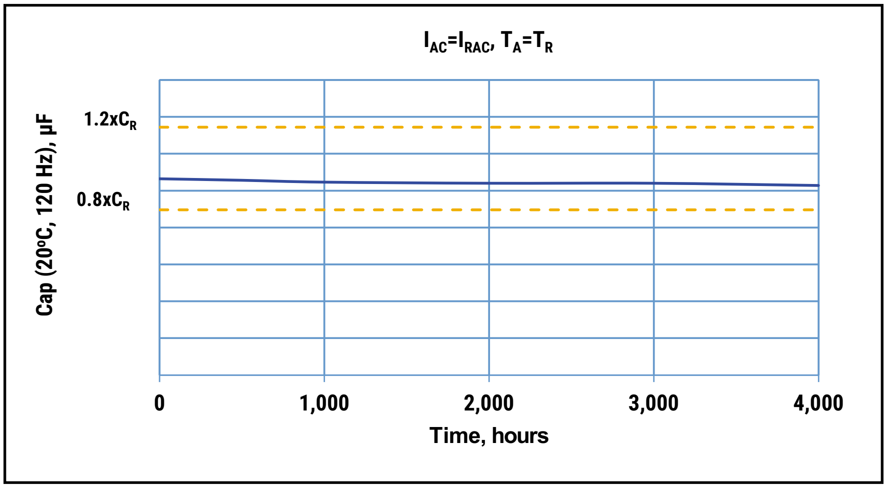
Due to the conductive polymer and electrolyte, Hybrid Aluminum Polymer Capacitors feature higher conductivity. Therefore, ESR and Impedance of these capacitors are significantly lower than that of a standard electrolytic capacitor at higher frequencies. This allows an Hybrid Aluminum Polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

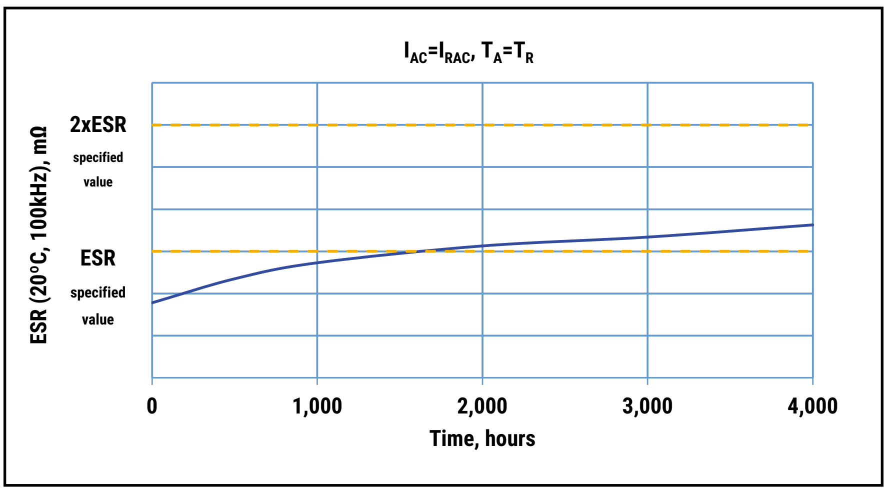




Operational Life

Typical capacitance and ESR curves of Polymer Hybrid V-Chip mounted on a standard Printed Circuit Board (PCB) at rated temperature T_R and with rated ripple current I_{RAC} applied:





DC Life Formula

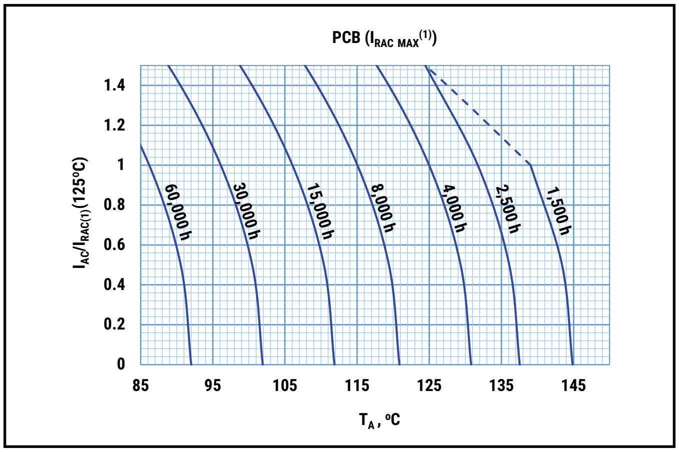
Expected DC operational life (L_{Op}, in k hour) can be calculated in accordance to the following equation:

$L_{Op} = 6 \times 10^{((125\text{-}T)/33)}$

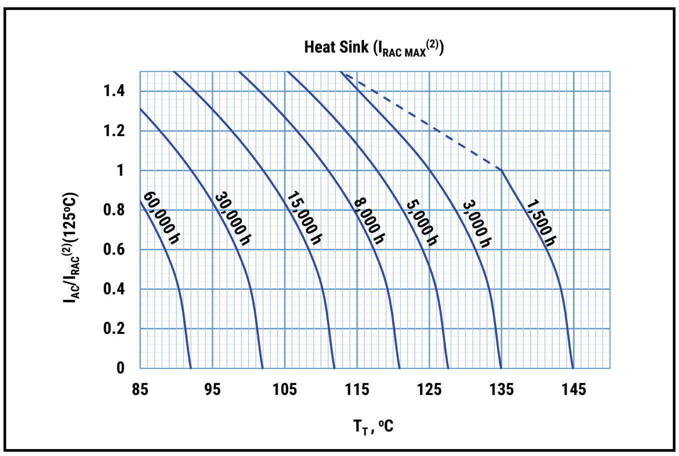
Where:
L_{Op}: Life at maximum permissible operating temperature with rated operating voltage applied (k hour). Maximum L_{Op} = 131 kh.
T: Ambient operating temperature (°C).

Operational Life

Operational Life ($L_{Op}1$) of a Polymer Hybrid V-Chip mounted on a Printed Circuit Board (PCB) at ambient temperature T_A and ripple current I_{AC} applied can be converted from the diagram:

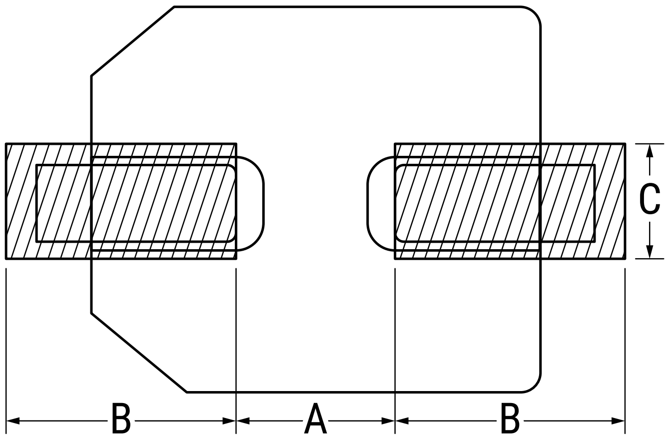


Operational Life ($L_{Op}2$), when using a low thermal resistance path, at capacitor terminal temperature T_T and ripple current I_{AC} applied, can be converted from the diagram:



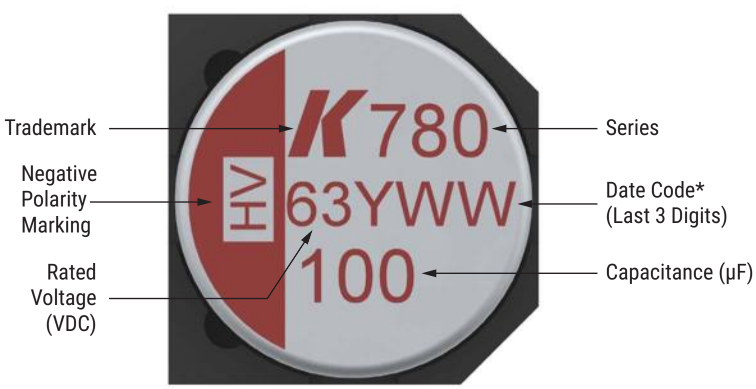
$I_{RAC(1)}$ and $I_{RAC(2)}$ correspond to maximum ripple current specified for each case and should be consulted in Table 1 of this datasheet. The dashed lines correspond to the maximum ripple current allowed. As an example, when using a low thermal resistance path, at a terminal temperature of 135°C, the applied ripple current is limited to $I_{AC}/I_{RAC(2)}$ = 1.2.

Landing Pad – Millimeters



Diameter	A	B	C
5	1.4	3	1.6
6.3	1.9	3.5	1.6
8	3.1	4.2	2.2
10	4.5	4.4	2.2
10 (Anti-Vibration)	4.5	4.4	4.6
Units in mm			

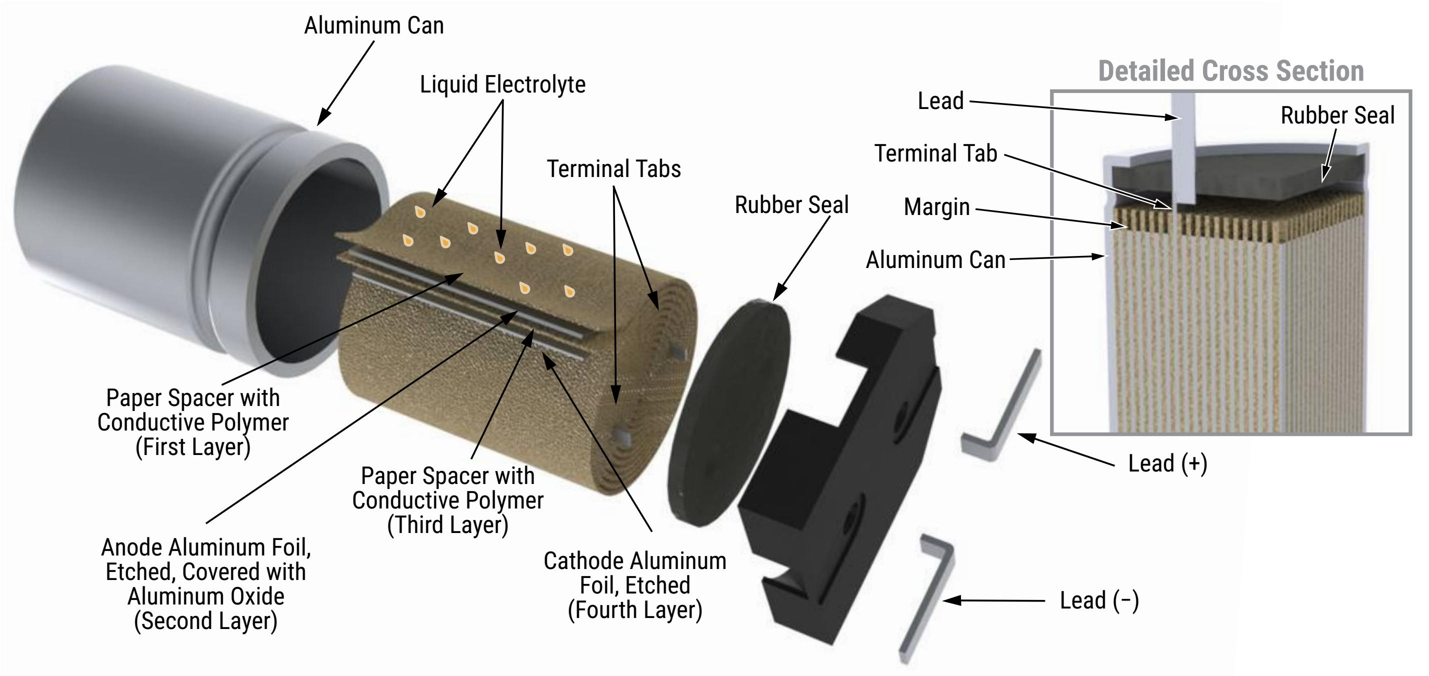
Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	T = 2020
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

Year Code	
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction

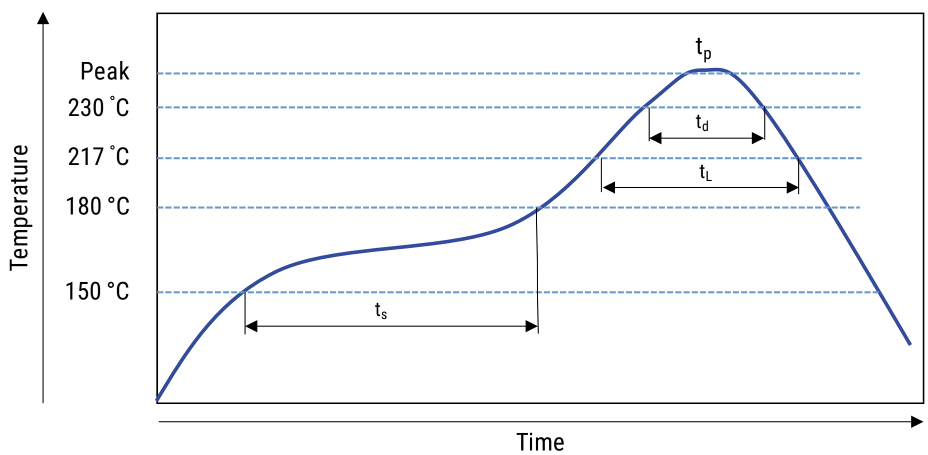


Re-Flow Soldering

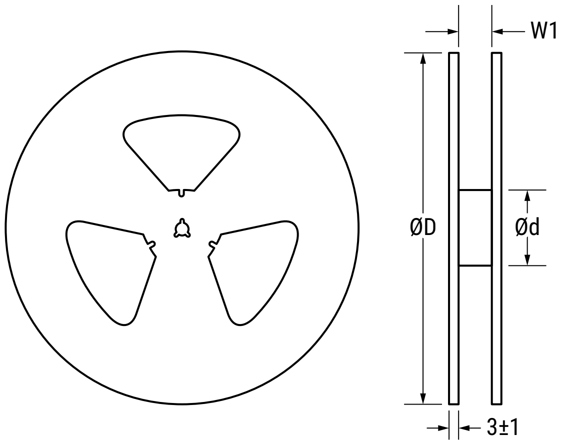
The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Time Period	Preheating t_s	t_L	t_d	t_p	Reflow Number
Temperature (°C)	150 – 180	≥ 217	≥ 230	260	1
				250	1 or 2
Time (seconds)	60 – 120	≤ 50	≤ 40	≤ 5	-

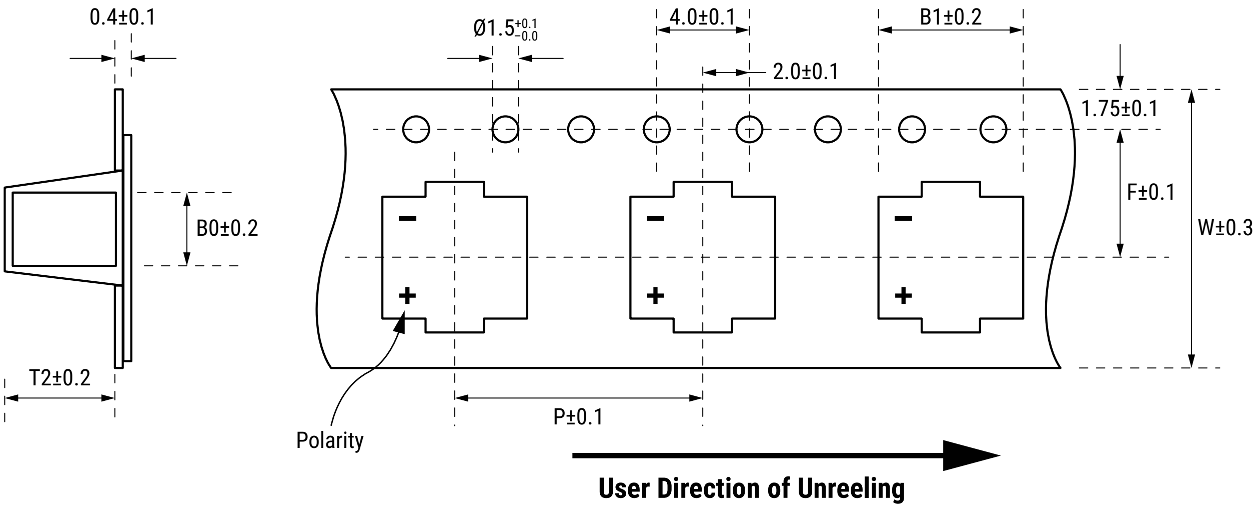


Lead Taping & Packaging



Size Code	Diameter (mm)	Length (mm)	Reel			Reel Quantity	Box Quantity
			d (mm)	D (mm)	W1 (mm)		
			±3	±2	±2		
EB	6.3	5.7	100	380	24	1,000	10,000
EN	6.3	9.7	100	380	24	800	8,000
KN	8	9.7	100	380	24	500	3,000
KS	8	12.2	100	380	24	400	2,400
MN	10	10.2	100	380	24	500	3,000
MS	10	12.2	100	380	24	400	2,400
MS (Anti-Vibration)	10	12.4	100	380	24	400	2,400

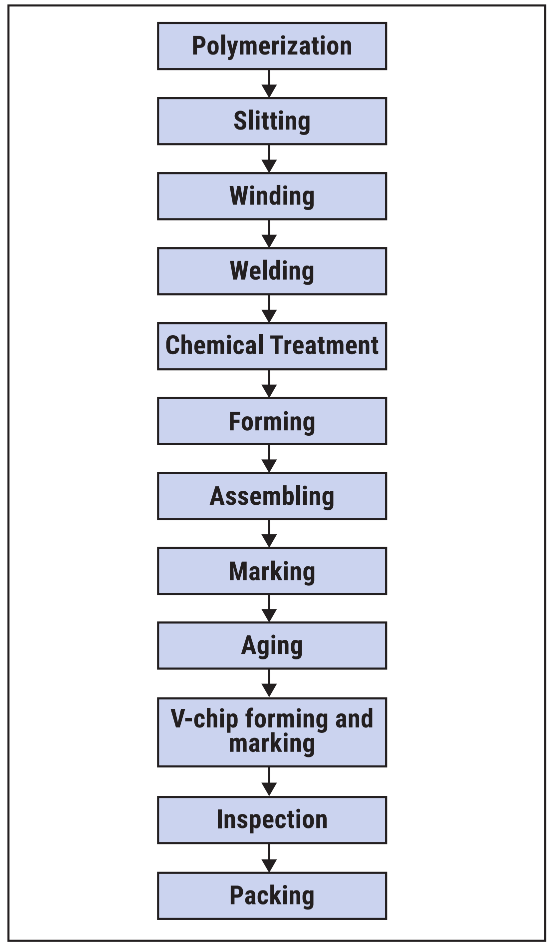
Taping for Automatic Insertion Machines



Size Code	D x L	W	P	F	B1	B0	T2
	Tolerance	±0.3	±0.1	±0.1	±0.2	±0.2	±0.2
EB	6.3 x 5.7	16	12	7.5	7	7	7.6
EN	6.3 x 9.7	16	12	7.5	7	7	9.6
KN	8.0 x 9.7	24	16	11.5	8.6	8.6	10.3
KS	8 x 12.2	24.0	16.0	11.5	8.7	8.7	12.6
MN	10 x 10.2	24.0	16.0	11.5	10.7	10.7	10.1
MN (Anti-Vibration)	10 x 10.4	24.0	16.0	11.5	10.7	11.2	10.3
MS	10 x 12.2	24.0	16.0	11.5	10.7	10.7	12.5
MS (Anti-Vibration)	10 x 12.4	24.0	16.0	11.5	10.7	11.2	12.7

Construction Data

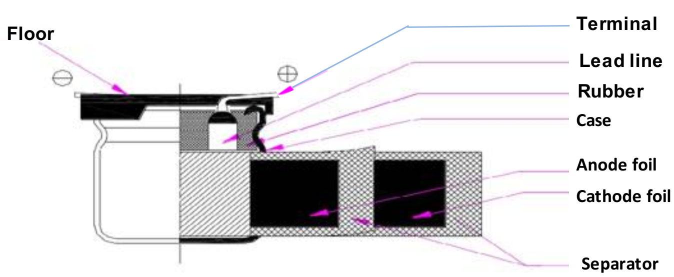
The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.



The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to a variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding



A781, 135°C, Hybrid Polymer V-Chip, AEC-Q200

RoHS REACH COMPLIANT HF Halogen Free

Overview

KEMET's A781 is a surface mount conductive polymer hybrid capacitor with outstanding electrical performance. The A781 winding is housed in a cylindrical aluminum can with a high/quality rubber deck. Low ESR is conditioned by a highly conductive polymer (PEDOT/PSS). The polymer system creates an electrical pathway between the anodic oxide layer and the cathode through a mechanical separator - paper. The A781 winding is impregnated with liquid electrolyte that translates to the self-healing features of the capacitor. Thanks to its mechanical robustness, the A781 is suitable for use in mobile and automotive installations with operation up to +135°C.

Applications

KEMET's A781 is a series of high-performance surface mount hybrid capacitors. Due to its mechanical robustness, the A781 is suitable for use in mobile and automotive installations with extremely high demands and operation up to +135°C.

Benefits

- Surface mount form factor
- High ripple current up to $2.9A_{rms}$
- High temperature; 135°C up to 2,000 hours
- Low leakage current (Typically no re-ageing required)
- High vibration resistance up to 30g
- Self-healing behaviors
- Outstanding electrical performance
- AEC-Q200 compliance
- RoHS compliant
- Halogen-Free

Standard

Anti-Vibration

Part Number System

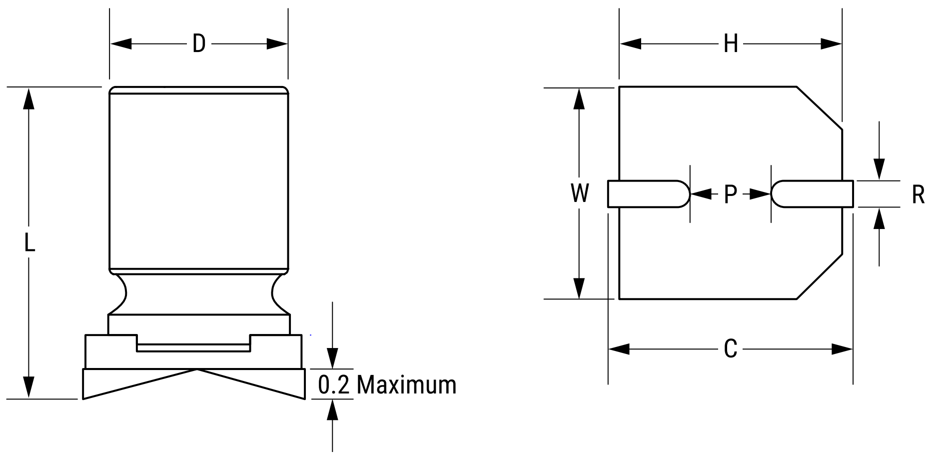
A	781	MS	107	M	1J	LA	S	030
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Surface Mount Hybrid Polymer Aluminum Capacitors 135°C 2,000 hours	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	25 = 1E 35 = 1V 50 = 1H 63 = 1J	LA = Tape & Reel	S = Automotive V = Automotive +Anti-Vibration	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

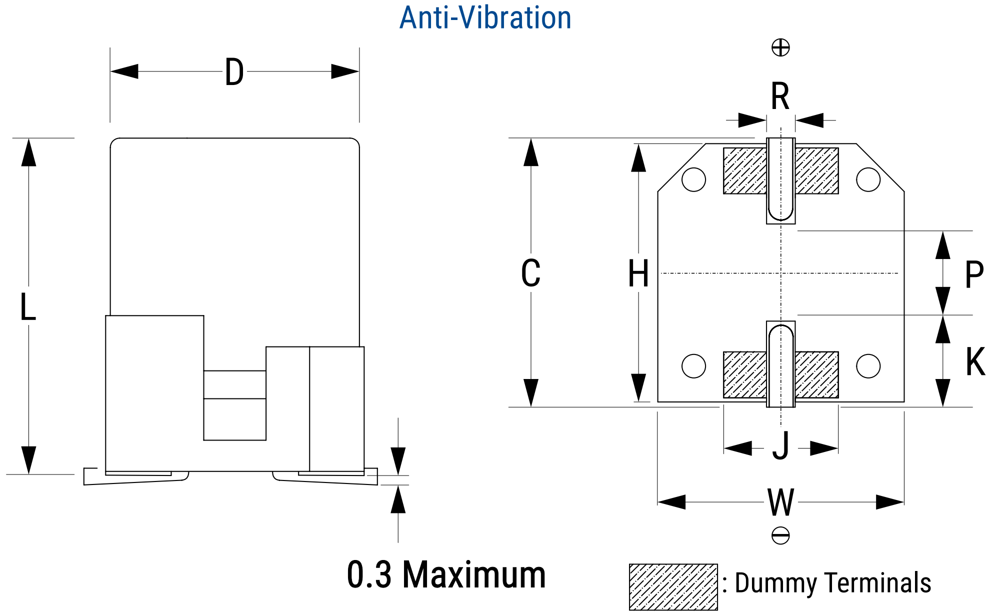
Packaging Type	Packaging Code
Standard Packaging Options	
Tape & Reel	LA
Contact KEMET for other Lead and Packaging options	

Dimensions – Millimeters

Standard



Anti-Vibration



Size Code	D		L		W		H		C		R	P	J	K
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Range	Nominal	Nominal	Nominal
KS	8.0	±0.5	12.2	±0.3	8.3	±0.2	8.3	±0.2	9.0	±0.2	0.8 – 1.1	3.1	-	-
MN	10.0	±0.5	10.2	±0.3	10.3	±0.2	10.3	±0.2	11.0	±0.2	0.8 – 1.1	4.6	-	-
MN (Anti-Vibration)	10.0	±0.5	10.4	±0.3	10.3	±0.2	10.8	±0.2	11.2	±0.2	0.7 – 1.1	4.6	4.4	3.2
MS	10.0	±0.5	12.2	±0.5	10.3	±0.2	10.3	±0.2	11.0	±0.2	0.8 – 1.1	4.6	-	-
MS (Anti-Vibration)	10.0	±0.5	12.4	±0.5	10.3	±0.2	10.8	±0.2	11.2	±0.2	0.7 – 1.1	4.6	4.4	3.2

Environmental Compliance

RoHS

REACH COMPLIANT

HF Halogen Free

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalogue are produced to help our customers' obligations to guarantee their products and fulfil these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfil the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and makes any necessary changes in its products, whenever needed. Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free or LFW = Lead-free wires on the label.

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	68 – 560 µF
Rated Voltage	25 – 63 VDC
Operating Temperature	−55°C to +135°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	2,000 hours at rated temperature (See conditions in Test Method and Performance)
Leakage Current	I = 0.01 CV
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequecy correction factor for permissible ripple current should be calculated following $I_{AC,\,f}$ / $I_{AC,\,100\,kHz}$:

Rated Voltage (V)	Frequency	100 Hz	200 Hz	500 Hz	1 kHz	5 kHz	10 kHZ	50 kHz	100 kHz
25 and 35	Coefficient	0.40	0.50	0.60	0.67	0.79	0.84	0.97	1.00
50 and 63		0.22	0.31	0.42	0.55	0.75	0.82	0.94	1.00

Test Method & Performance

Conditions	Endurance Life Test		High Temperature Storage Test
Temperature	+125°C	+135°C	+135°C
Test Duration	4,000 hours	2,000 hours	1,000 hours
Ripple Current	Rated ripple applied		No ripple current applied
Voltage	Rated voltage		No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**		
Capacitance Change	Within ±20% of the initial value		
Dissipation Factor	Does not exceed 200% of the specified value		
ESR	Does not exceed 200% of the specified value		
Leakage Current	Does not exceed the specified value		Does not exceed the specified value after Voltage treatment (Re-age procedure)
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 2,500 hours at 85°C, 85% RH.**		
Capacitance Change	Within ±20% of the initial value		
Dissipation Factor	Does not exceed 200% of the specified value		
ESR	Does not exceed 200% of the specified value		
Leakage Current	Does not exceed the specified value		
Surge Voltage (Rated Voltage x 1.15(V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles, each consisting of charge with the surge voltages specified at 135°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes, 30 seconds.**		
Capacitance Change	Within ±20% of the initial value		
Dissipation Factor	Does not exceed 150% of the specified value		
ESR	Does not exceed 150% of the specified value		
Leakage Current	Does not exceed the specified value		
Resistance to Soldering Heat	**Measurement for solder temperature profile at capacitor top and terminal.**		
Capacitance Change	Within ±10% of the initial value		
Dissipation Factor	Does not exceed 150% of the specified value		
ESR	Does not exceed 150% of the specified value		
Leakage Current	Does not exceed the specified value		

Test Method & Performance – Anti-Vibration Version

Anti-Vibration Version	
Vibration Test Specifications	1.5 mm displacement amplitude or 30 g maximum acceleration. Vibration applied for three 4-hour sessions at 10 – 2,000 Hz (capacitor on PCB).
Capacitance Change	Within ±20% of the initial value
Dissipation Factor	Does not exceed 150% of the specified value
ESR	Does not exceed 150% of the specified value
Leakage Current	Does not exceed the specified value

Shelf Life & Re-Ageing

Shelf Life
Solderability is 12 months after manufacturing date.

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

- The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
- Do not store in damp conditions such as water, saltwater spray or oil spray.
- Do not store in an environment containing gases such as hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.
- Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 12 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

MSL 1 rating according to IPC/JEDEC-J-STD-020.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 125°C for a period of 120 minutes through a 1 kΩ series resistor.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Surge Voltage	Rated Capacitance	ESR	Dissipation Factor	Ripple Current[1]	Ripple Current[2]	Ripple Current max[3]	Ripple Current max[3]	Leakage Current	Case Size	KEMET Part Number		Case Size
(VDC)	(VDC)	120 Hz 20°C (µF)	100 kHz 20°C (mΩ)	120 Hz 20°C	100 kHz 125°C (mA)	100 kHz 135°C (mA)	100 kHz 105°C (mA)	100 kHz 125°C (mA)	20°C 2 min (µA)	D x L (mm)	Standard Version	Anti-Vibration Version	D x L (mm) Anti-Vibration
25	28.75	330	25	0.14	2,200	2,500	7,000	4,500	82.5	10 × 10.2	A781MN337M1ELAS025	A781MN337M1ELAV025	10 x 10.4
25	28.75	470	25	0.14	2,200	2,500	7,000	4,500	117.5	10 × 10.2	A781MN477M1ELAS025	A781MN477M1ELAV025	10 x 10.4
25	28.75	560	22	0.14	2,600	2,900	7,450	4,800	140.0	10 × 12.2	A781MS567M1ELAS022	A781MS567M1ELAV022	10 × 12.4
35	40.25	180	25	0.12	2,200	2,500	7,000	4,500	63.0	10 × 10.2	A781MN187M1VLAS025	A781MN187M1VLAV025	10 x 10.4
35	40.25	270	22	0.12	2,600	2,900	7,450	4,800	94.5	10 × 12.2	A781MS277M1VLAS022	A781MS277M1VLAV022	10 × 12.4
50	57.50	100	30	0.10	2,000	2,300	6,400	4,100	50.0	10 × 10.2	A781MN107M1HLAS030	A781MN107M1HLAV030	10 x 10.4
50	57.50	150	28	0.10	2,300	2,600	6,600	4,250	75.0	10 × 12.2	A781MS157M1HLAS028	A781MS157M1HLAV028	10 × 12.4
63	72.45	68	35	0.08	1,850	2,100	5,900	3,800	42.8	10 × 10.2	A781MN686M1JLAS035	A781MN686M1JLAV035	10 x 10.4
63	72.45	100	30	0.08	2,200	2,500	6,400	4,100	63.0	10 × 12.2	A781MS107M1JLAS030	A781MS107M1JLAV030	10 × 12.4

1 Capacitor mounted on PCB, Lop: 4,000 hours
2 Capacitor mounted on PCB, Lop: 2,000 hours
3 Capacitor mounted with low thermal resistance path (heat-sink), Lop: 3,000 hours
KEMET technology allows to achieve enhanced ripple performance by adding a heat sink solution. This component acts as a dissipator of generated heat, granting effective cooling of the capacitor system.

Installing

Hybrid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current. Depending on the nature of the circuit, it may be recommended to follow the re-aging procedure before application.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that Hybrid Polymer Aluminum capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

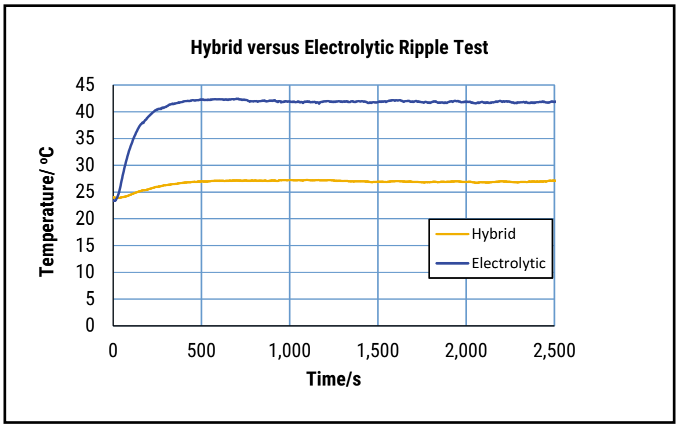
- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

Temperature Stability Characteristics

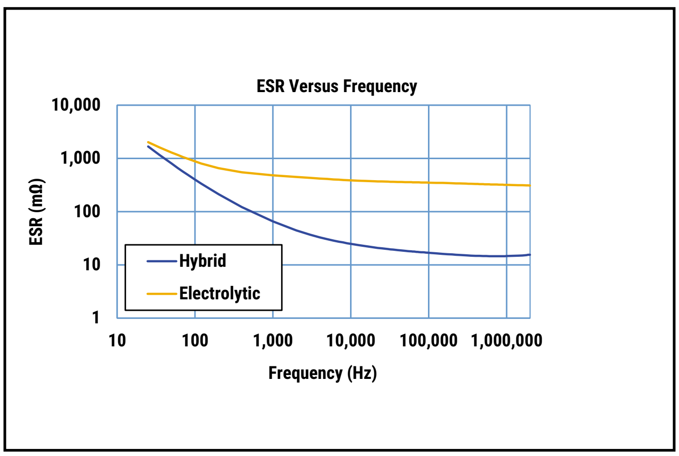
Hybrid Polymer Aluminum Capacitors allow high ripple currents for smaller case sizes and higher voltage comparing with standard electrolytics. The presence of conductive polymer and electrolyte allows for higher temperature robustness and a more stable product performance.

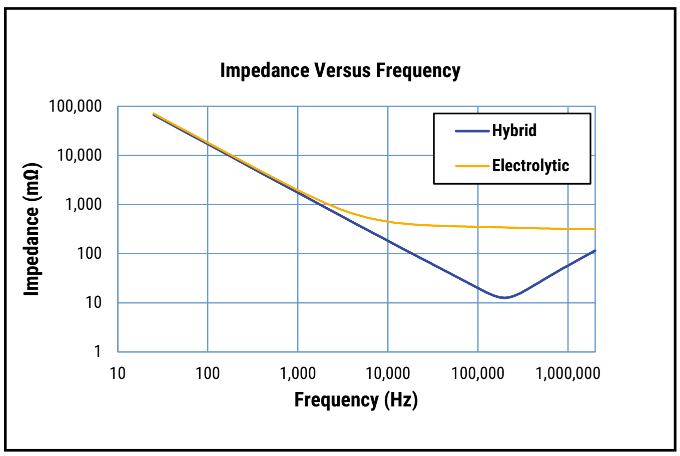
Temperature Stability Characteristics



Electrical Parameters across Frequency Range

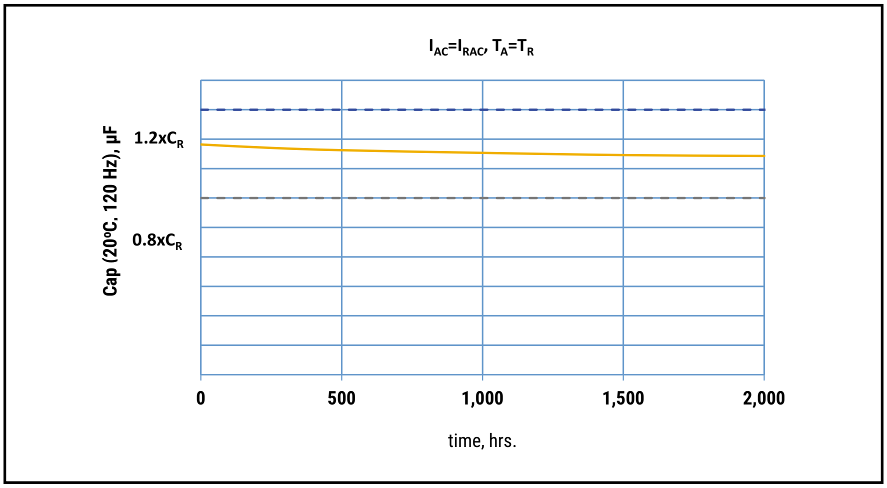
Due to the conductive polymer and electrolyte, Hybrid Aluminum Polymer Capacitors feature higher conductivity. Therefore, ESR and Impedance of these capacitors are significantly lower than that of a standard electrolytic capacitor at higher frequencies. This allows an Hybrid Aluminum Polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

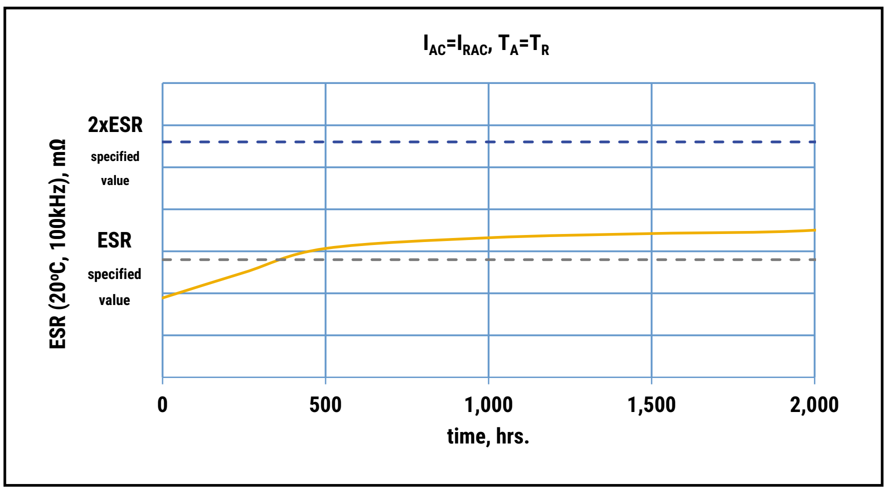




Operational Life

Typical capacitance and ESR curves of Polymer Hybrid V-Chip mounted on a standard Printed Circuit Board (PCB) at rated temperature T_R and with rated ripple current I_{RAC} applied:





DC Life Formula

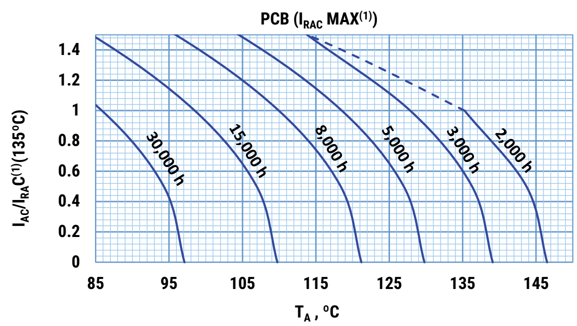
Expected DC operational life (L_{Op}, in k hour) can be calculated in accordance to the following equation:

$L_{Op} = 6.5 \times 10^{((125-T)/42)}$

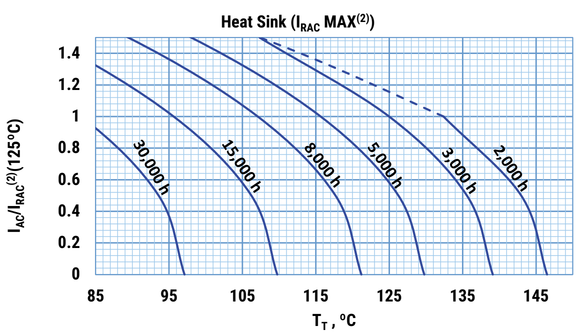
Where:
L_{Op}: Life at maximum permissible operating temperature with rated operating voltage applied (k hour). Maximum L_{Op} = 131 kh.
T: Ambient operating temperature (°C).

Operational Life

Operational Life ($L_{Op}1$) of a Polymer Hybrid V-Chip mounted on a Printed Circuit Board (PCB) at ambient temperature T_A and ripple current I_{AC} applied can be converted from the diagram:

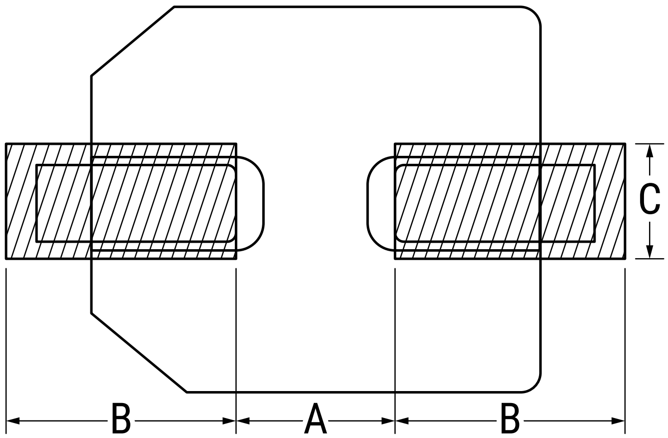


Operational Life ($L_{Op}2$), when using a low thermal resistance path, at capacitor terminal temperature T_T and ripple current I_{AC} applied, can be converted from the diagram:



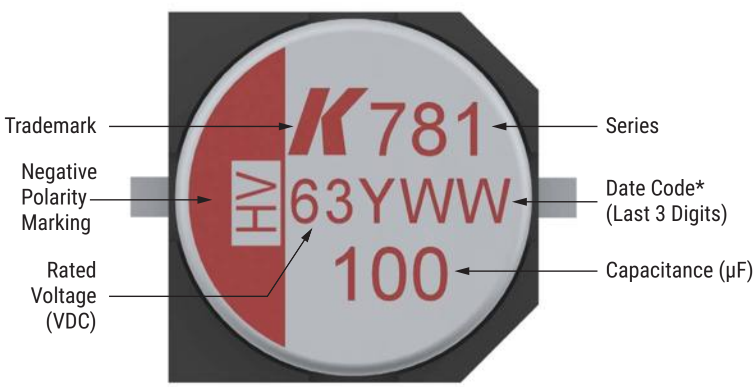
$I_{RAC(1)}$ and $I_{RAC(2)}$ correspond to maximum ripple current specified for each case and should be consulted in Table 1 of this datasheet. The dashed lines correspond to the maximum ripple current allowed. As an example, when using a low thermal resistance path, at a terminal temperature of 135°C, the applied ripple current is limited to $I_{AC}/I_{RAC(2)}$ = 0.88.

Landing Pad – Millimeters



Diameter	A	B	C
8	3.1	4.2	2.2
10	4.5	4.4	2.2
10 (Anti-Vibration)	4.5	4.4	4.6
Units in mm			

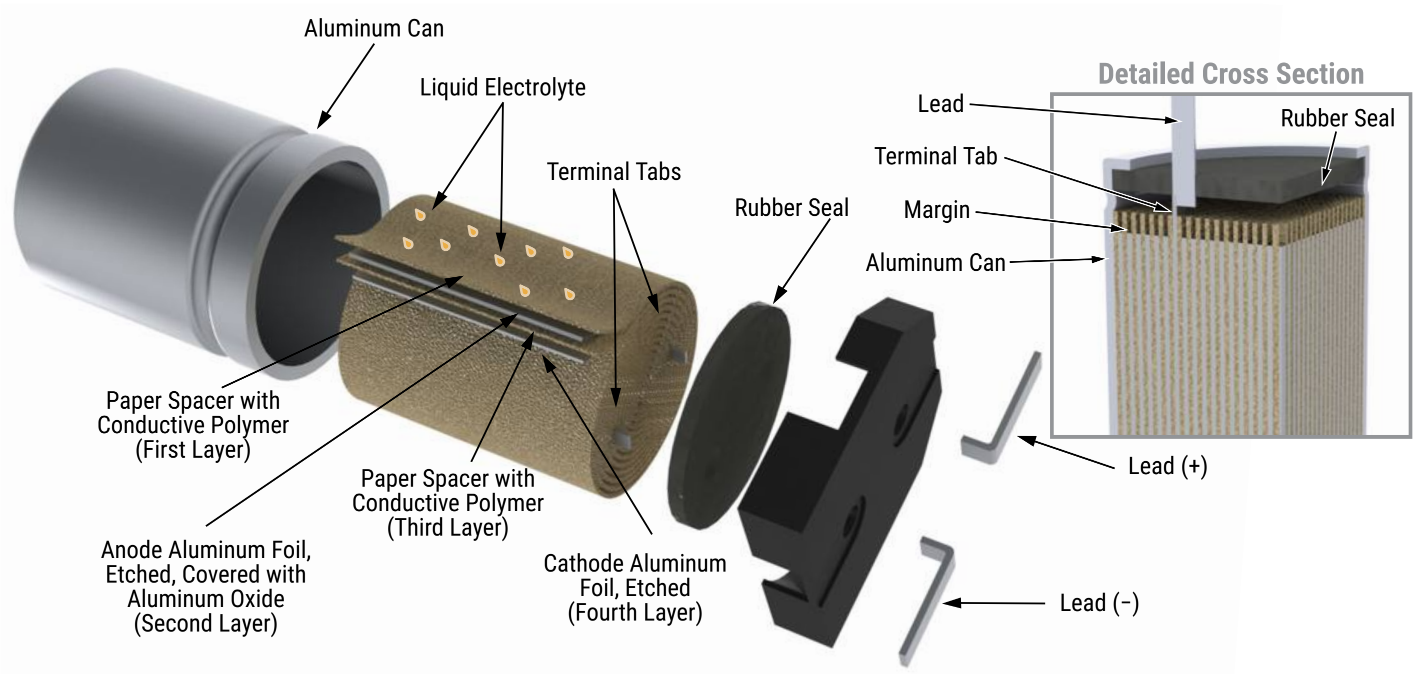
Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	T = 2020
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

Year Code	
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction

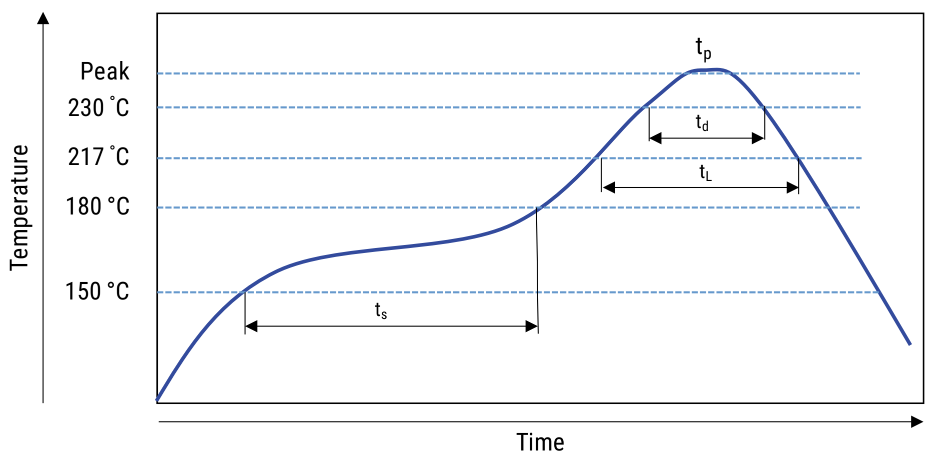


Re-Flow Soldering

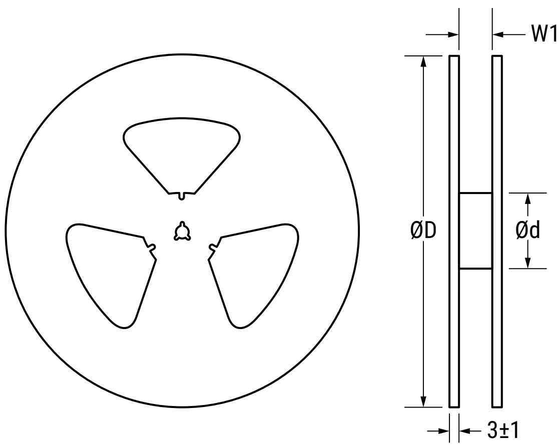
The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Time Period	Preheating t_s	t_L	t_d	t_p	Reflow Number
Temperature (°C)	150 – 180	≥ 217	≥ 230	260	1
				250	1 or 2
Time (seconds)	60 – 120	≤ 50	≤ 40	≤ 5	-

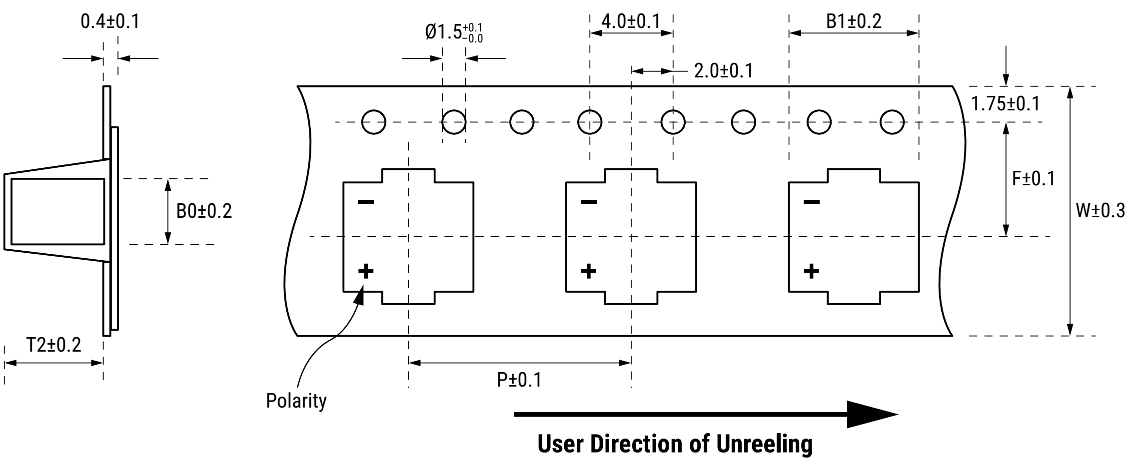


Lead Taping & Packaging



Size Code	Diameter (mm)	Length (mm)	Reel			Reel Quantity	Box Quantity
			d (mm)	D (mm)	W1 (mm)		
			±3	±2	±2		
KS	8	12.2	100	380	24	400	2,400
MN	10	10.2	100	380	24	500	3,000
MS	10	12.2	100	380	24	400	2,400
MS (Anti-Vibration)	10	12.4	100	380	24	400	2,400

Taping for Automatic Insertion Machines



Size Code	D x L	W	P	F	B1	B0	T2
	Tolerance	±0.3	±0.1	±0.1	±0.2	±0.2	±0.2
KS	8 x 12.2	24.0	16.0	11.5	8.7	8.7	12.6
MN	10 x 10.2	24.0	16.0	11.5	10.7	10.7	10.1
MN (Anti-Vibration)	10 x 10.4	24.0	16.0	11.5	10.7	11.2	10.3
MS	10 x 12.2	24.0	16.0	11.5	10.7	10.7	12.5
MS (Anti-Vbration)	10 x 12.4	24.0	16.0	11.5	10.7	11.2	12.7

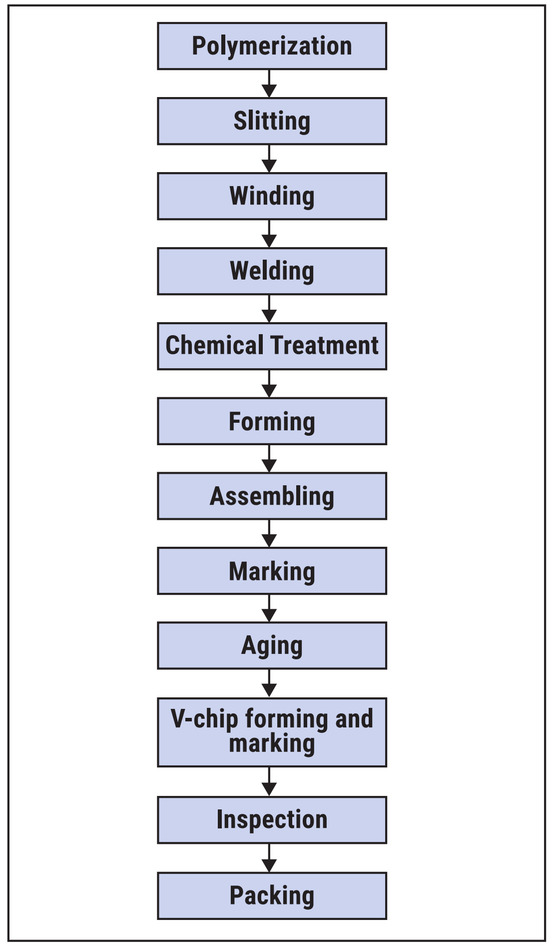
Construction Data

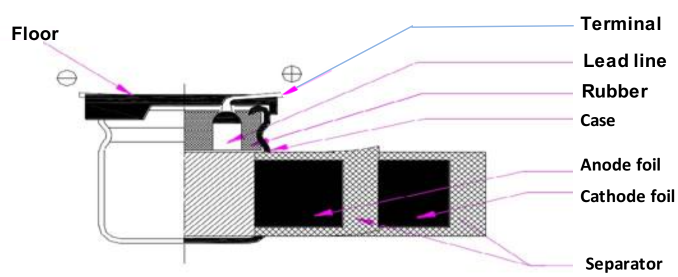
The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.

The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to a variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding





A769 125°C, High Ripple

Overview

KEMET's A769 Surface Mount Solid Polymer Aluminum Capacitors offer longer life and greater stability across a wide range of temperatures. This highly conductive solid polymer electrolyte eliminates the risk of drying out and, due to its ultra low ESR properties, is able to withstand higher ripple currents during normal operation, up to +35% when compared to A768 series. The A769 series is AEC-Q200 qualified and ideally suited for automotive and industrial applications. Anti-Vibration version is available for 10 mm diameter. If CV/Size is not available please contact your local Sales Representative for more information.

Applications

Typical applications include long life LED drivers, professional power amplifiers, industrial power supplies, DC/DC converters, voltage regulators, and decoupling. This series is used for automotive powertrain.

Benefits

- High ripple current up to 3.6 A_{RMS}
- High temperature; 125°C/2,000 hours
- Ultra low impedance
- High vibration resistance up to 30 g
- Surface mount form factor
- RoHS compliant
- Halogen-free

Standard

Anti-Vibration

Part Number System

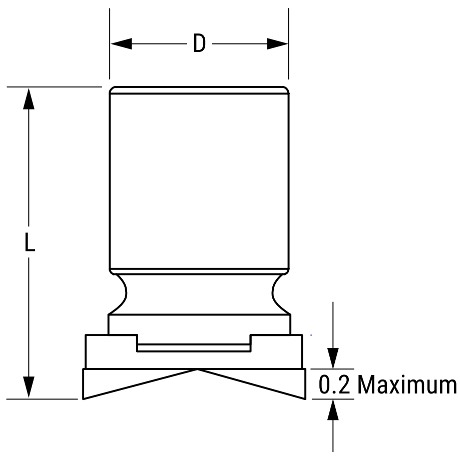
A	769	MS	107	M	1J	LA	S	18
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Surface Mount Solid Polymer Aluminum Capacitors 125°C 2,000 hours High Temperature	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	16 = 1C 20 = 1D 25 = 1E 35 = 1V 40 = 1G 50 = 1H 63 = 1J	LA = Tape & Reel	S = Automotive V = Automotive + Anti-Vibration AEC-Q200 available up to 63 V	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

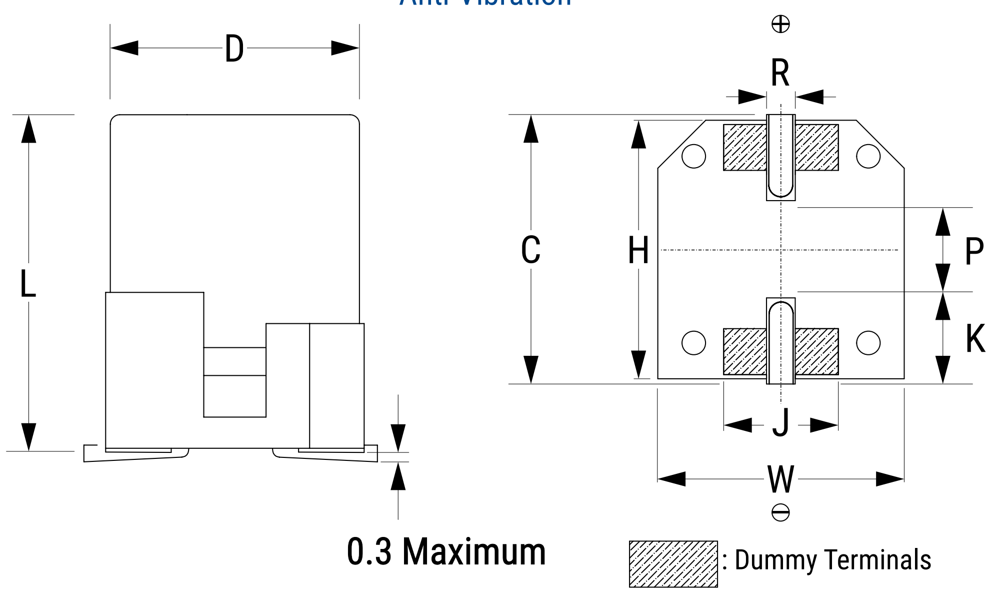
Packaging Type	Packaging Code
Standard Packaging Options	
Tape & Reel	LA
Contact KEMET for other Lead and Packaging options	

Dimensions – Millimeters

Standard



Anti-Vibration



Size Code	D		L		W		H		C		R	P	J	K
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Range	Nominal	Nominal	Nominal
KE	8	±0.5	6.7	±0.3	8.3	±0.2	8.3	±0.2	9	±0.2	0.8 – 1.1	3.1	-	-
KS	8	±0.5	12.2	±0.3	8.3	±0.2	8.3	±0.2	9	±0.2	0.8 – 1.1	3.2	-	-
MS	10	±0.5	12.2	±0.5	10.3	±0.2	10.3	±0.2	11	±0.2	0.8 – 1.1	4.6	-	-
MS (Anti-Vibration)	10	±0.5	12.4	±0.5	10.3	±0.2	10.8	±0.2	11	±0.2	0.7 – 1.1	4.6	4.4	3.2

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant, and Halogen-Free.

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and make any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free or LFW = Lead-free wires on the label.

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	22 – 1,000 µF
Rated Voltage	16 – 63 VDC
Operating Temperature	–55°C to +125°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	2,000 hours (see conditions in Test Method & Performance)
Leakage Current	I = 0.2 CV
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
Coefficient	0.05	0.30	0.70	1.00

Test Method & Performance

Conditions	Load Life Test	Shelf Life Test
Temperature	125°C	125°C
Test Duration	2,000 hours	168 hours
Ripple Current	No ripple current applied	No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 1,000 hours at 60°C, 90%~95% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Surge Voltage (Rated Voltage x 1.15(V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles, each consisting of charge with the surge voltages specified at 125°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes, 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Resistance to Soldering Heat	**Measurement for solder temperature profile at capacitor top and terminal.**	
Capacitance Change	Within ±10% of the initial value	
Dissipation Factor	Does not exceed 130% of the specified value	
ESR	Does not exceed 130% of the specified value	
Leakage Current	Does not exceed specified value	

Test Method & Performance – Anti-Vibration Version

Anti-Vibration Version	
Vibration Test Specifications	1.5 mm displacement amplitude or 30 g maximum acceleration. Vibration applied for three 4-hour sessions at 10 – 2,000 Hz (capacitor on PCB).
Capacitance Change	Within ±20% of the initial value
Dissipation Factor	Does not exceed 150% of the specified value
ESR	Does not exceed 150% of the specified value
Leakage Current	Does not exceed specified value

Shelf Life & Re-Ageing

Shelf Life
Solderability is 12 months after manufacturing date.

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

• This series should not be stored in high temperatures or where there is a high level of humidity.
• The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
• Do not store in damp conditions such as water, saltwater spray or oil spray.
• Do not store in an environment of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.)
•Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 12 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

Note: The JEDEC-J-STD-020 standard does not apply.

Floor Life
The Capacitor should be soldered within 4 weeks after removal from sealed bag. Reseal the unused capacitors into plastic bags. All parts manufactured from week 1 of year 2022 are packed in sealed plastic bags.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 125°C for a period of 120 minutes through a 1 kΩ series resistor.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Surge Voltage	Rated Capacitance	ESR	Ripple Current	Leakage Current	Case Size	KEMET Part Number		Case Size
(VDC)	(VDC)	120 Hz 20°C (µF)	100 kHz 20°C (mΩ)	100 kHz 125°C (mA)	20°C 2 min (µA)	D x L (mm)	() Represents Part Number Options	Anti-Vibration Version	D x L (mm) Anti-Vibration
16	18.40	470	11	3,375	1,504	8 × 12.2	A769KS477M1CLAS011	-	-
16	18.40	560	11	3,375	1,792	8 × 12.2	A769KS567M1CLAS011	-	-
16	18.40	1,000	10	3,645	3,200	10 × 12.2	A769MS108M1CLAS010	A769MS108M1CLAV010	10 × 12.4
20	23.00	180	25	1,840	720	8 × 6.7	A769KE187M1DLAS025	-	-
20	23.00	220	25	1,840	880	8 × 6.7	A769KE227M1DLAS025	-	-
20	23.00	390	11	3,240	1,560	8 × 12.2	A769KS397M1DLAS011	-	-
20	23.00	680	10	3,510	2,720	10 × 12.2	A769MS687M1DLAS010	A769MS687M1DLAV010	10 × 12.4
25	28.75	150	25	1,840	750	8 × 6.7	A769KE157M1ELAS025	-	-
25	28.75	180	25	1,840	900	8 × 6.7	A769KE187M1ELAS025	-	-
25	28.75	330	12	3,139	1,650	8 × 12.2	A769KS337M1ELAS012	-	-
25	28.75	390	12	3,139	1,950	8 × 12.2	A769KS397M1ELAS012	-	-
25	28.75	470	11	3,375	2,350	10 × 12.2	A769MS477M1ELAS011	A769MS477M1ELAV011	10 × 12.4
25	28.75	560	11	3,375	2,800	10 × 12.2	A769MS567M1ELAS011	A769MS567M1ELAV011	10 × 12.4
35	40.25	82	31	1,610	574	8 × 6.7	A769KE826M1VLAS031	-	-
35	40.25	100	31	1,610	700	8 × 6.7	A769KE107M1VLAS031	-	-
35	40.25	180	16	2,700	1,260	8 × 12.2	A769KS187M1VLAS016	-	-
35	40.25	220	16	2,700	1,540	8 × 12.2	A769KS227M1VLAS016	-	-
35	40.25	270	14	2,970	1,890	10 × 12.2	A769MS277M1VLAS014	A769MS277M1VLAV014	10 × 12.4
35	40.25	330	14	2,970	2,310	10 × 12.2	A769MS337M1VLAS014	A769MS337M1VLAV014	10 × 12.4
40	46.00	68	32	1,553	544	8 × 6.7	A769KE686M1GLAS032	-	-
40	46.00	82	32	1,553	656	8 × 6.7	A769KE826M1GLAS032	-	-
40	46.00	150	16	2,633	1,200	8 × 12.2	A769KS157M1GLAS016	-	-
40	46.00	220	14	2,970	1,760	10 × 12.2	A769MS227M1GLAS014	A769MS227M1GLAV014	10 × 12.4
40	46.00	270	14	2,970	2,160	10 × 12.2	A769MS277M1GLAS014	A769MS277M1GLAV014	10 × 12.4
50	57.50	33	36	1,495	330	8 × 6.7	A769KE336M1HLAS036	-	-
50	57.50	39	36	1,495	390	8 × 6.7	A769KE396M1HLAS036	-	-
50	57.50	82	13	2,565	820	8 × 12.2	A769KS826M1HLAS013	-	-
50	57.50	100	16	2,903	1,000	10 × 12.2	A769MS107M1HLAS016	A769MS107M1HLAV016	10 × 12.4
50	57.50	100	20	2,565	1,000	8 × 12.2	A769KS107M1HLAS020	-	-
50	57.50	120	16	2,903	1,200	10 × 12.2	A769MS127M1HLAS016	A769MS127M1HLAV016	10 × 12.4
50	57.50	150	16	2,903	1,500	10 × 12.2	A769MS157M1HLAS016	A769MS157M1HLAV016	10 × 12.4
63	72.45	22	46	1,351	277	8 × 6.7	A769KE226M1JLAS046	-	-
63	72.45	27	46	1,351	340	8 × 6.7	A769KE276M1JLAS046	-	-
63	72.45	47	20	2,430	592	8 × 12.2	A769KS476M1JLAS020	-	-
63	72.45	56	20	2,430	706	8 × 12.2	A769KS566M1JLAS020	-	-
63	72.45	82	18	2,700	1,033	10 × 12.2	A769MS826M1JLAS018	A769MS826M1JLAV018	10 × 12.4
63	72.45	100	18	2,700	1,260	10 × 12.2	A769MS107M1JLAS018	A769MS107M1JLAV018	10 × 12.4
(VDC)	(VDC)	120 Hz 20°C (µF)	100 kHz 20°C (mΩ)	100 kHz 125°C (mA)	20°C 2 min (µA)	D x L (mm)	() Represents Part Number Options	Anti-Vibration Version	D x L (mm) Anti-Vibration
Rated Voltage	Surge Voltage	Rated Capacitance	ESR	Ripple Current	Leakage Current	Case Size	KEMET Part Number		Case Size

Installing

Solid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that electrolytic capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

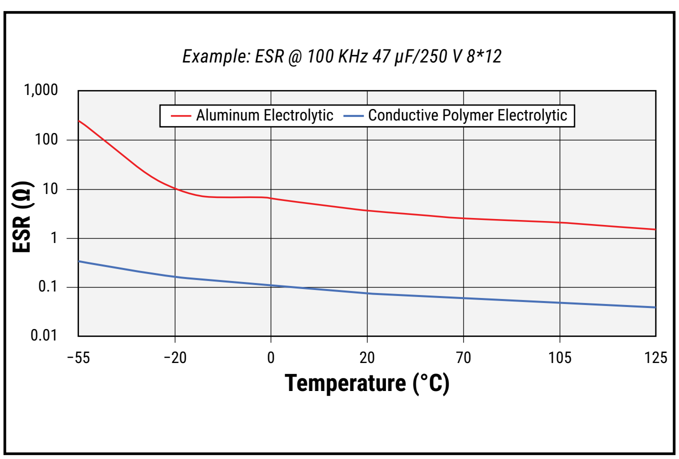
Temperature Stability Characteristics

Stable characteristics in a very low temperature range allows for less circuits in the design.

Due to a solid polymer electrolyte, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

The ESR of polymer capacitors is nearly constant within its operating temperature range, while the ESR of a standard electrolytic capacitor noticeably changes with temperature.

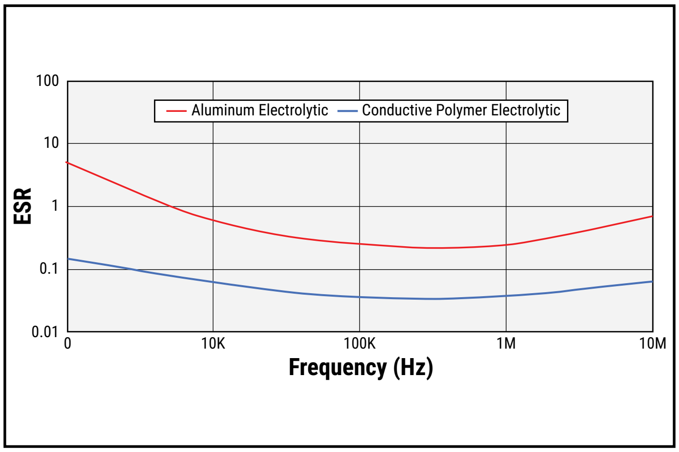
Temperature Stability Characteristics



Stability of ESR across Frequency Range

Due to a solid polymer electrolyte, the ESR curve of a solid polymer aluminum capacitor, is lower and more stable than that of a standard electrolytic capacitor.

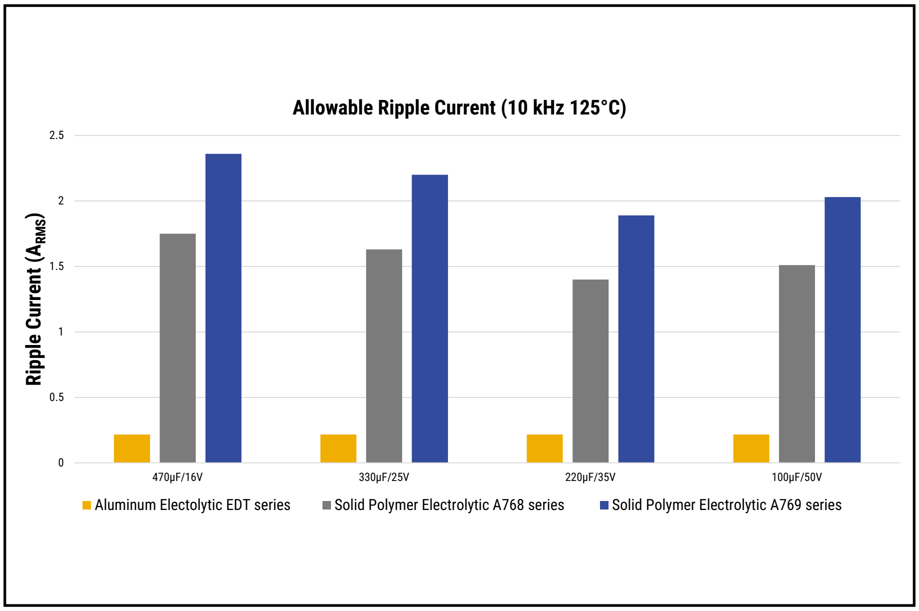
Stable ESR Values across Frequency



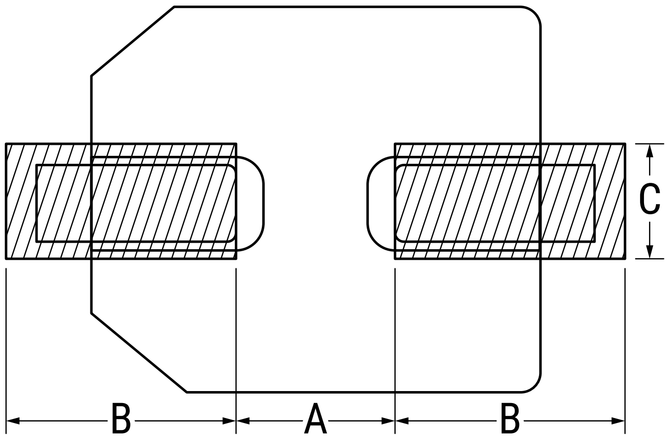
High Resistance to Ripple Current

As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation.

Allowable Ripple Current (10 kHz 125°C)

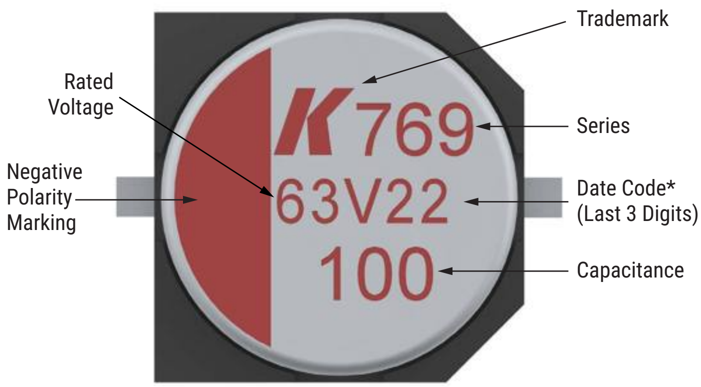


Landing Pad – Millimeters



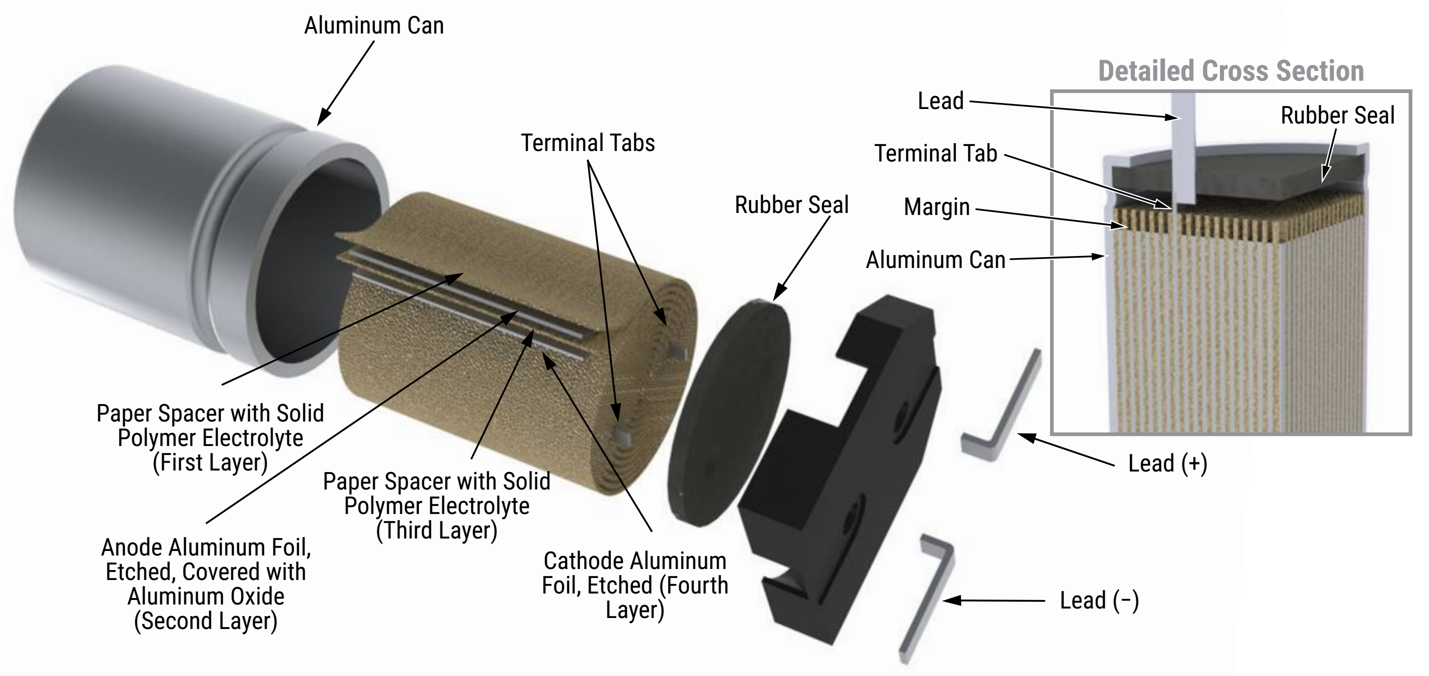
Diameter	A	B	C
5	1.4	3	1.6
6.3	1.9	3.5	1.6
8	3.1	4.2	2.2
10	4.5	4.4	2.2
10 (Anti-Vibration)	4.5	4.4	4.6

Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	S = 2019
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year
Year Code	
S	2019
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction

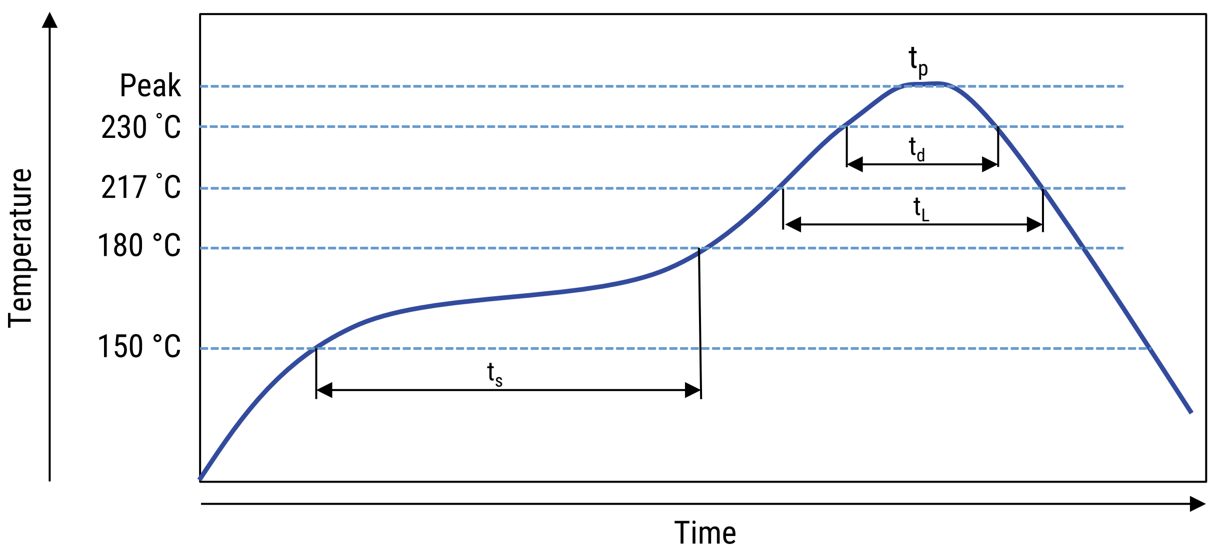


Re-Flow Soldering

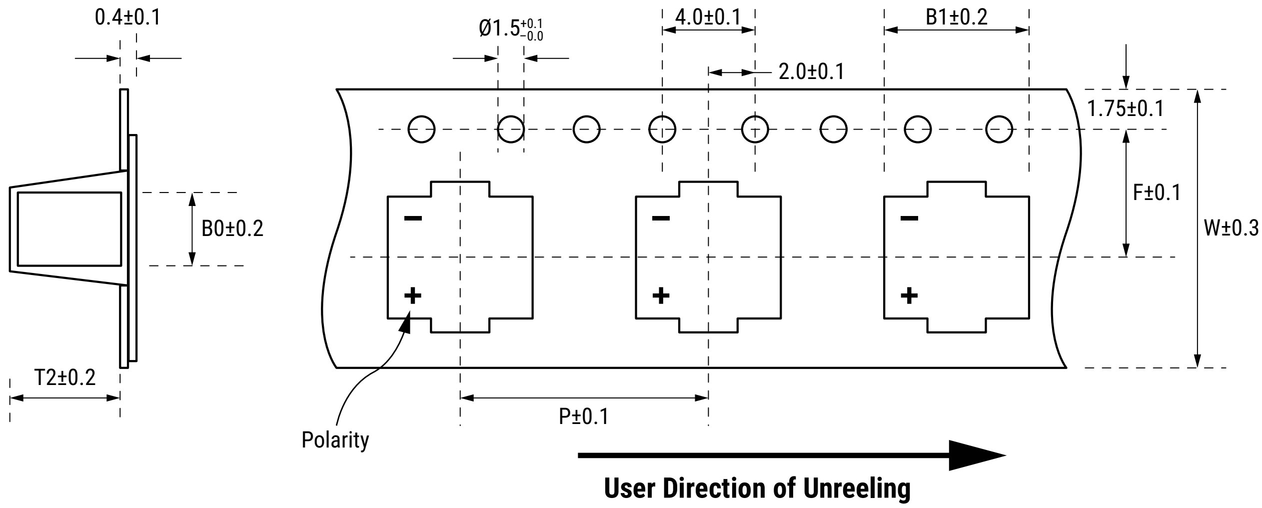
The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapor heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Time Period	Preheat t_s	t_L	t_d	t_p	Reflow Number
Temperature (°C)	150 – 180	≥ 217	≥ 230	260	1
				250	1 or 2
Time (seconds)	60 - 120	≤ 50	≤ 40	≤ 5	–



Taping for Automatic Insertion Machines



Size Code	Diameter	Length	W	P	F	B1	B0	T2
	(mm)	(mm)	±0.3	±0.1	±0.1	±0.2	±0.2	±0.2
BC	5.0	6.0	16.0	12.0	7.5	5.6	5.6	7.1
BG	5.0	7.0	16.0	12.0	7.5	5.6	5.6	7.1
EB	6.3	5.7	16.0	12.0	7.5	7.0	7.0	7.6
EG	6.3	7.0	16.0	12.0	7.5	7.0	7.0	7.6
EK	6.3	8.0	16.0	12.0	7.5	7.0	7.0	7.6
EN	6.3	9.7	16.0	12.0	7.5	7.0	7.0	9.6
KE	8.0	6.7	24.0	12.0	11.5	8.6	8.6	6.8
KG	8.0	7.0	24.0	12.0	11.5	8.6	8.6	8.4
KH	8.0	7.5	24.0	12.0	11.5	8.6	8.6	8.4
KN	8.0	9.7	24.0	16.0	11.5	8.6	8.6	10.3
KS	8.0	12.2	24.0	16.0	11.5	8.6	8.6	12.5
MN	10.0	10.0	24.0	16.0	11.5	10.7	10.7	10.1
MS	10.0	12.2	24.0	16.0	11.5	10.7	10.7	12.5
MS (Anti-Vbration)	10.0	12.4	24.0	16.0	11.5	11.2	10.7	12.7
MU	10.0	12.6	24.0	16.0	11.5	10.7	10.7	13.1

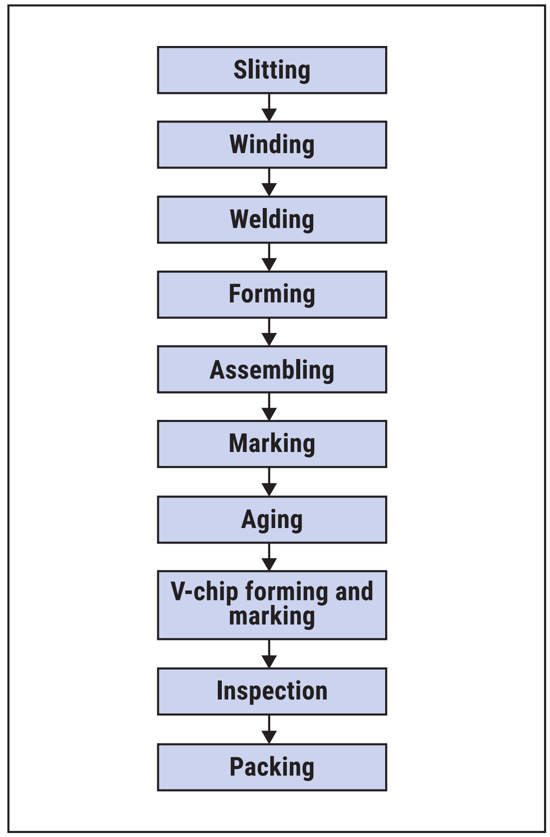
Construction Data

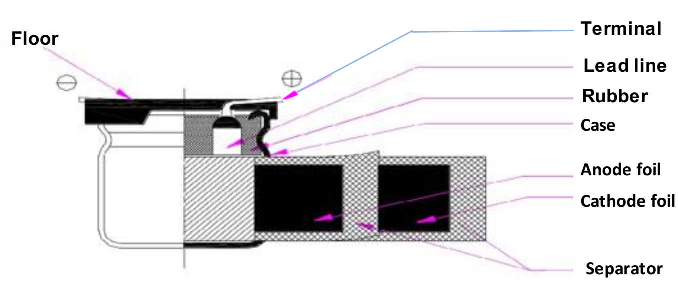
The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.

The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding





A771 125°C, Long Life, High Ripple

Overview

KEMET's A771 Surface Mount Solid Polymer Aluminum Capacitors offer 4,000h lifetime and greater stability across a wide range of temperatures. This highly conductive solid polymer electrolyte eliminates the risk of drying out and, due to its ultra low ESR properties, is able to withstand higher ripple currents during normal operation, up to +35% when compared to A768 series. The A771 is AEC-Q200 qualified, ideally suited for automotive and industrial applications. Anti-Vibration version is available for 10 mm diameter. If CV/Size is not available please contact your local Sales Representative for more information.

Applications

Typical applications include long life LED drivers, professional power amplifiers, industrial power supplies, DC/DC converters, voltage regulators, and decoupling. This series is used for automotive powertrain.

Benefits

- High temperature and long lifetime: 125°C/4,000 hours
- High ripple current up to 3.6 A_{RMS}
- Ultra low impedance
- High vibration resistance up to 30 g
- Surface mount form factor
- RoHS compliant
- Halogen-free

Standard

Anti-Vibration

Part Number System

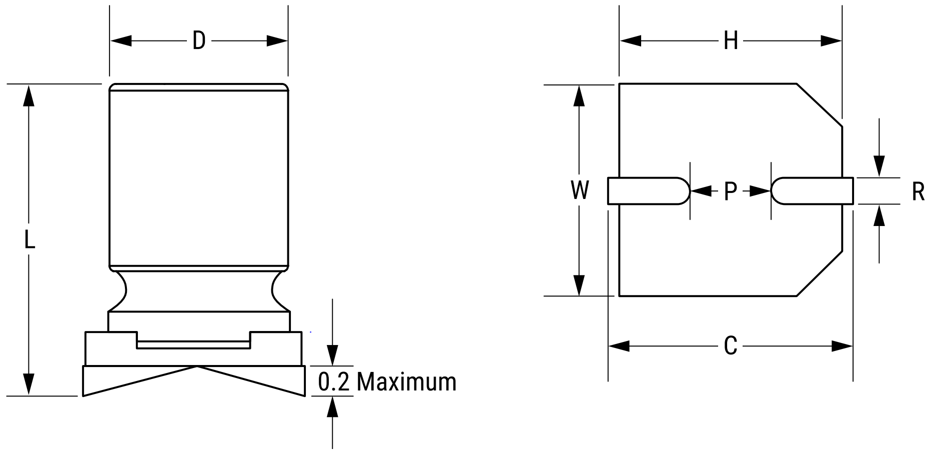
A	771	MS	107	M	1J	LA	S	018
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Surface Mount Solid Polymer Aluminum Capacitors 125°C 4,000 hours Long Life, High Ripple, Low Leakage	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	16 = 1C 20 = 1D 25 = 1E 35 = 1V 40 = 1G 50 = 1H 63 = 1J	LA = Tape & Reel	S = Automotive AEC-Q200 V = Automotive + Anti-Vibration	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

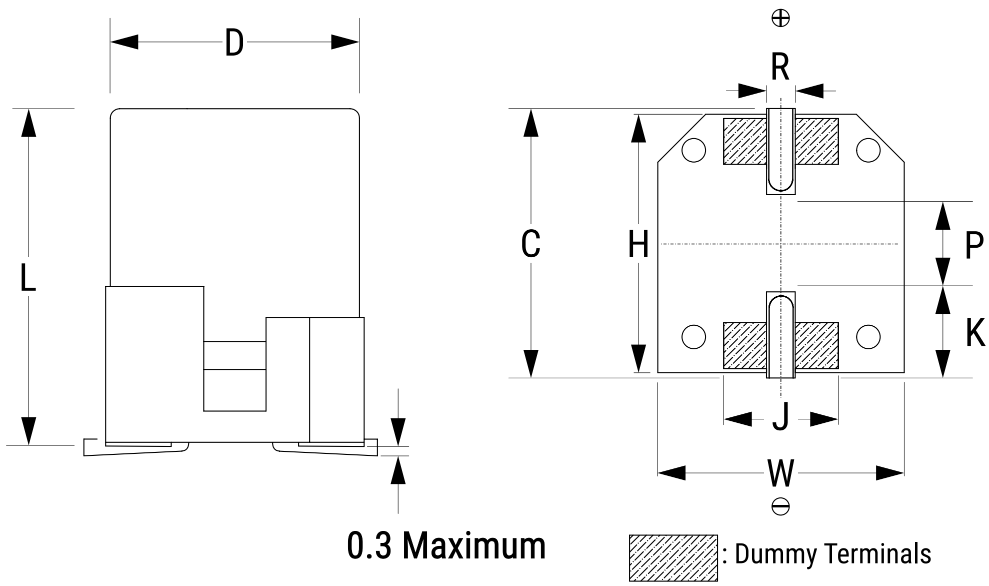
Packaging Type	Packaging Code
Standard Packaging Options	
Tape & Reel	LA
Contact KEMET for other Lead and Packaging options	

Dimensions – Millimeters

Standard



Anti-Vibration



Size Code	D		L		W		H		C		R	P	J	K
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Range	Nominal	Nominal	Nominal
KS	8	±0.5	12.2	±0.3	8.3	±0.2	8.3	±0.2	9	±0.2	0.8 – 1.1	3.2	-	-
MN	10	±0.5	10.2	±0.3	10.3	±0.2	10.3	±0.2	11	±0.2	0.8 – 1.1	4.6	-	-
MN (Anti-Vibration)	10	±0.5	10.4	±0.3	10.3	±0.2	10.8	±0.2	11.2	±0.2	0.7 – 1.1	4.6	4.4	3.2
MS	10	±0.5	12.2	±0.5	10.3	±0.2	10.3	±0.2	11	±0.2	0.8 – 1.1	4.6	-	-
MS (Anti-Vibration)	10	±0.5	12.4	±0.5	10.3	±0.2	10.8	±0.2	11	±0.2	0.7 – 1.1	4.6	4.4	3.2

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant, and Halogen-Free.

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and make any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free or LFW = Lead-free wires on the label.

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	47 – 1,000 µF
Rated Voltage	16 – 63 VDC
Operating Temperature	−55°C to +125°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	4,000 hours (see conditions in Test Method & Performance)
Leakage Current	≤ Specified Value
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
Coefficient	0.05	0.30	0.70	1.00

Test Method & Performance

Conditions	Load Life Test	Shelf Life Test
Temperature	125°C	125°C
Test Duration	4,000 hours	168 hours
Ripple Current	No ripple current applied	No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 1,000 hours at 60°C, 90%~95% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Surge Voltage (Rated Voltage x 1.15(V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles, each consisting of charge with the surge voltages specified at 125°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes, 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed specified value	
Resistance to Soldering Heat	**Measurement for solder temperature profile at capacitor top and terminal.**	
Capacitance Change	Within ±10% of the initial value	
Dissipation Factor	Does not exceed 130% of the specified value	
ESR	Does not exceed 130% of the specified value	
Leakage Current	Does not exceed specified value	

Test Method & Performance – Anti-Vibration Version

Anti-Vibration Version	
Vibration Test Specifications	1.5 mm displacement amplitude or 30 g maximum acceleration. Vibration applied for three 4-hour sessions at 10 – 2,000 Hz (capacitor on PCB).
Capacitance Change	Within ±20% of the initial value
Dissipation Factor	Does not exceed 150% of the specified value
ESR	Does not exceed 150% of the specified value
Leakage Current	Does not exceed specified value

Shelf Life & Re-Ageing

Shelf Life
Solderability is 12 months after manufacturing date.

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

• This series should not be stored in high temperatures or where there is a high level of humidity.
• The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
• Do not store in damp conditions such as water, saltwater spray or oil spray.
• Do not store in an environment of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.)
•Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 12 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

Note: The JEDEC-J-STD-020 standard does not apply.

Floor Life
The Capacitor should be soldered within 4 weeks after removal from sealed bag. Reseal the unused capacitors into plastic bags. All parts manufactured from week 1 of year 2022 are packed in sealed plastic bags.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 125°C for a period of 120 minutes through a 1 kΩ series resistor.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Surge Voltage	Rated Capacitance	ESR	Ripple Current	Leakage Current	Case Size	KEMET Part Number		Case Size
(VDC)	(VDC)	120 Hz 20°C (µF)	100 kHz 20°C (mΩ)	100 kHz 125°C (mA)	20°C 2 min (µA)	D x L (mm)	Standard Version	Anti-Vibration Version	D x L (mm) Anti-Vibration
16	18.40	470	11	3,375	1,504	8 x 12.2	A771KS477M1CLAS011	-	-
16	18.40	560	11	3,375	1,792	8 x 12.2	A771KS567M1CLAS011	-	-
16	18.40	680	13	3,190	2,176	10 x 10.2	A771MN687M1CLAS013	A771MN687M1CLAV013	10 x 10.4
16	18.40	1000	10	3,645	3,200	10 x 12.2	A771MS108M1CLAS010	A771MS108M1CLAV010	10 x 12.4
20	23.00	390	11	3,240	1,560	8 x 12.2	A771KS397M1DLAS011	-	-
20	23.00	560	13	3,080	2,240	10 x 10.2	A771MN567M1DLAS013	A771MN567M1DLAV013	10 x 10.4
20	23.00	680	10	3,510	2,720	10 x 12.2	A771MS687M1DLAS010	A771MS687M1DLAV010	10 x 12.4
25	28.75	330	12	3,139	1,650	8 x 12.2	A771KS337M1ELAS012	-	-
25	28.75	390	12	3,139	1,950	8 x 12.2	A771KS397M1ELAS012	-	-
25	28.75	330	14	2,990	1,650	10 x 10.2	A771MN337M1ELAS014	A771MN337M1ELAV014	10 x 10.4
25	28.75	470	11	3,375	2,350	10 x 12.2	A771MS477M1ELAS011	A771MS477M1ELAV011	10 x 12.4
25	28.75	560	11	3,375	2,800	10 x 12.2	A771MS567M1ELAS011	A771MS567M1ELAV011	10 x 12.4
35	40.25	180	16	2,700	1,260	8 x 12.2	A771KS187M1VLAS016	-	-
35	40.25	220	16	2,700	1,540	8 x 12.2	A771KS227M1VLAS016	-	-
35	40.25	270	14	2,970	1,890	10 x 10.2	A771MN277M1VLAS014	A771MN277M1VLAV014	10 x 10.4
35	40.25	270	14	2,970	1,890	10 x 12.2	A771MS277M1VLAS014	A771MS277M1VLAV014	10 x 12.4
35	40.25	330	14	2,970	2,310	10 x 12.2	A771MS337M1VLAS014	A771MS337M1VLAV014	10 x 12.4
40	46.00	150	16	2,633	1,200	8 x 12.2	A771KS157M1GLAS016	-	-
40	46.00	200	14	2,970	1,600	10 x 10.2	A771MN207M1GLAS014	A771MN207M1GLAV014	10 x 10.4
40	46.00	220	14	2,970	1,760	10 x 12.2	A771MS227M1GLAS014	A771MS227M1GLAV014	10 x 12.4
40	46.00	270	14	2,970	2,160	10 x 12.2	A771MS277M1GLAS014	A771MS277M1GLAV014	10 x 12.4
50	57.50	82	13	2,565	820	8 x 12.2	A771KS826M1HLAS013	-	-
50	57.50	100	16	2,903	1,000	10 x 12.2	A771MS107M1HLAS016	A771MS107M1HLAV016	10 x 12.4
50	57.50	100	20	2,565	1,000	8 x 12.2	A771KS107M1HLAS020	-	-
50	57.50	120	16	2,903	1,200	10 x 10.2	A771MN127M1HLAS016	A771MN127M1HLAV016	10 x 10.4
50	57.50	120	16	2,903	1,200	10 x 12.2	A771MS127M1HLAS016	A771MS127M1HLAV016	10 x 12.4
50	57.50	150	16	2,903	1,500	10 x 12.2	A771MS157M1HLAS016	A771MS157M1HLAV016	10 x 12.4
63	72.45	47	20	2,430	592	8 x 12.2	A771KS476M1JLAS020	-	-
63	72.45	56	20	2,430	706	8 x 12.2	A771KS566M1JLAS020	-	-
63	72.45	68	18	2,700	857	10 x 10.2	A771MN686M1JLAS018	A771MN686M1JLAV018	10 x 10.4
63	72.45	82	18	2,700	1,033	10 x 12.2	A771MS826M1JLAS018	A771MS826M1JLAV018	10 x 12.4
63	72.45	100	18	2,700	1,260	10 x 12.2	A771MS107M1JLAS018	A771MS107M1JLAV018	10 x 12.4
(VDC)	(VDC)	120 Hz 20°C (µF)	100 kHz 20°C (mΩ)	100 kHz 125°C (mA)	20°C 2 min (µA)	D x L (mm)	() Represents Part Number Options	Anti-Vibration Version	D x L (mm) Anti-Vibration
Rated Voltage	Surge Voltage	Rated Capacitance	ESR	Ripple Current	Leakage Current	Case Size	KEMET Part Number		Case Size

(1) Electrical Parameters code. See Part Number System for available options.

Installing

Solid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current.

A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that electrolytic capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

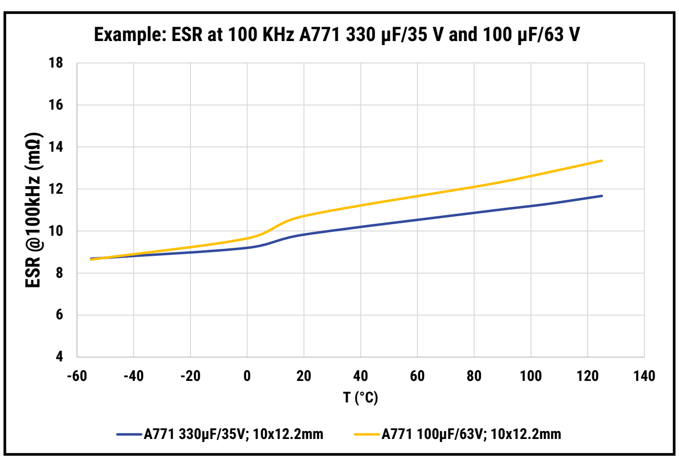
ESR Temperature and Frequency Dependence

Stable characteristics in a very low temperature range allows for less circuits in the design.

Due to a solid polymer electrolyte, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

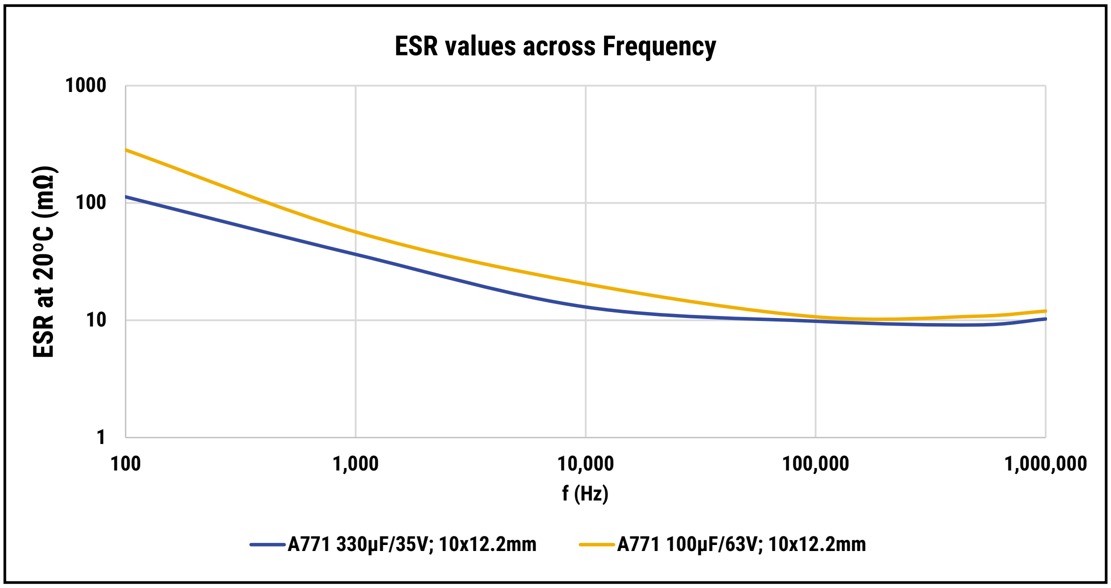
The ESR of polymer capacitors is nearly constant within its operating temperature range.

Temperature Stability Characteristics



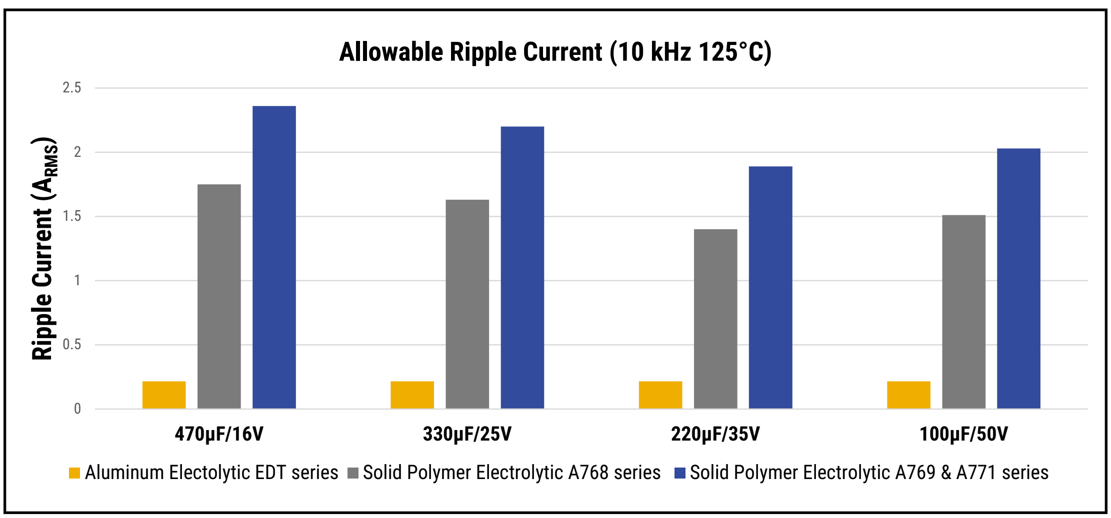
ESR across Frequency Range

Due to a solid polymer electrolyte, the ESR curve of a solid polymer aluminum capacitor, is low and stable in high frequency range (10kHz to 1MHz).

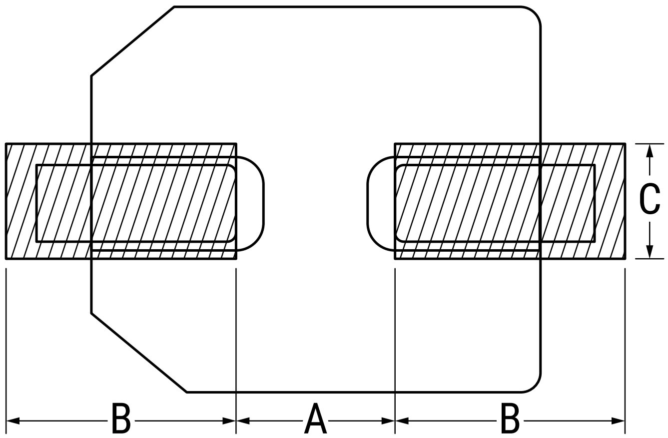


High Resistance to Ripple Current

As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation.

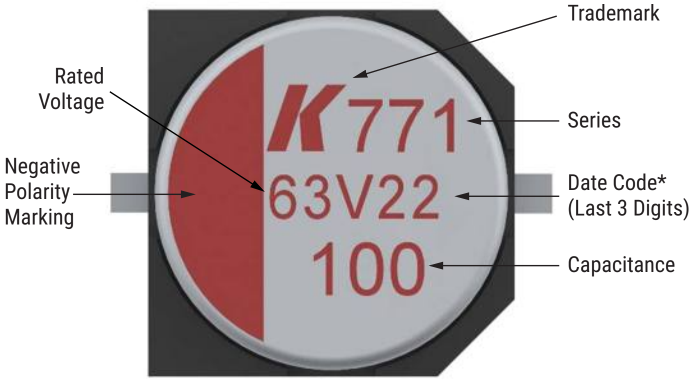


Landing Pad – Millimeters



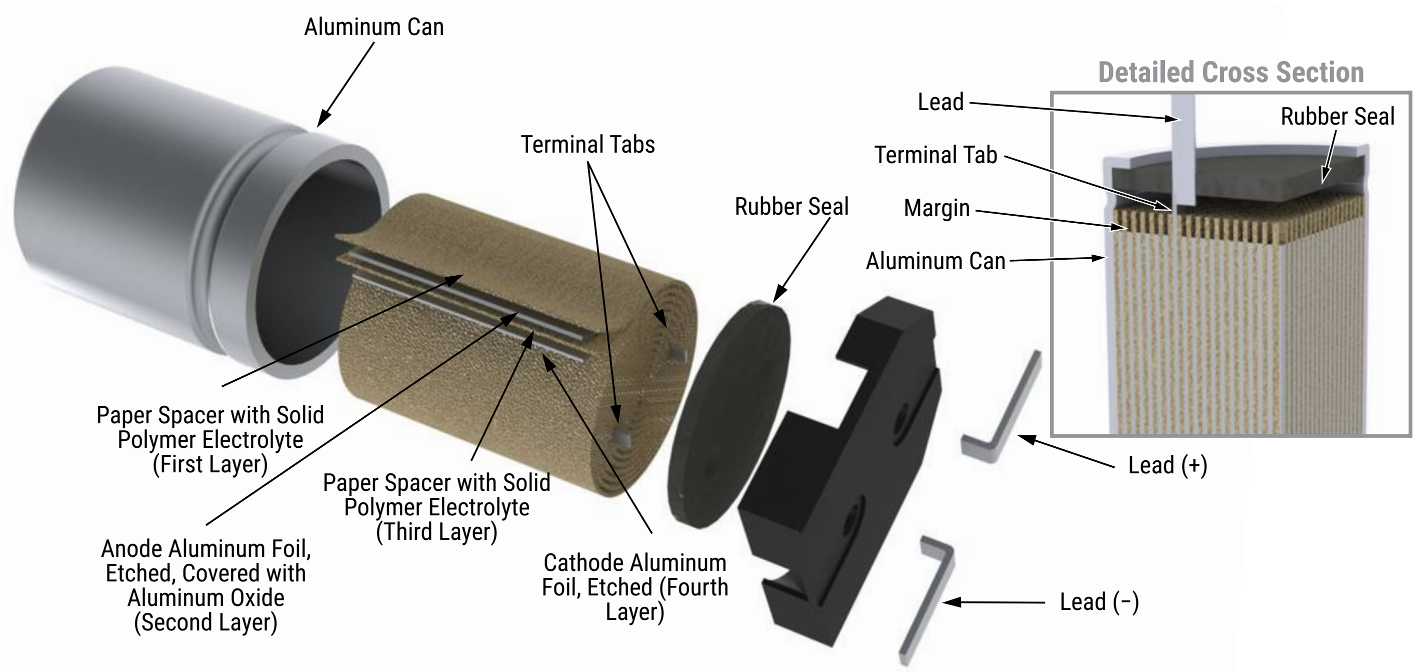
Diameter	A	B	C
8	3.1	4.2	2.2
10	4.5	4.4	2.2
10 (Anti-Vibration)	4.5	4.4	4.6

Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	S = 2019
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year
Year Code	
S	2019
T	2020
U	2021
V	2022
W	2023
X	2024
Y	2025
Z	2026

Construction

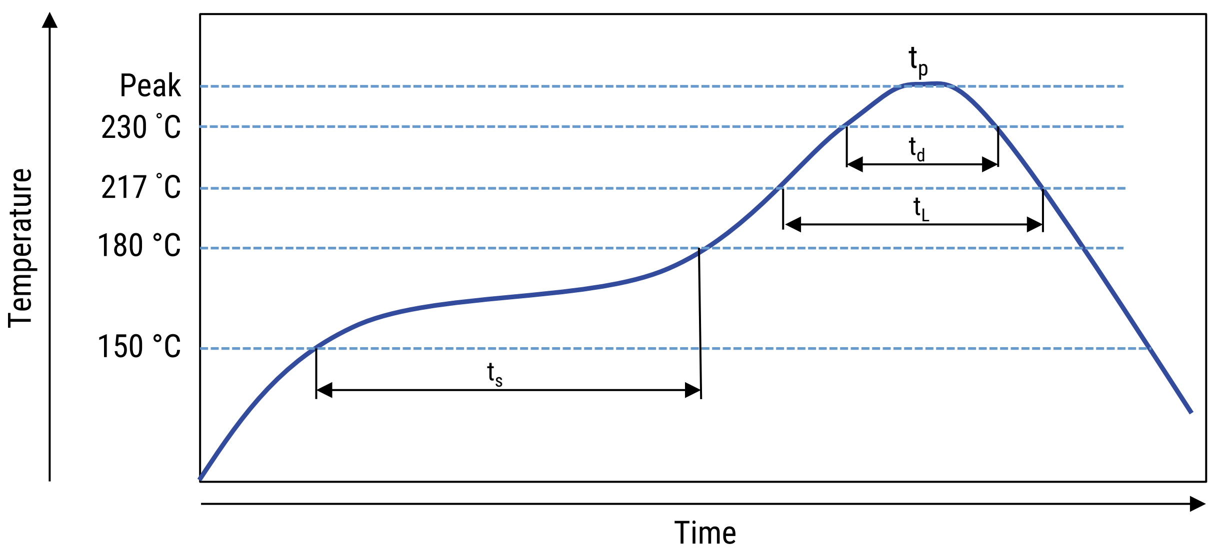


Re-Flow Soldering

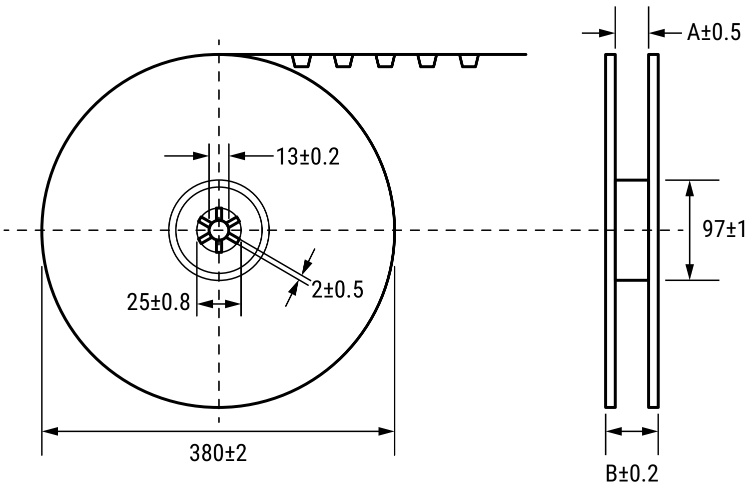
The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapor heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Time Period	Preheat t_s	t_L	t_d	t_p	Reflow Number
Temperature (°C)	150 – 180	≥ 217	≥ 230	260	1
				250	1 or 2
Time (seconds)	60 - 120	≤ 50	≤ 40	≤ 5	–

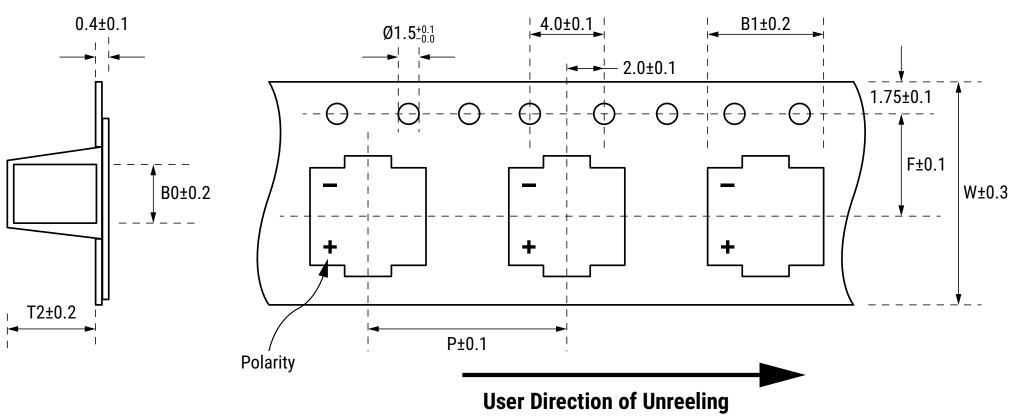


Lead Taping & Packaging



Size Code	Diameter (mm)	Length (mm)	Reel Quantity/SPQ	Box Quantity	Reel	
					A	B
					±0.5	±0.2
KS	8	12.2	400	2,400	26	30
MN	10	10.2	500	3,000	26	30
MN (Anti-Vibration)	10	10.4	500	3,000	26	30
MS	10	12.2	400	2,400	26	30
MS (Anti-Vibration)	10	12.4	400	2,400	26	30

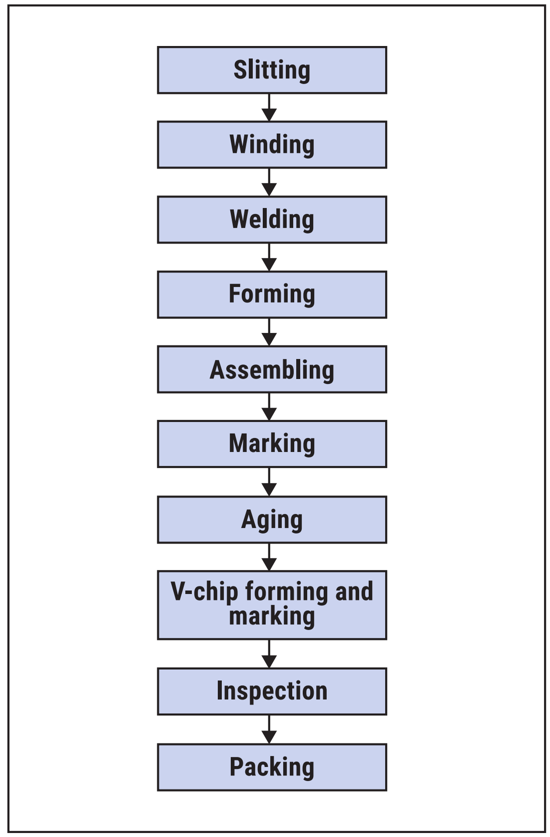
Taping for Automatic Insertion Machines



Size Code	Diameter	Length	W	P	F	B1	B0	T2
	(mm)	(mm)	±0.3	±0.1	±0.1	±0.2	±0.2	±0.2
KS	8.0	12.2	24.0	16.0	11.5	8.7	8.7	12.5
MN	10.0	10.0	24.0	16.0	11.5	10.7	10.7	10.1
MN (Anti-Vibration)	10.0	10.4	24.0	16.0	11.5	10.7	11.2	10.3
MS	10.0	12.2	24.0	16.0	11.5	10.7	10.7	12.5
MS (Anti-Vbration)	10.0	12.4	24.0	16.0	11.5	10.7	11.2	12.7

Construction Data

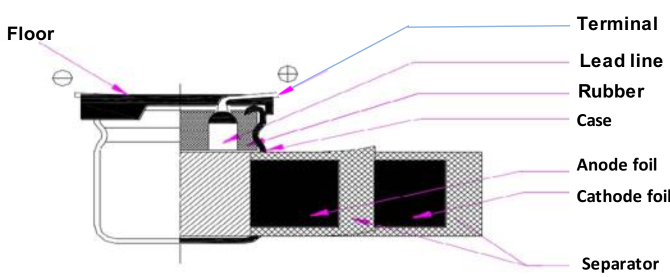
The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.



The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete. Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding



Surface Mount Hybrid Aluminum Polymer Capacitors

A784, 150°C, Hybrid Polymer V-Chip, AEC-Q200

RoHS REACH COMPLIANT HF Halogen Free

Overview

KEMET’s A784 is a surface mount conductive polymer hybrid capacitor with outstanding electrical performance. The A784 winding is housed in a cylindrical aluminum can with a high/quality rubber deck. Low ESR is conditioned by a highly conductive polymer (PEDOT/PSS). The polymer system creates an electrical pathway between the anodic oxide layer and the cathode through a mechanical separator -paper. The A784 winding is impregnated with liquid electrolyte that translates to the self-healing features of the capacitor. Thanks to its mechanical robustness, the A784 is suitable for use in mobile and automotive installations with operation up to +150°C.

Applications

KEMET’s A784 is a series of high-performance surface mount hybrid capacitors. Due to its mechanical robustness, the A784 is suitable for use in mobile and automotive installations with extremely high demands and operation up to +150°C.

Benefits

- Surface mount form factor
- High ripple current up to 2.5A_{rms} at 150°C
- High temperature; 150°C up to 1,000 hours
- Low leakage current (Typically no re-ageing required)
- High vibration resistance up to 30g
- Self-healing behaviors
- Outstanding electrical performance
- AEC-Q200 compliance
- RoHS compliant
- Halogen-Free

Standard

Anti-Vibration

Part Number System

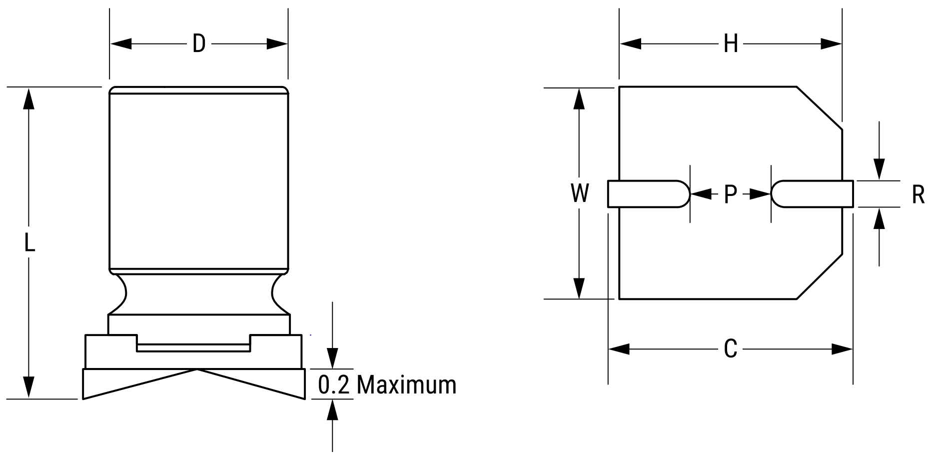
A	784	MW	157	M	1J	LA	V	015
Capacitor Class	Series	Size Code	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)	Packaging	Electrical Parameters	ESR
A = Aluminum	Surface Mount Hybrid Polymer Aluminum Capacitors 150°C 1,000 hours	See Dimension Table	First two digits represent significant figures for capacitance values. Last digit specifies the number of zeros to be added.	M = ±20%	25 = 1E 35 = 1V 50 = 1H 63 = 1J	LA = Tape & Reel	S = Automotive V = Automotive +Anti-Vibration	Last 3 digits represent significant figures for ESR values. (mΩ)

Ordering Options Table

Packaging Type	Packaging Code
Standard Packaging Options	
Tape & Reel	LA
Contact KEMET for other Lead and Packaging options	

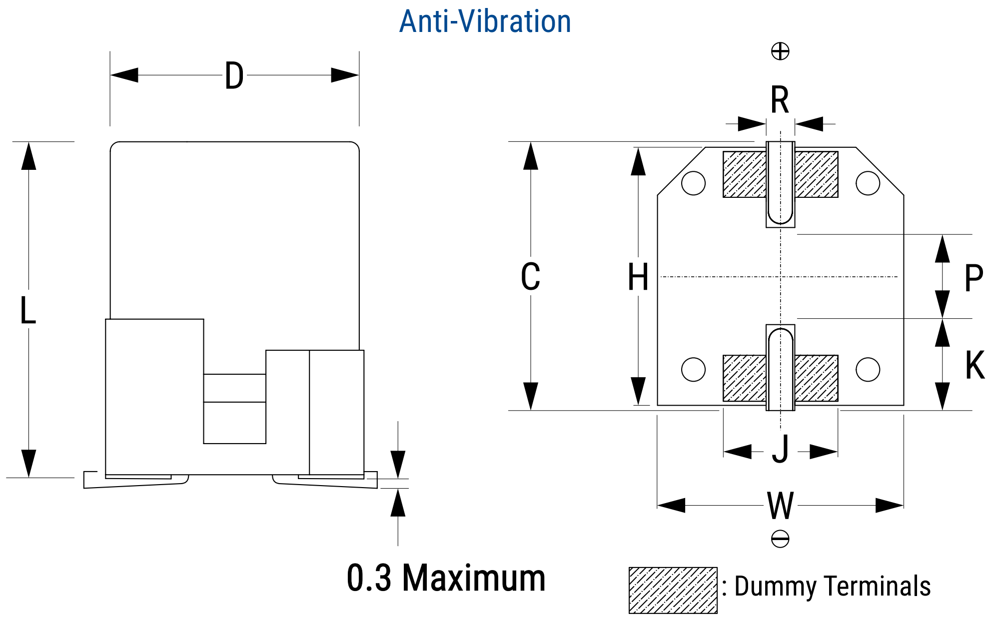
Dimensions – Standard – Millimeters

Standard



Size Code	D		L		W		H		C		R	P	J	K
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Range	Nominal	Nominal	Nominal
MS	10.0	±0.5	12.2	±0.5	10.3	±0.2	10.3	±0.2	11.0	±0.2	0.8 – 1.1	4.6	-	-
MW	10.0	±0.5	16.5	±0.5	10.3	±0.2	10.3	±0.2	11.0	±0.2	0.8 – 1.1	4.6	-	-

Dimensions – Anti-Vibration – Millimeters



Size Code	D		L		W		H		C		R	P	J	K
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Range	Nominal	Nominal	Nominal
MS (Anti-Vibration)	10.0	±0.5	12.4	±0.5	10.3	±0.2	10.8	±0.2	11.2	±0.2	0.7 – 1.1	4.6	4.4	3.2
MW (Anti-Vibration)	10.0	±0.5	16.7	±0.5	10.3	±0.2	10.8	±0.2	11.2	±0.2	0.7 – 1.1	4.6	4.4	3.2

Environmental Compliance

All Part Number in this datasheet are Reach and RoHS compliant and Halogen-Free.

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalogue are produced to help our customers' obligations to guarantee their products and fulfil these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfil the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation worldwide and makes any necessary changes in its products, whenever needed. Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as LF = Lead-free or LFW = Lead-free wires on the label.

Performance Characteristics

Item	Performance Characteristics
Capacitance Range	100 – 560 µF
Rated Voltage	25 – 63 VDC
Operating Temperature	−55°C to +150°C
Capacitance Tolerance	±20% at 120 Hz/20°C
Life Test	1,000 hours at rated temperature (See conditions in Test Method and Performance)
Leakage Current	I = 0.01 CV
	C = Rated capacitance (µF), V = Rated voltage (VDC), Voltage applied for 2 minutes at 20°C.

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequecy correction factor for permissible ripple current should be calculated following $I_{AC, f} / I_{AC, 100 kHz}$:

Rated Voltage (V)	Frequency	100 Hz	200 Hz	500 Hz	1 kHz	5 kHz	10 kHZ	50 kHz	100 kHz
25 and 35	Coefficient	0.40	0.50	0.60	0.67	0.79	0.84	0.97	1.00
50 and 63		0.22	0.31	0.42	0.55	0.75	0.82	0.94	1.00

Test Method & Performance

Conditions	Endurance Life Test	High Temperature Storage Test
Temperature	+150°C	+150°C
Test Duration	1,000 hours at rated temperature (See conditions in Test Method and Performance)	1,000 hours
Ripple Current	Rated ripple applied	No ripple current applied
Voltage	Rated voltage	No voltage applied
Performance	**The following specifications will be satisfied when the capacitor is restored to 20°C.**	
Capacitance Change	Within ±30% of the initial value	
Dissipation Factor	Does not exceed 200% of the specified value	
ESR	Does not exceed 200% of the specified value	
Leakage Current	Does not exceed the specified value	Does not exceed the specified value after Voltage treatment (Re-age procedure)
Damp Heat	**The following specifications will be satisfied when the capacitor is restored to 20°C after application of rated voltage for 2,500 hours at 85°C, 85% RH.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 200% of the specified value	
ESR	Does not exceed 200% of the specified value	
Leakage Current	Does not exceed the specified value	
Surge Voltage (Rated Voltage x 1.15(V))	**The following specifications will be satisfied when the capacitor is subjected to 1,000 cycles, each consisting of charge with the surge voltages specified at 150°C for 30 seconds through a protective resistor (Rc = 1 kΩ) and discharge for 5 minutes, 30 seconds.**	
Capacitance Change	Within ±20% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed the specified value	
Resistance to Soldering Heat	**Measurement for solder temperature profile at capacitor top and terminal.**	
Capacitance Change	Within ±10% of the initial value	
Dissipation Factor	Does not exceed 150% of the specified value	
ESR	Does not exceed 150% of the specified value	
Leakage Current	Does not exceed the specified value	

Test Method & Performance – Anti-Vibration Version

Anti-Vibration Version Only	
Vibration Test Specifications	1.5 mm displacement amplitude or 30 g maximum acceleration. Vibration applied for three 4-hour sessions at 10 – 2,000 Hz (capacitor on PCB).
Capacitance Change	Within ±20% of the initial value
Dissipation Factor	Does not exceed 150% of the specified value
ESR	Does not exceed 150% of the specified value
Leakage Current	Does not exceed the specified value

Shelf Life & Re-Ageing

Shelf Life
Solderability is 12 months after manufacturing date.

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will slowly increase.

- The suitable storage condition is +5 to +35°C and less than 75% in relative humidity.
- Do not store in damp conditions such as water, saltwater spray or oil spray.
- Do not store in an environment containing gases such as hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.
- Do not store under exposure to ozone, ultraviolet rays or radiation.

If a capacitor has been stored for more than 12 months under these conditions and it shows increased leakage current, then a treatment by voltage application is recommended.

MSL 1 rating according to IPC/JEDEC-J-STD-020.

Re-age Procedure
Apply the rated DC voltage to the capacitor at 125°C for a period of 120 minutes through a 1 kΩ series resistor.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Surge Voltage	Rated Capacitance	ESR	Dissipation Factor	Ripple Current[1]	Ripple Current[2]	Leakage Current	Case Size	KEMET Part Number		Case Size
(VDC)	(VDC)	120 Hz 20°C (µF)	100 kHz 20°C (mΩ)	120 Hz 20°C	100 kHz 125°C (mA)	100 kHz 150°C (mA)	20°C 2 min (µA)	D x L (mm)	Standard Version	Anti-Vibration Version	D x L (mm) Anti-Vibration
25	28.75	470	18	0.14	3,200	1,900	117.5	10 × 12.2	A784MS477M1ELAS018	A784MS477M1ELAV018	10 × 12.4
35	40.25	560	13	0.12	3,900	2,500	196	10 × 16.5	A784MW567M1VLAS013	A784MW567M1VLAV013	10 × 16.7
50	57.50	150	26	0.10	2,700	1,700	75	10 × 12.2	A784MS157M1HLAS026	A784MS157M1HLAV026	10 × 12.4
63	72.45	100	28	0.08	2,600	1,700	63	10 × 12.2	A784MS107M1JLAS028	A784MS107M1JLAV028	10 × 12.4
63	72.45	150	15	0.08	3,600	2,200	94.5	10 × 16.5	A784MW157M1JLAS015	A784MW157M1JLAV015	10 × 16.7

1 Capacitor mounted on PCB, Lop: 4,000 hours
2 Capacitor mounted on PCB, Lop: 1,000 hours

Installing

Hybrid Polymer Aluminum Capacitors are prone to a change in leakage current due to thermal stress during soldering. The leakage current may increase after soldering or reflow soldering. Therefore, verify the suitability for use in circuits sensitive to leakage current. Depending on the nature of the circuit, it may be recommended to follow the re-aging procedure before application.

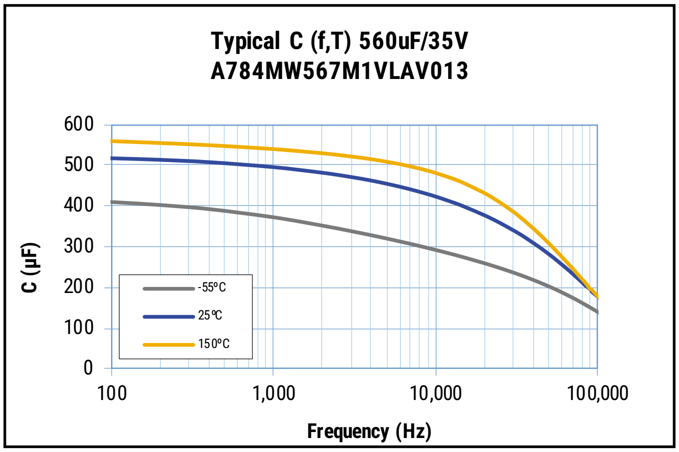
A general principle is that lower temperature operation results in a longer, useful life of the capacitor. For this reason, it should be ensured that Hybrid Polymer Aluminum capacitors are placed away from heat-emitting components. Adequate space should be allowed between components for cooling air to circulate, especially when high ripple current loads are applied. In any case, the maximum rated temperature must not be exceeded.

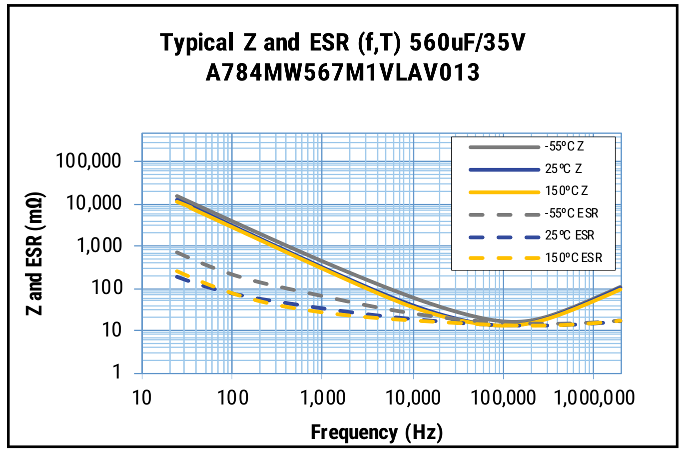
- Do not deform the case of capacitors or use capacitors with a deformed case.
- Verify that the connections of the capacitors are able to insert on the board without excessive mechanical force. Excessive force during insertion, as well as after soldering may cause terminal damage and affect the electrical performance.
- Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
- If the capacitors require mounting through additional means, the recommended mounting accessories shall be used.
- Verify the correct polarization of the capacitor on the board.

KEMET recommends, to ensure that the voltage across each capacitor does not exceed its rated voltage.

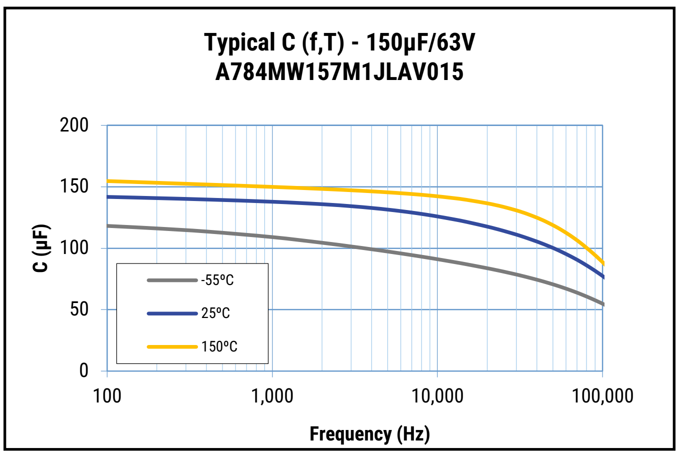
Electrical Parameters across Frequency Range

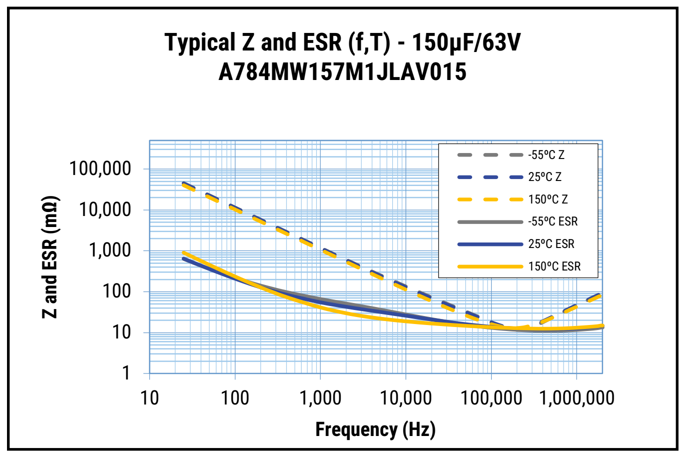
A784MW567M1VLAV013





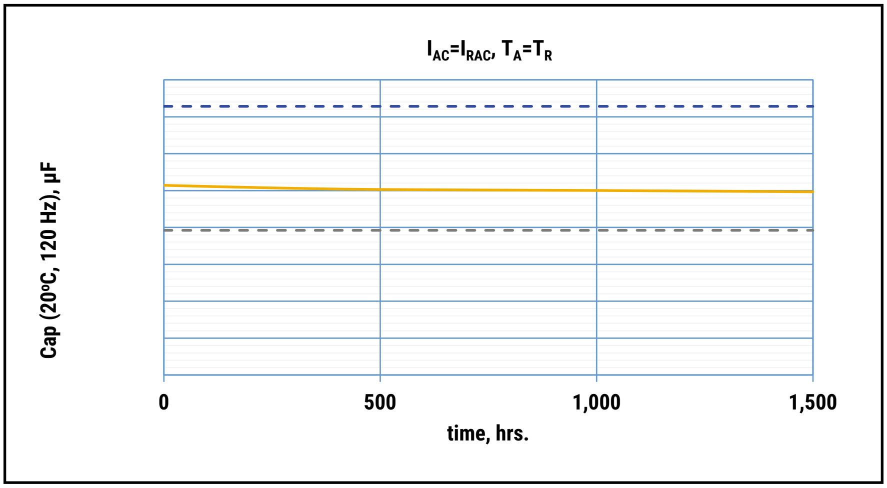
A784MW157M1JLAV015

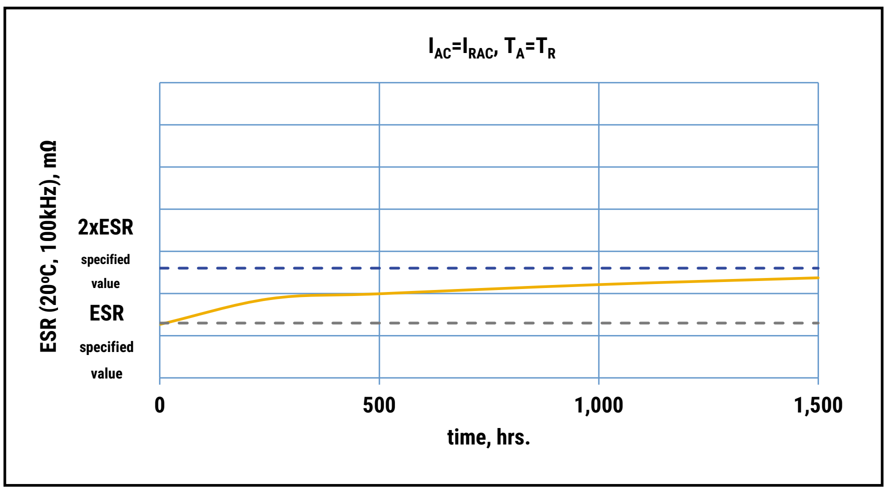




Operational Life

Typical capacitance and ESR curves of Polymer Hybrid V-Chip mounted on a standard Printed Circuit Board (PCB) at rated temperature T_R and with rated ripple current I_{RAC} applied:





DC Life Formula

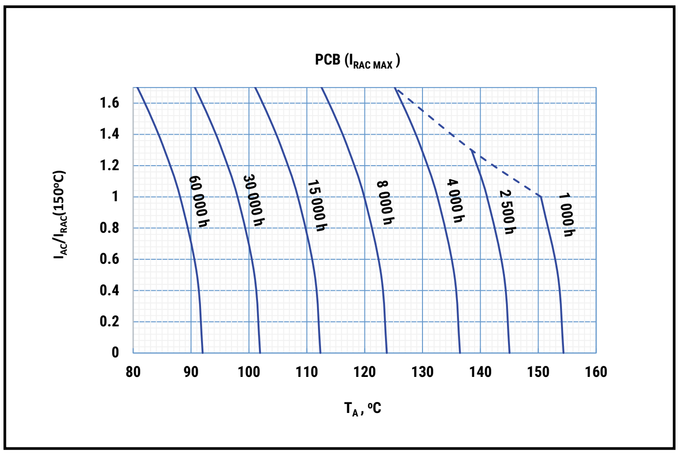
Expected DC operational life (L_{Op}, in k hour) can be calculated in accordance to the following equations:

$L_{Op} = 6{,}000 \times 10^{((125\text{-}T)/33)}$ for TA lower or equal to 110°C
$L_{Op} = 7{,}500 \times 10^{((125\text{-}T)/42)}$ for TA higher than 110°C

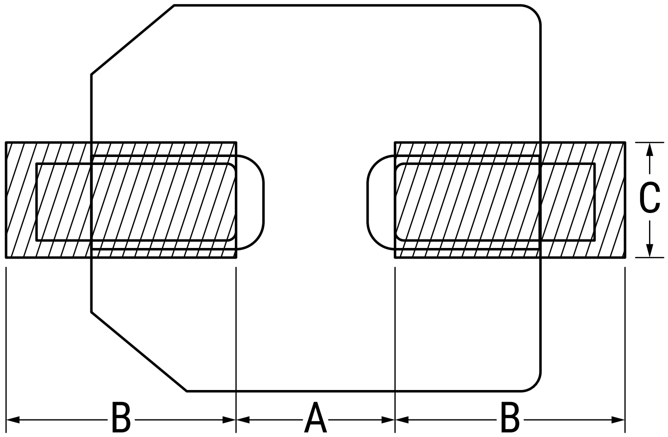
Where:
L_{Op}: Life at maximum permissible operating temperature with rated operating voltage applied (k hour). Maximum L_{Op} = 200 kh.
TA: Ambient operating temperature (°C).

Operational Life

Operational Life (L_{Op}) of a Polymer Hybrid V-Chip mounted on a Printed Circuit Board (PCB) at ambient temperature T_A and ripple current I_{AC} applied, can be converted from the diagram:

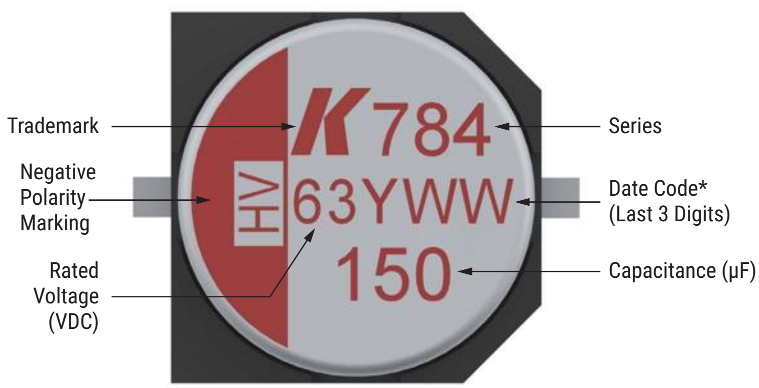


Landing Pad – Millimeters



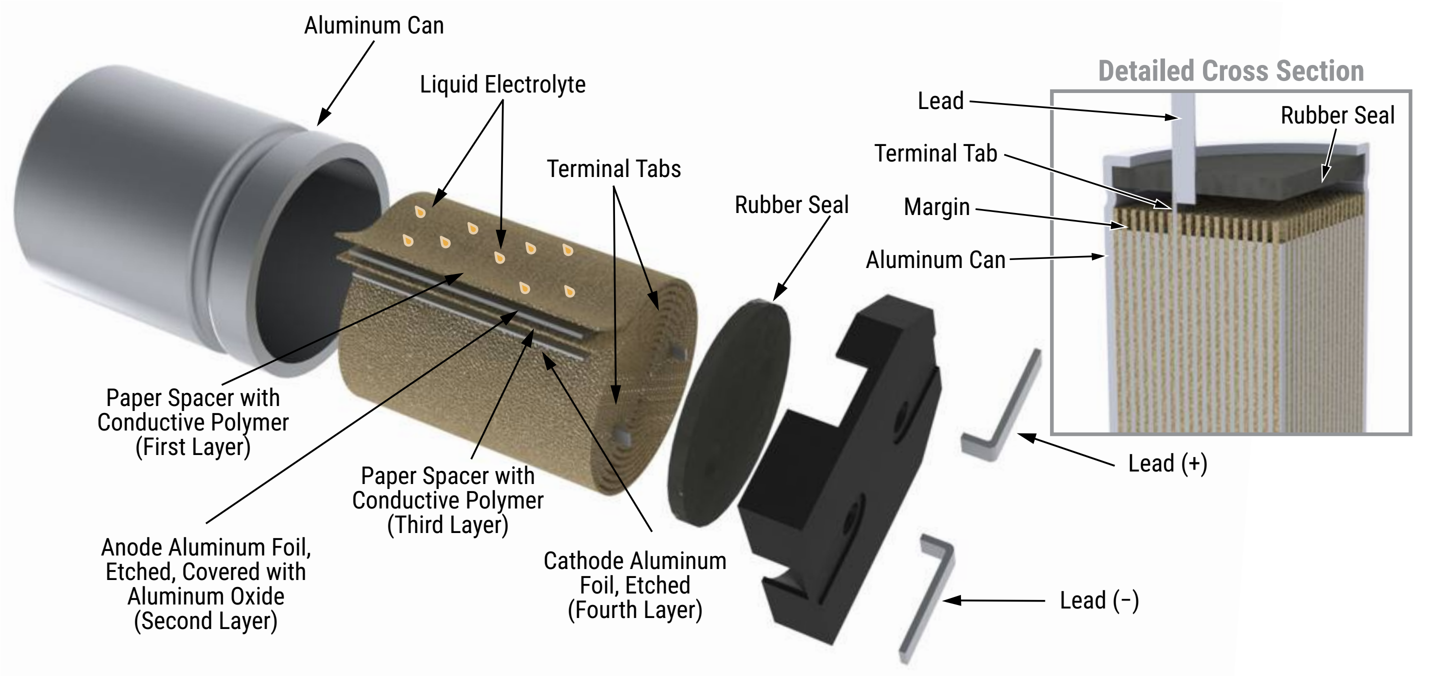
Diameter	A	B	C
10	4.5	4.4	2.2
10 (Anti-Vibration)	4.5	4.4	4.6
Units in mm			

Marking



Date Code*	
1st Digits = Rated Voltage	
Letter = Year Code	V = 2022
Final Digits = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year
Year Code	
V	2022
W	2023
X	2024
Y	2025
Z	2026
A	2027
B	2028

Construction

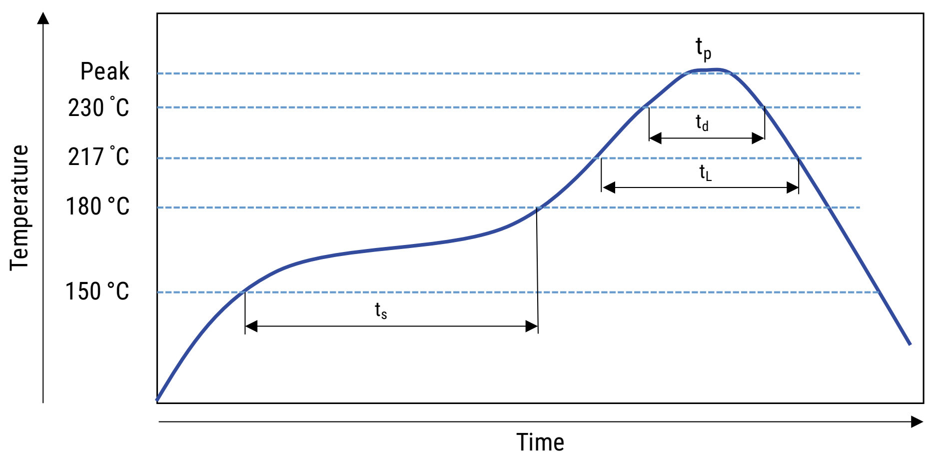


Re-Flow Soldering

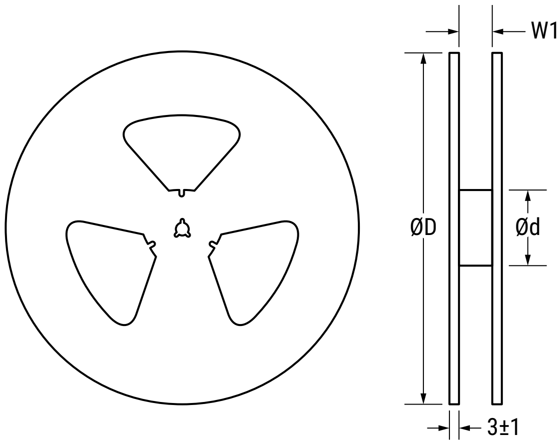
The soldering conditions should be within the specified conditions below:

- Do not dip the capacitors body into the melted solder.
- Flux should only be applied to the capacitors terminals.
- Vapour heat transfer systems are not recommended. The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Time Period	Preheating t_s	t_L	t_d	t_p	Reflow Number
Temperature (°C)	150 – 180	≥ 217	≥ 230	260	1
				250	1 or 2
Time (seconds)	60 – 120	≤ 50	≤ 40	≤ 5	-

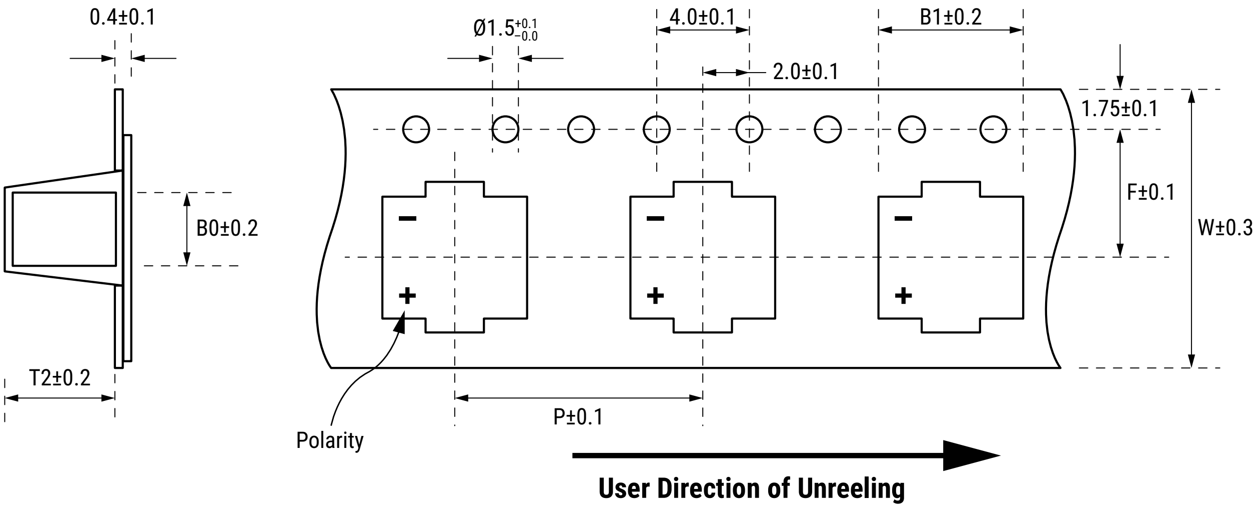


Lead Taping & Packaging



Size Code	Diameter (mm)	Length (mm)	Reel			Reel Quantity	Box Quantity
			d (mm)	D (mm)	W1 (mm)		
			±3	±2	±2		
MS	10	12.2	100	380	24	400	2,400
MW	10	16.5	100	380	24	250	1,500
MS (Anti-Vibration)	10	12.4	100	380	24	400	2,400
MW (Anti-Vibration)	10	16.7	100	380	24	250	1,500

Taping for Automatic Insertion Machines



Size Code	D x L	W	P	F	B1	B0	T2
	Tolerance	±0.3	±0.1	±0.1	±0.2	±0.2	±0.2
MS	10 x 12.2	24	16	11.5	10.7	10.7	12.5
MW	10 x 16.5	24	16	11.5	10.7	11.2	16.9
MS (Anti-Vibration)	10 x 12.4	24	16	11.5	10.7	11.2	12.7
MW (Anti-Vibration)	10 x 16.7	24	20	11.5	10.7	11.2	16.9

Construction Data

The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then ‘formed’ to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.

The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with a conductive polymer electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

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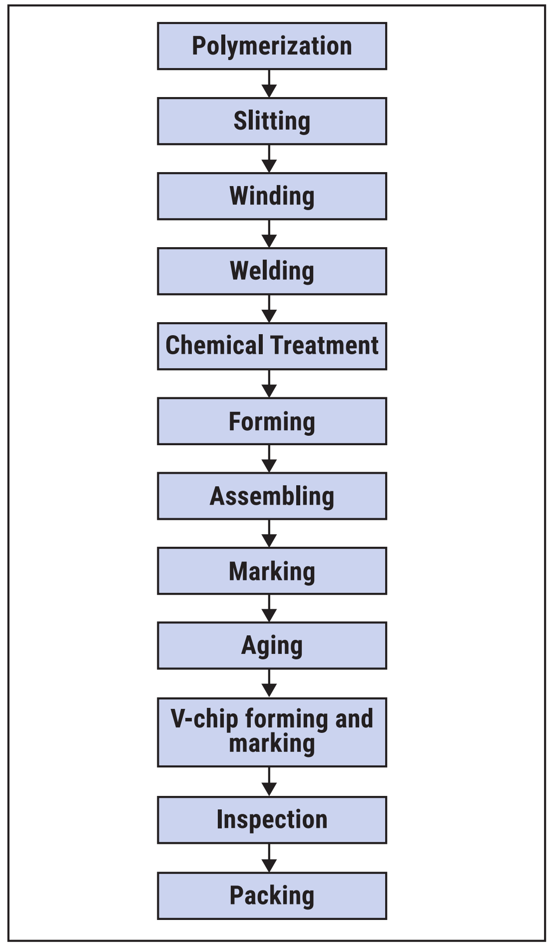
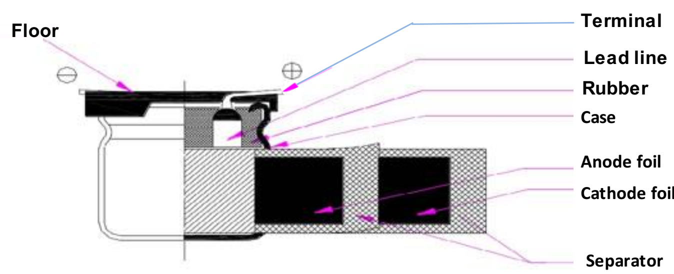
- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding





Rectangular Aluminum Polymer Capacitors

APL90, +125C, Polymer, AEC-Q200

KEMET
a YAGEO company

RoHS REACH COMPLIANT HF Halogen Free

Overview

The KEMET APL90 is an AEC-Q200 qualified aluminum polymer rectangular capacitor, designed to fulfill 48V automotive applications and related platforms requiring compactness under low profile or low footprint application needs. It offers high capacitance, high ripple current performance and robust vibration resistance. Rated at 125ºC, the APL90 offers excellent volumetric efficiency in a shape that lends itself to stacking into modules. Its shape, allows for easy use with a heat sink from the large surface area of the aluminum case or along its thickness, as like offers a solution for applications requiring very low profiles. These capacitors can then be mounted in horizontal or vertical position both allowing heat-sink to benefit space usage. Also, systems needing high energy efficient 48V power supplies, like the ones required for high end data centers, can also benefit with the usage of this product.

Applications

Typical applications are mainly in the field of automotive, such as DC-link on 48V inverters for MHEV, DC-Link on 48V systems motor drives as water pumps, power steering or cooling fans. Also, input capacitors for 48V systems data centers power supplies. Lower voltages (25VDC, 35VDC and 50VDC) are available upon request supporting new design platforms.

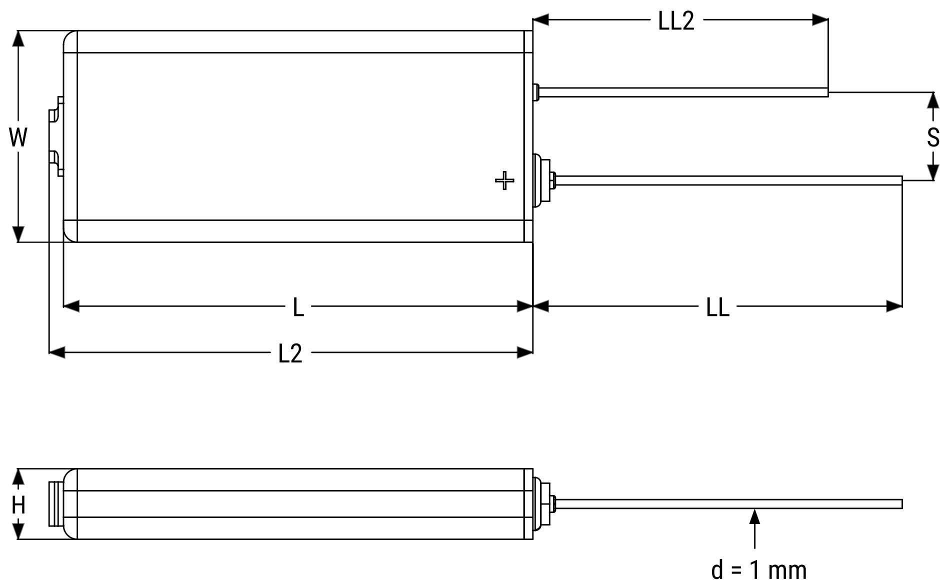
Benefits

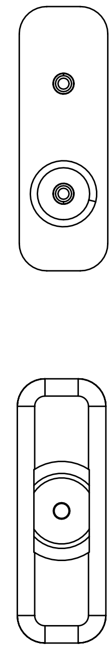
- Rectangular shape for good volumetric efficiency and modular stacking options
- Easy use of multiple heat sink options - allowing I_{AC} optimization
- Height restriction solution / Compactness
- Life of 2,000 hours at +125°C [(V_R) and (I_R) applied]
- AEC-Q200 qualified for automotive applications
- High vibration up to 20 g
- Excellent ripple current capability - Up to 26A
- Excellent surge voltage capability
- Optimized designs available on request

Part Number System

APL90	A	112	LH	063
Series	Termination	Capacitance Code (µF)	Size Code	Rated Voltage (VDC)
Aluminum Polymer Rectangular	See Termination Table	First two digits represent significant figures. Third digit specifies number of zeros.	See Dimension Table	063 = 63

Termination Style and Dimensions – Millimeters





Size Code	Dimensions* in mm							Approximate Weight (Grams)
	H	W	L	L2	LL	LL2	S	
	±0.5	±0.5	±0.5	± 2	± 2	± 2	± 1	
LH	8.0	24.0	53.8	54.9	42.0	40.0	10.0	14

Case - Aluminum
Leads - Copper wire with tin electroplate

Performance Characteristics

Item	Performance Characteristics	
Capacitance Range	1,100 µF	
Rated Voltage	63 VDC	
Operating Temperature	−55 to +125°C	
Storage Temperature Range	−55 to +125°C	
Capacitance Tolerance	±20% select values at 100 Hz/+20°C	
Operational Lifetime	Rated voltage, +125°C, Rated ripple current	
	2,000 hours	
Leakage Current	I < 0.01 CV (µA) Leakage current performance is in line with wet and hybrid polymer electrolytic capacitor's behaviour. Leakage current limit is calculated under same principle being 1/20 x lower than conventional solid polymer capacitors.	
	C = rated capacitance (µF), V = rated voltage (VDC). Voltage applied for 5 minutes at +20°C	
Typical ESL	< 13 nH at 1 MHz	
Vibration Test Specifications	**Procedure**	**Requirements**
	1.5 mm displacement amplitude or 20 g maximum acceleration. Vibration applied for three directions of 4-hour sessions at 10 – 2,000 Hz. (Capacitor clamped by body.)	No leakage of electrolyte or other visible damage. Deviations in capacitance from initial measurements must not exceed Δ C/C ±5%

Surge Voltage

Test Condition	Voltage (VDC)
	63
≤ 30 second surge followed by a no load period of 330 seconds, 1,000 cycles at +125°C	72.45

Test Method & Performance

Endurance Life Test	
Conditions	**Performance**
Temperature	+125°C
Test Duration	2,000 hours
Ripple Current	Rated ripple current specified in table
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor
Shelf Life Test	
Temperature	+125°C
Test Duration	1,000 hours
Ripple Current	Rated ripple applied
Voltage	No voltage applied
The following specifiations will be satisfied when the capacitor is tested at +20°C (±5°C)	
Capacitance Change	Within 15% of the initial value
Equivalent Series Resistance	Does not exceed 2x initial measured value
Leakage Current	Does not exceed leakage current limit

Shelf Life and Re-Ageing

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will very slowly increase.

After long periods of storage, it could be a benefit to re-age the capacitors as common practice for Aluminum capacitors. Leakage current performance is in line with wet and hybrid electrolytic capacitor's behaviour. Leakage current limit is calculated under same principle.

Reliability

Reliability
The reliability of a component can be defined as the probability that it will perform satisfactorily under a given set of conditions for a given length of time. In practice, it is impossible to predict with absolute certainty how any individual component will perform. Therefore, we must utilize probability theory. It is also necessary to clearly define the level of stress involved (e.g., operating voltage, ripple current, temperature, and time.) Finally, the meaning of satisfactory performance must be defined by specifying a set of conditions, which determine the end of life of the component.

End of Life Definition
Catastrophic failure: short circuit, open circuit or safety vent operation
Parametric failure:
- Change in capacitance > ±15%
- Leakage current > initial specified limit
- ESR > 2x ESR Limit

Mechanical Data

Polarity & Reversed Voltage
Aluminium electrolytic capacitors manufactured for use in DC applications contain an anode foil and a cathode foil. As such, they are polarized devices and must be connected with the +Ve to the anode foil and the -Ve to the cathode foil. If this were to be reversed, then the electrolytic process that took place in forming the oxide layer on the anode would be recreated in trying to form an oxide layer on the cathode. In forming the cathode foil in this way, heat would be generated and gas given off within the capacitor, usually leading to failure.

The cathode foil already possesses a thin stabilized oxide layer. This thin oxide layer is equivalent to a forming voltage of approximately 2 V. As a result, the capacitor can withstand a voltage reversal of up to 1.5 V for short periods. Above this voltage, the formation process will commence. Aluminium electrolytic capacitors can also be manufactured for the use in intermittent AC applications by using two anode foils in place of one anode and one cathode.

Mounting Position
The capacitor can be mounted upright or inclined to a horizontal position. For the vibration specifications to be valid, the capacitor must always be clamped by the body. The leads and connection tabs cannot provide the support necessary to stabilize the capacitor.

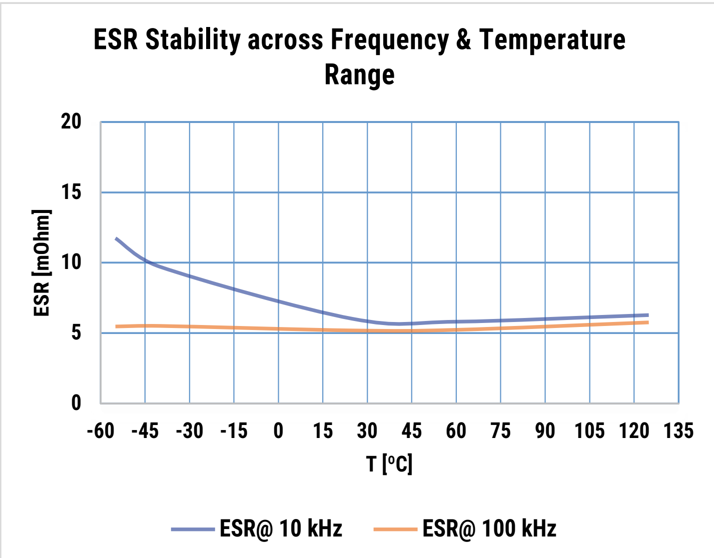
Installing
As general principle, KEMET recommends:
• The maximum rated temperature of the capacitor must not be exceeded.
• Ensure that the voltage across each capacitor does not exceed its rated voltage.
• Ensure electrical insulation between the capacitor case, negative terminal, positive terminal and PCB.
• Verify the correct polarization of the capacitor on the board.
• Do not cover the safety vent.
• Due to its rectangular shape, our APL90 product families offer the ability of stack capacitors, getting a modular arrangement. Also, easy use of heat sink condition is allowed to improve ripple current capability. More technical information related with this benefit can be checked under our specific Application Notes for Rectangular Aluminum Products.

Electrical Performance

Temperature stability characteristics

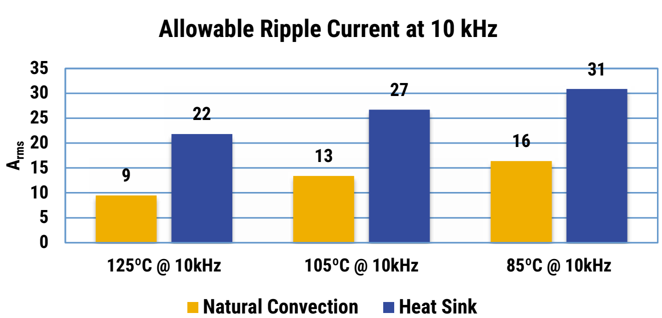
Due to a solid polymer technology, Solid Polymer Aluminum Capacitors feature higher conductivity. This results in a lower ESR which, coupled with high capacitance allows an aluminum polymer capacitor to replace several standard electrolytic capacitors, reducing the number of components and maximizing board space.

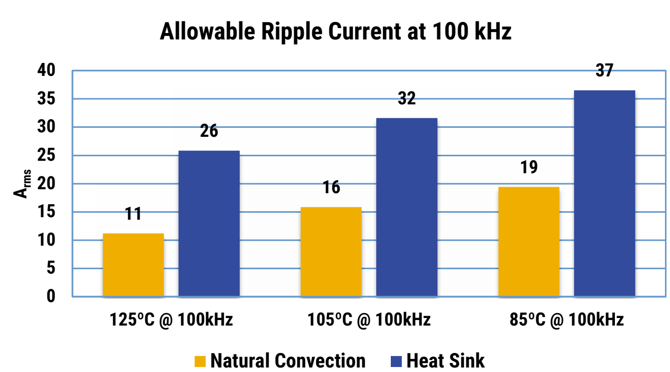
The ESR at high frequency (from 10kHz to 100kHz) of polymer capacitors is nearly constant within its operating temperature range, while the ESR of a standard electrolytic capacitor noticeably changes with temperature.



Ripple Current and Heat sink condition

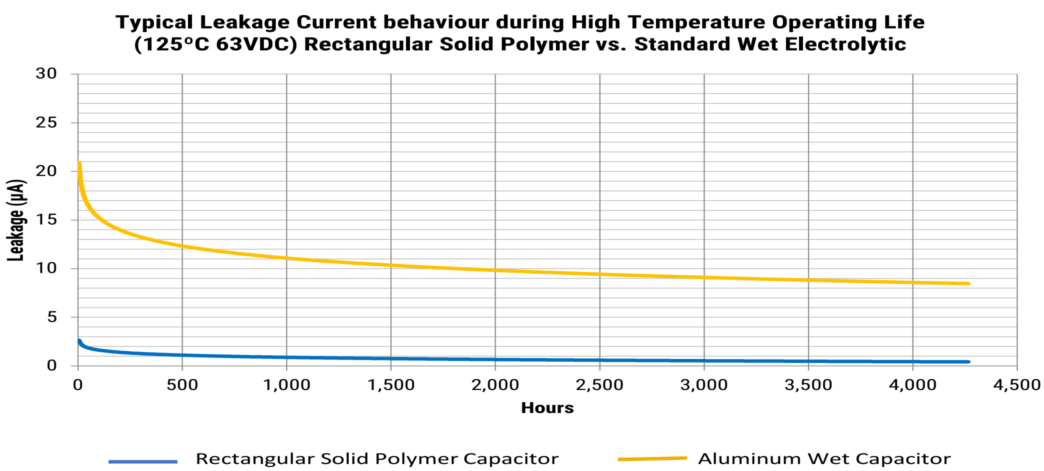
As a result of a lower ESR, solid polymer aluminum capacitors are able to withstand higher ripple currents during normal operation. Specially, the rectangular shape allows for a very efficient usage of a heat sink condition, promoting a very easy way to double the ripple current capability under compact application conditions.





Electrical Performance cont.

Leakage current behavior in time
When during application, this KEMET polymer technology capacitor shows very low leakage current values, as the results of KEMET material process development designed for Thermal and Electrical efficiency without compromising leakage current behaviour.



Environmental Compliance

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production.

In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material.
KEMET will closely follow any changes in legislation world wide and makes any necessary changes in its products, whenever needed.

Some customer segments such as medical, military, and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as lead-free (LF) or lead-free wires (LFW) on the label.

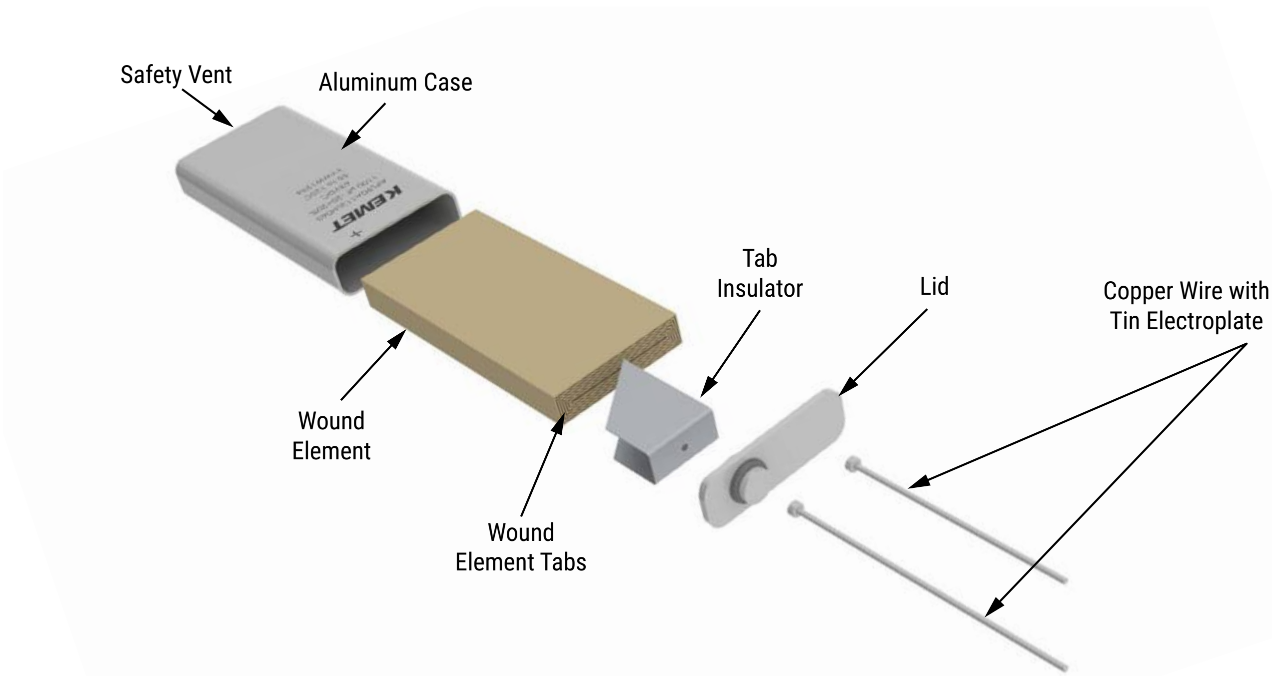
KEMET a YAGEO company

Table 1 – Ratings & Part Number Reference

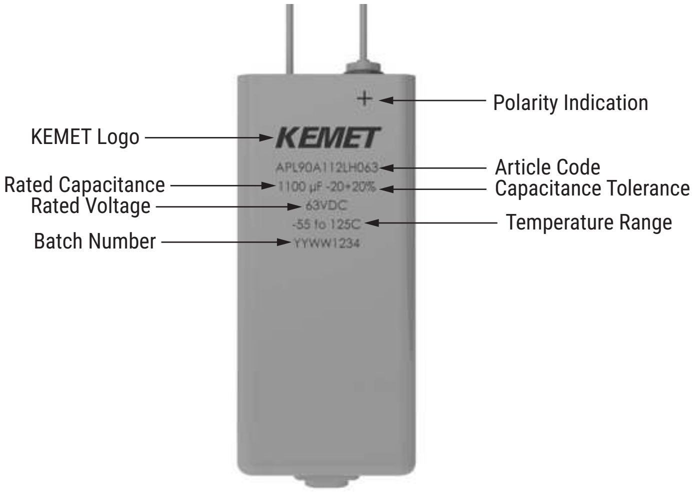
Rated Voltage	Rated Capacitance	Size Code	Case Size	Ripple Current				ESR Maximum		Part Number
(VDC)	100 Hz, 20°C (µF)		W x L (mm)	10 kHz, 125°C (A)[1]	100 kHz, 125°C (A)[1]	10 kHz, 125°C (A)[2]	100 kHz, 125°C (A)[2]	10 kHz, 20°C (mOhms)	100 kHz, 20°C (mOhms)	
63	1,100	LH	24 x 53.8	9.5	11.2	21.8	25.8	10.5	7.5	APL90A112LH063

[1] Natural Convection - Ambient Temperature
[2] Capacitor-mounted with low thermal resistance path (heat-sink) - Capacitor case Temperature

Construction



Marking



**Print shown is representative*

T528 Low ESL Polymer Electrolytic for CPU/GPU Decoupling

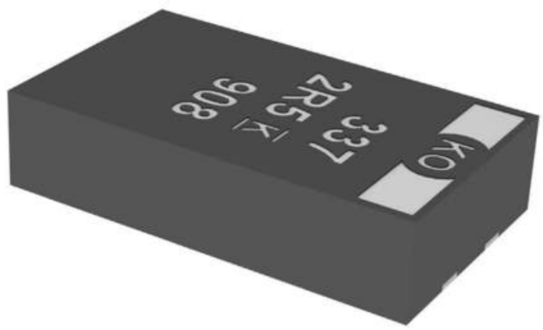
Overview

The KEMET Organic Capacitor (KO-CAP) is a solid electrolytic capacitor with a conductive polymer cathode capable of delivering very low ESR and improved capacitance retention at high frequencies. KO-CAP combines the low ESR of multilayer ceramic, the high capacitance of aluminum electrolytic, and the volumetric efficiency of tantalum into a single surface mount package. Unlike liquid electrolyte-based capacitors, KO-CAP has a very long operational life and high ripple current capabilities.

The T528 low ESL Facedown Terminal Polymer Electrolytic combines ultra-low ESR and high capacitance in a package design that offers the lowest ESL in the market. This series offers exceptional performance for high-speed microprocessor, FPGA, or ASIC decoupling designs. The T528 utilizes a unique termination design that allows for a reduction in the inductance loop area and comes in a low profile 1.7 mm case height. This series offers improved capacitance retention at frequencies of up to 1 MHz.

Benefits

- Low ESL < 0.7 nH at 20 MHz
- Improved volumetric efficiency
- High frequency capacitance retention
- 100% accelerated steady state aging
- 100% surge current tested
- EIA standard case sizes
- Halogen-free epoxy and RoHS compliant
- Lead free 260°C reflow capable



Applications

Typical applications include high speed server, microprocessor decoupling and high ripple current applications.

Environmental Compliance

RoHS Compliant when ordered with 100% Sn or Ni-Pd-Au.

- Halogen-free
- Epoxy compliant with UL94 V-0
- Molded Epoxy complies for outgassing testing under ASTM E 595.

Ordering Information

T	528	Z	337	M	2R5	A	T	E009	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR Code	Packaging (C-Spec)
T = Tantalum	528 = Low ESL Facedown Terminal Polymer	B W Z	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	002 = 2 2R5 = 2.5 004 = 4 006 = 6.3	A = N/A	T = 100% Matte Tin (Sn)-plated P = Ni-Pd-Au-plated	E = ESR last three digits specify ESR in mΩ (009 = 9 mΩ)	Blank = 7" reel 7280 = 13" reel

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to 105°C
Rated Capacitance Range	150 – 470 µF at 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2 – 6.3 V
DF (120 Hz)	≤ 10% - Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.1 CV (µA) at rated voltage after 5 minutes

Qualification

<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">105°C at rated voltage, 2,000 hours</td><td>Δ C/C</td><td colspan="3">Within −20/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ Initial Limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">105°C at 0 volts, 2,000 hours</td><td>Δ C/C</td><td colspan="3">Within −20/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Humidity</td><td colspan="2" rowspan="4">60°C, 90% RH, No Load, 500 hours</td><td>Δ C/C</td><td colspan="3">Within −5/+35% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ Initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 5.0 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at −55°C, +25°C, +85°C, +105°C</td><td></td><td>+25°C</td><td>−55°C</td><td>+85°C</td><td>+105°C</td></tr>
<tr><td>Δ C/C</td><td>IL*</td><td>±20%</td><td>±20%</td><td>±30%</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>1.2 x IL</td><td>1.5 x IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>10 x IL</td><td>10 x IL</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">105°C, 1.32 x rated voltage 1,000 cycles</td><td>Δ C/C</td><td colspan="3">Within −20/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within initial limits</td></tr>
<tr><td rowspan="3">Mechanical Shock/ Vibration</td><td colspan="2" rowspan="3">MIL-STD-202, Method 213, Condition I, 100 G peak
MIL-STD-202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
</table>

**IL = Initial limit*

Reliability

KO-CAP capacitors have an average failure rate of 0.5 %/1,000 hours at category voltage, U_C, and category temperature, T_C. These capacitors are qualified using industry test standards at U_C and T_C. The minimum test time (1,000 or 2,000 hours) is dependent on the product.

The actual life expectancy of KO-CAP capacitors increases when application voltage, U_A, and application temperature, T_A, are lower than U_C and T_C. As a general guideline, when $U_A < 0.9 * U_C$ and $T_A < 85°C$, the life expectancy will typically exceed the useful lifetime of most hardware (> 10 years).

The lifetime of a KO-CAP capacitor at a specific application voltage and temperature can be modeled using the equations below. A failure is defined as passing enough current to blow a 1-Amp fuse. The calculation is an estimation based on empirical results and is not a guarantee.

$$VAF = \left(\frac{U_C}{U_A}\right)^n$$

where:

VAF = acceleration factor due to voltage, unitless

U_C = category voltage, volt

U_A = application voltage, volt

n = exponent, 16

$$TAF = e^{\left[\frac{E_a}{k}\left(\frac{1}{273+T_A} - \frac{1}{273+T_C}\right)\right]}$$

where:

TAF = acceleration factor due to temperature, unitless

E_a = activation energy, 1.4 eV

k = Boltzmann's constant, 8.617E-5 eV/K

T_A = application temperature, °C

T_C = category temperature, °C

$$AF = VAF * TAF$$

where:

AF = acceleration factor, unitless

TAF = accerlation factor due to temperature, unitless

VAF = acceleration factor due to voltage, unitless

$$Life_{U_A,T_A} = Life_{U_C,T_C} * AF$$

where:

$Life_{UA, TA}$ = estimated life application voltage and temperature, years

$Life_{UC, TC}$ = guaranteed life category voltage and temperature, years

AF = acceleration factor, unitless

Reliability Table 1 – Common temperature range classifications

85°C (T_R)/ 85°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R)/ 105°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R)/ 125°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	1.7	2.7	4.2	5.4	6.7	8.4	10.7	13.4	16.8	23.5	33.5	42.2	50.3

Terms:

Category Voltage, U_C: Maximum recommended peak DC operating voltage for continuous operation at the category temperature, T_C

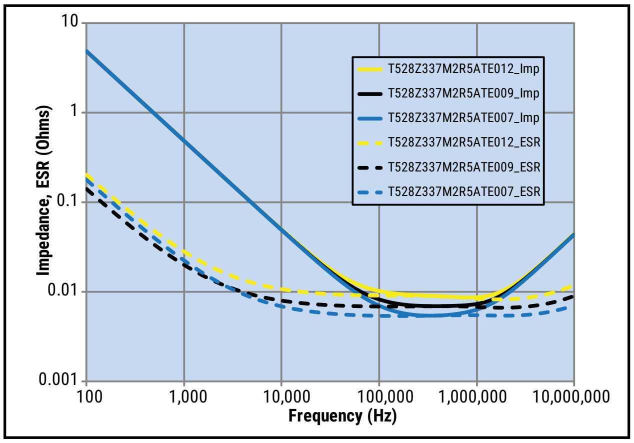
Rated Voltage, U_R: Maximum recommended peak DC operating voltage for continuous operation up to the rated temperature, T_R

Category Temperature, T_C: Maximum recommended operating temperature; voltage derating may be required at T_C

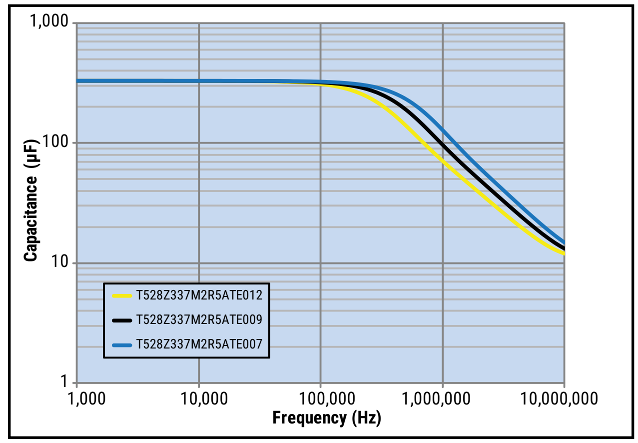
Rated Temperature, T_R: Maximum recommended operating temperature without voltage derating; T_R is equal to or lower than T_C

Electrical Characteristics

ESR vs. Frequency

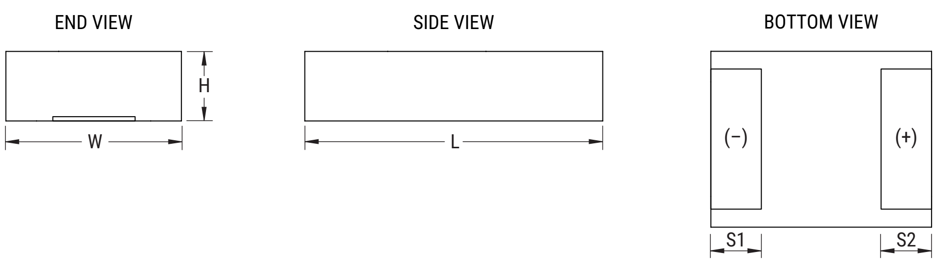


Capacitance vs. Frequency

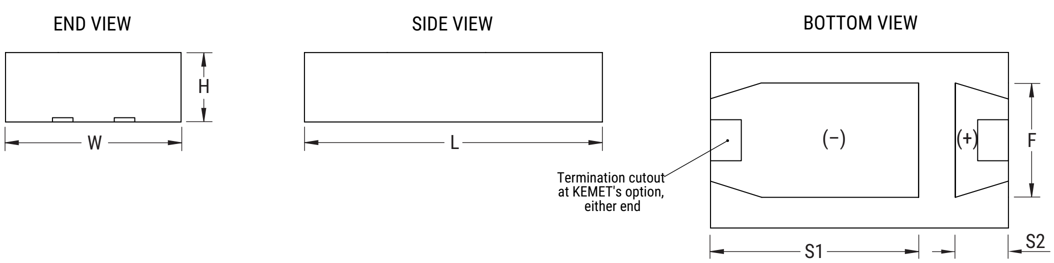


Dimensions – Millimeters

B Case



W and Z Cases



Case Size		Component Dimensions						Typical Weight
KEMET	EIA	L	W	H	F ±0.2	S1	S2	(mg)
B	3528–20	3.5 ±0.2	2.8 ±0.2	1.9 ±0.1	2.2	0.8 ±0.3	0.8 ±0.3	94.85
W	7343–15	7.3 ±0.4	4.3 ±0.3	1.4 ±0.1	2.8	5.0 ±0.4	1.3 ±0.2	222.95
Z	7343–17	7.3 ±0.4	4.3 ±0.3	1.6 ±0.1	2.8	5.0 ±0.4	1.3 ±0.2	206.33

These weights are provided as reference. If exact weights are needed, please contact your KEMET Sales Representative

Table 1 – Ratings & Part Number Reference

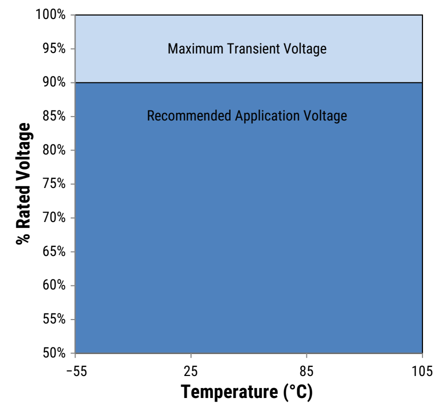
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at +25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
2	270	B/3528-20	T528B277M002APE006	54.0	8	6	3,900	3	105
2	270	B/3528-20	T528B277M002APE009	54.0	8	9	3,200	3	105
2.5	220	Z/7343-17	T528Z227M2R5ATE006	55.0	10	6	7,400	3	105
2.5	270	B/3528-20	T528B277M2R5APE006	67.5	10	6	3,900	3	105
2.5	270	B/3528-20	T528B277M2R5APE009	67.5	10	9	3,200	3	105
2.5	330	W/7343-15	T528W337M2R5ATE009	82.5	10	9	6,000	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE005	82.5	10	5	8,100	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE006	82.5	10	6	7,400	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE007	82.5	10	7	6,800	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE008	82.5	10	8	6,400	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE009	82.5	10	9	6,000	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE012	82.5	10	12	5,200	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE005	117.5	10	5	8,100	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE006	117.5	10	6	7,400	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE008	117.5	10	8	6,400	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE009	117.5	10	9	6,000	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE012	117.5	10	12	5,200	3	105
4	220	Z/7343-17	T528Z227M004ATE007	88.0	10	7	6,800	3	105
4	220	Z/7343-17	T528Z227M004ATE008	88.0	10	8	6,400	3	105
4	220	Z/7343-17	T528Z227M004ATE009	88.0	10	9	6,000	3	105
4	220	Z/7343-17	T528Z227M004ATE012	88.0	10	12	5,200	3	105
4	330	Z/7343-17	T528Z337M004ATE009	132.0	10	9	6,000	3	105
4	330	Z/7343-17	T528Z337M004ATE012	132.0	10	12	5,200	3	105
6.3	150	Z/7343-17	T528Z157M006ATE007	94.5	10	7	6,800	3	105
6.3	150	Z/7343-17	T528Z157M006ATE008	94.5	10	8	6,400	3	105
6.3	150	Z/7343-17	T528Z157M006ATE009	94.5	10	9	6,000	3	105
6.3	150	Z/7343-17	T528Z157M006ATE012	94.5	10	12	5,200	3	105
6.3	220	Z/7343-17	T528Z227M006ATE009	138.6	10	9	6,000	3	105
6.3	220	Z/7343-17	T528Z227M006ATE012	138.6	10	12	5,200	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at +25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

Other part number options:
1- Standard with tin terminations (14th character = T). Tin/lead terminations is also available (14th character = H).
Also available on large (13 inch) reels. Add 7280 to the end of the part number.
Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Derating Guidelines

Voltage Rating	Maximum Recommended Steady State Voltage
−55°C to 105°C	
$2\ V \le V_R \le 6.3\ V$	90% of V_R

V_R = Rated Voltage



Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage which may be applied is limited by two criteria:

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage. See the Reverse Voltage section for allowable limits.

The maximum power dissipation by case size can be determined using the table at right. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Refer to the table below for temperature compensation requirements.

Temperature Compensation Multipliers for Maximum Ripple Current		
T ≤ 45°C	45° C < T ≤ 85°C	85°C < T ≤ 125°C
1.00	0.70	0.25

T = Environmental Temperature

The maximum power dissipation rating must be reduced with increasing environmental operating temperatures. Refer to the Temperature Compensation Multiplier table for details.

KEMET Case Code	EIA Case Code	Maximum Power Dissipation (Pmax) mWatts at 45°C with +30°C Rise
B	3528-20	127
W	7343-15	325
Z	7343-17	325

Using the P max of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{P\ max/R}$
$E(max) = Z\ \sqrt{P\ max/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
P max = maximum power dissipation (watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (ohms)

Reverse Voltage

Polymer electrolytic capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a small degree of transient voltage reversal for short periods as shown in the below table.

Temperature	Permissible Transient Reverse Voltage
25°C	15% of Rated Voltage
55°C	10% of Rated Voltage
85°C	5% of Rated Voltage
105°C	3% of Rated Voltage
125°C*	1% of Rated Voltage

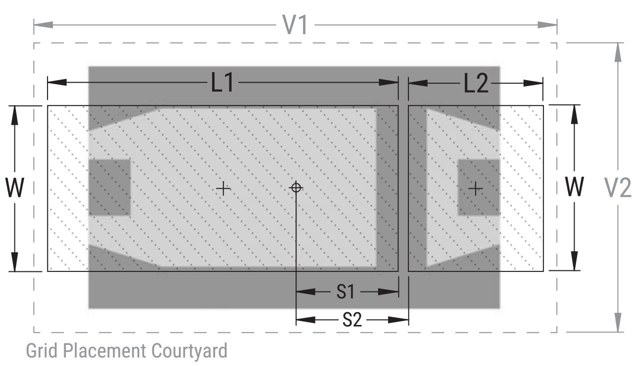
**For Series Rated to 125°C*

Table 2 – Land Dimensions/Courtyard

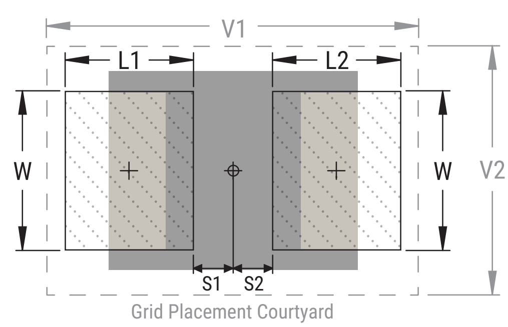
KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)							Density Level B: Median (Nominal) Land Protrusion (mm)							Density Level C: Minimum (Least) Land Protrusion (mm)						
Case	EIA	L1	L2	W	S1	S2	V1	V2	L1	L2	W	S1	S2	V1	V2	L1	L2	W	S1	S2	V1	V2
B	3528-20	2.20	2.20	2.35	0.46	0.46	6.32	4.00	1.80	1.80	2.23	0.56	0.56	5.22	3.50	1.42	1.42	2.13	0.64	0.64	4.36	3.24
W[1]	7343-15	6.48	2.68	3.04	-1.82	1.98	10.32	5.60	6.18	2.38	2.92	-1.82	1.98	9.22	5.10	5.82	2.02	2.82	-1.76	2.04	8.36	4.84
Z[1]	7343-17	6.48	2.68	3.04	-1.82	1.98	10.32	5.60	6.18	2.38	2.92	-1.82	1.98	9.22	5.10	5.82	2.02	2.82	-1.76	2.04	8.36	4.84

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] Negative values of S1 mean that pad lies at the center's right side.

W, Z Case



B Case



Soldering Process

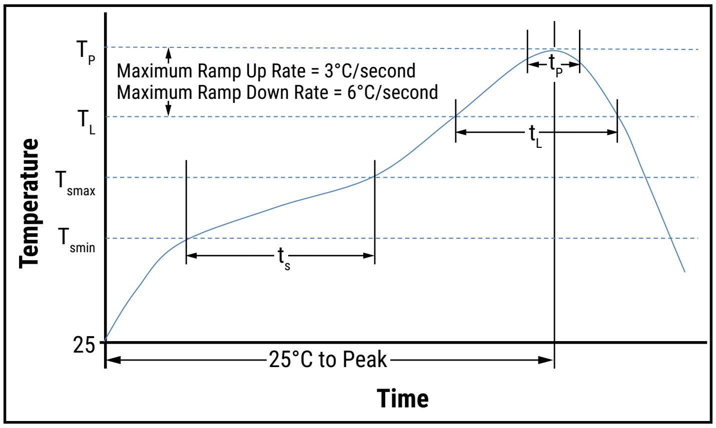
KEMET's families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/second maximum	3°C/second maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/second maximum	6°C/second maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



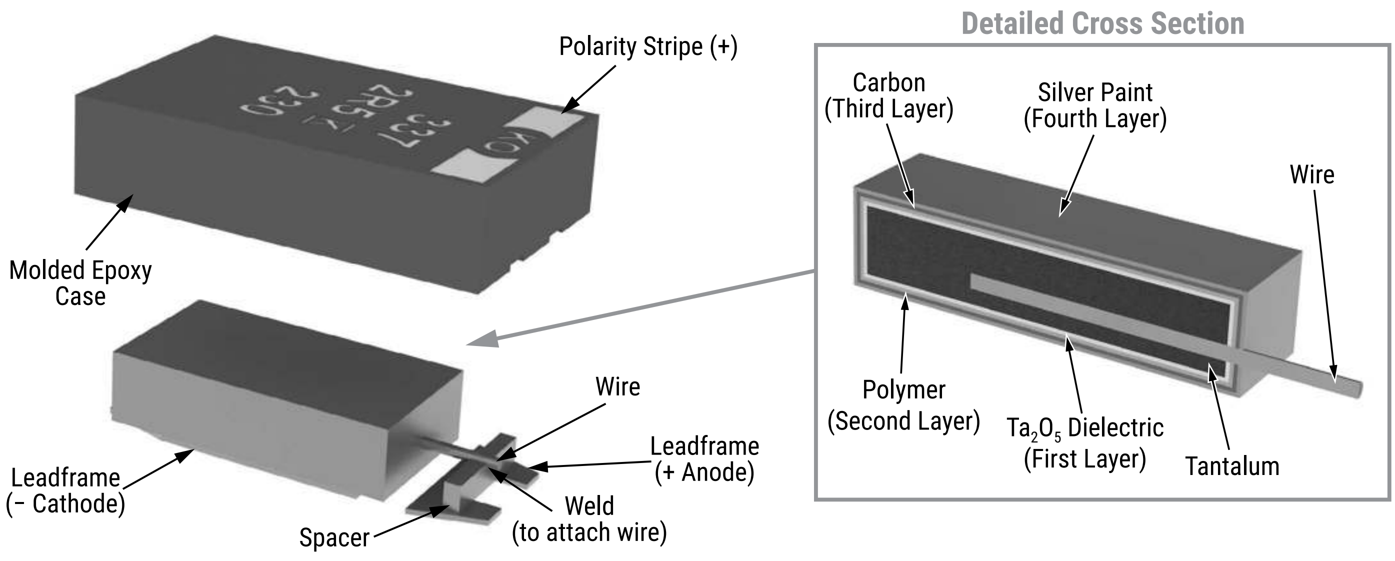
Storage

All KO-CAP series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J–STD–020 and packaged per IPC/JEDEC J–STD–033. MSL3 specifies a floor time of 168 H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

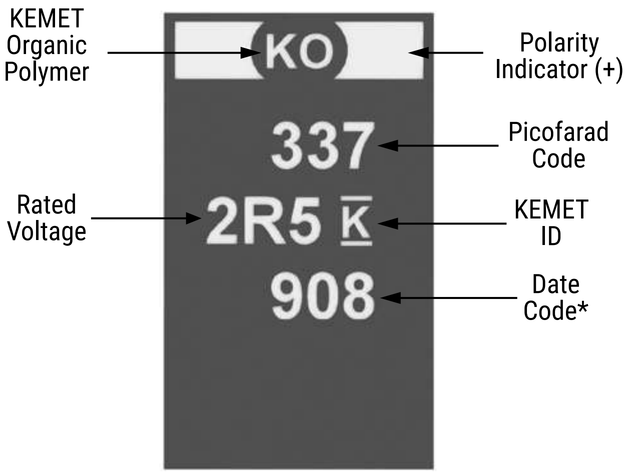
The calculated shelf life in a sealed bag would be 12 months from a bag seal date in a storage environment of < 40°C and humidity < 90% RH. It should be 24 months from a bag seal date in a storage environment of < 30°C and humidity < 70% RH.

If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure.

Construction



Capacitor Marking



* 908 = 8th week of 2019

Date Code *	
1st digit = last number of year	6 = 2016 7 = 2017 8 = 2018 9 = 2019 0 = 2020
2nd and 3rd digit = week of the year	01 = 1st week of the year to 52 = 52nd week of the year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

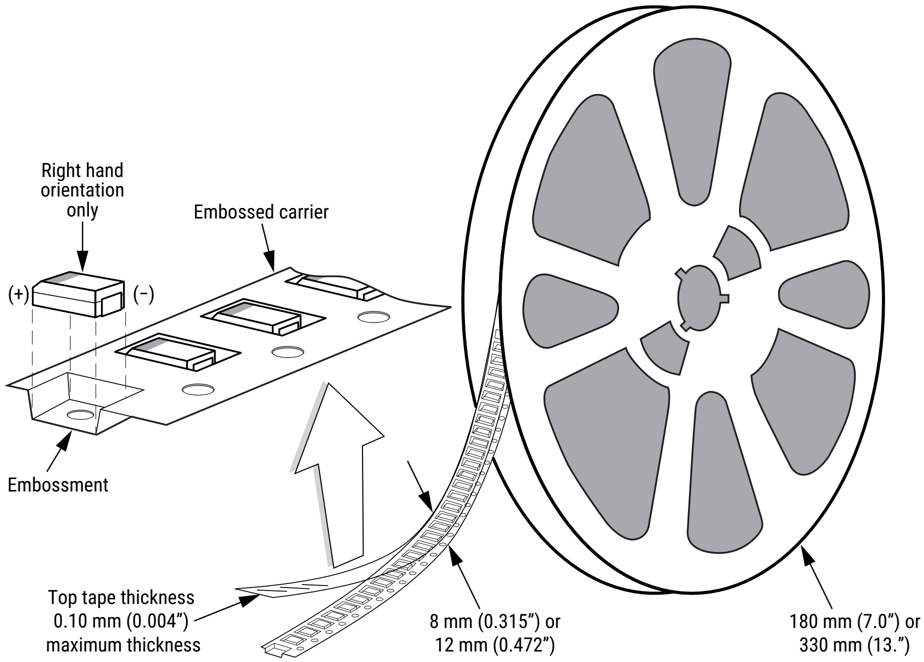


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
P	2012-10	8	3,000	N/A
R	2012-12	8	2,500	10,000
I	3216-10	8	3,000	N/A
S	3216-12	8	2,500	10,000
A	3216-18	8	2,000	N/A
T	3528-12	8	3,000	10,000
M	3528-15	8	2,500	8,000
B	3528-21	8	2,000	8,000
U	6032-15	12	1,000	5,000
L	6032-19	12	1,000	3,000
C	6032-28	12	500	3,000
Q	7343-12	12	1,000	3,000
W	7343-15	12	1,000	3,000
Z	7343-17	12	1,000	3,000
V	7343-19	12	1,000	3,000
D	7343-31	12	500	2,500
Y	7343-40	12	500	2,000
X	7343-43	12	500	2,000
J	7360-15	12	1,000	3,000
H	7360-20	12	1,000	3,000
O	7360-43	12	250	1,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

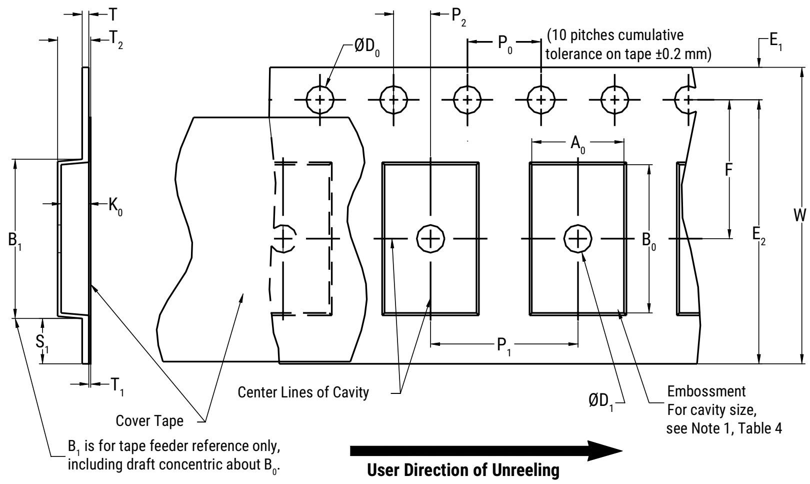


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/−0.0 (0.059 +0.004/−0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0, B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) and Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	

1. The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.

2. The tape, with or without components, shall pass around R without damage (see Figure 4).

3. If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).

4. B_1 dimension is a reference dimension for tape feeder clearance only.

5. The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:
(a) the component does not protrude above the top surface of the carrier tape.
(b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
(c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
(d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
(e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

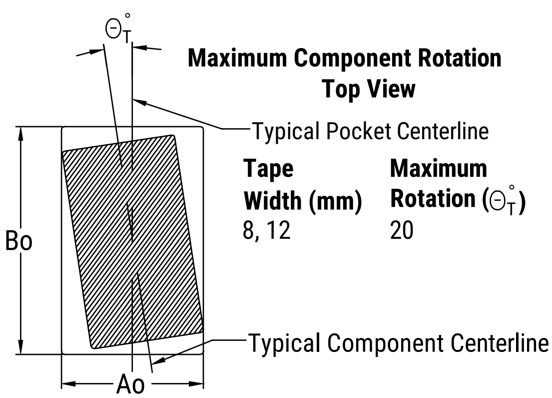
Packaging Information Performance Notes

1. Cover tape break force: 1.0 kg minimum.
2. Cover tape peel strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 newton (10 to 100 gf)
12 mm	0.1 to 1.3 newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624*.

Figure 2 – Maximum Component Rotation



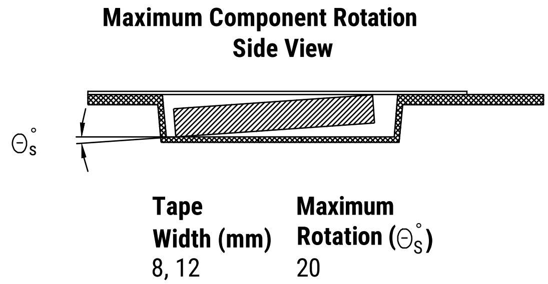


Figure 3 – Maximum Lateral Movement

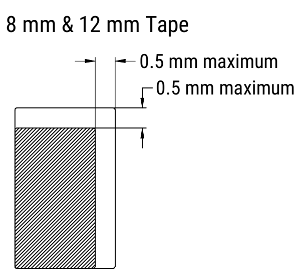


Figure 4 – Bending Radius

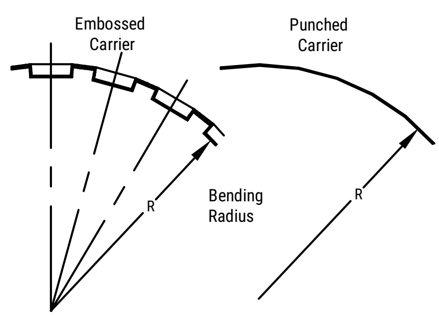
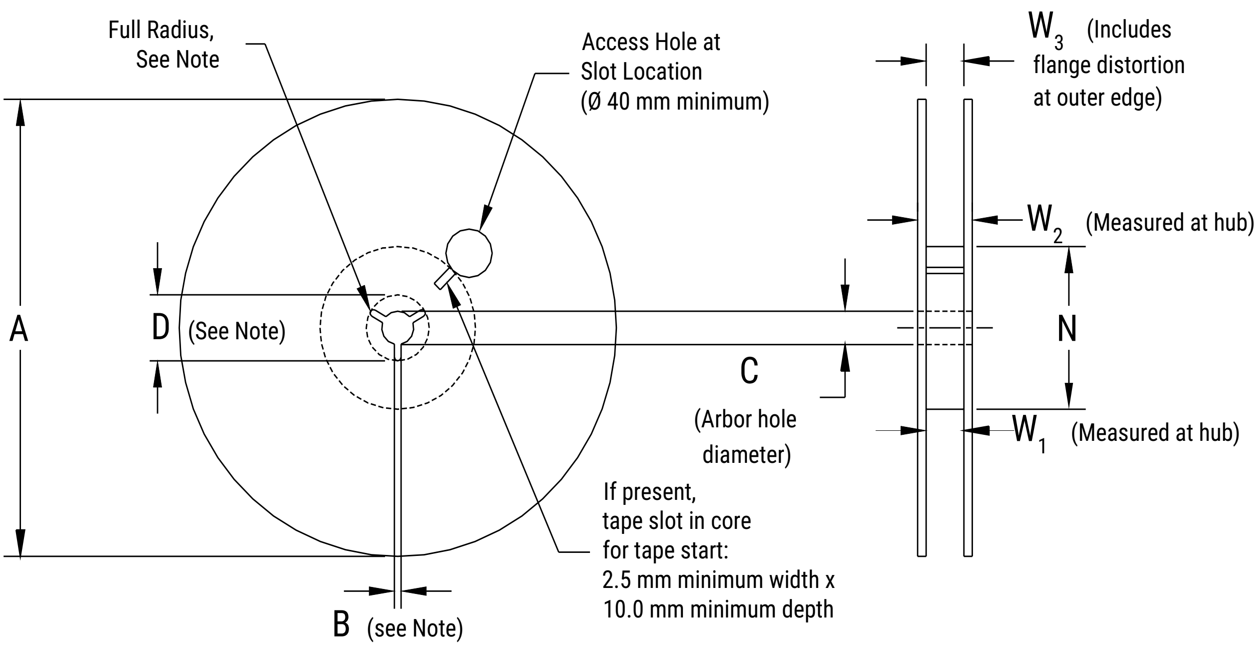


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
12 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

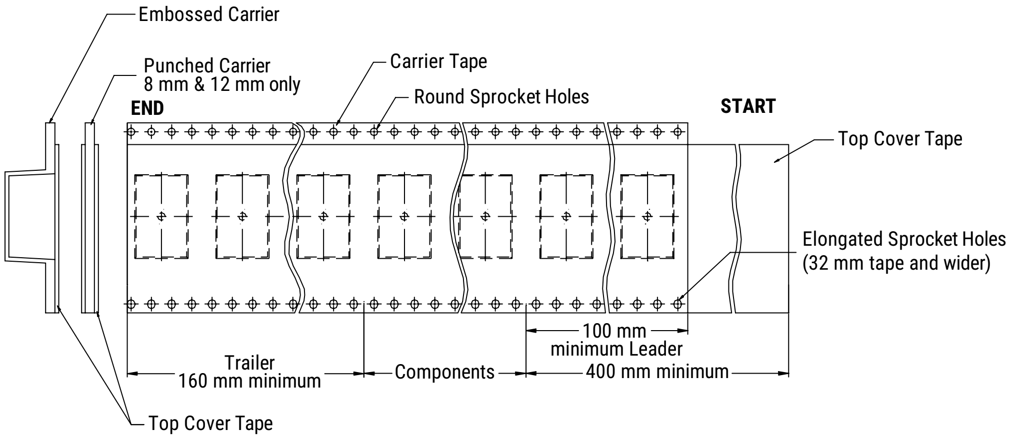
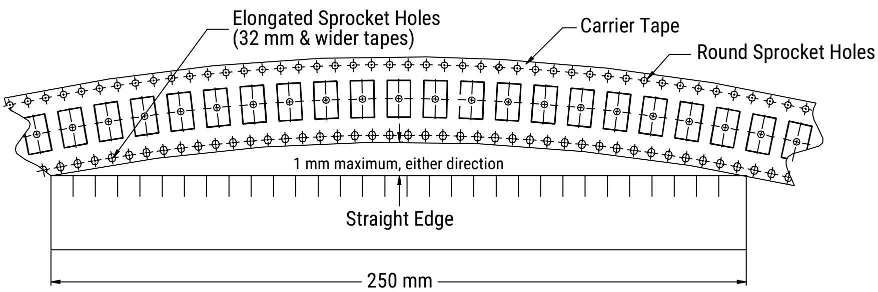


Figure 7 – Maximum Camber



Aluminum Organic Capacitor (AO-CAP)

A700 Polymer Aluminum, 2 – 35 VDC

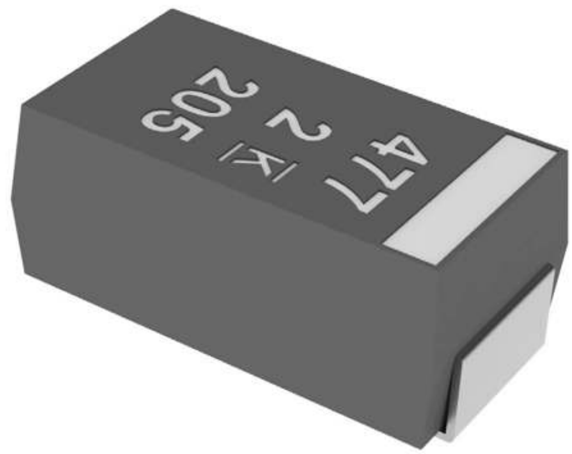
Overview

The KEMET Aluminum Organic Capacitor (AO-CAP) is a solid state aluminum capacitor. The cathode is a conductive organic polymer, which results in very low ESR and improved capacitance retention at high frequency. AO-CAPs may be operated at steady state voltages up to 100% of rated voltage without the need to de-rate.

Since there is no liquid electrolyte, the A700 offers long operational lifetimes, low ESR, and high operational temperatures. The inherent low ESR renders the A700 suitable for high ripple current handling. The small package size, high ripple current capability, high operating temperature, low parasistics, and high capacitance makes the A700 ideal for high performance microprocessor, FPGA, and ASIC decoupling designs.

Benefits

- ESR: 4.5 – 70 mΩ
- Polymer cathode technology
- Plus performance grade with extended life up to 3,000 hours at 125°C
- High frequency capacitance retention
- Non-ignition failure mode
- 100% accelerated steady state aging
- 100% surge current tested
- Volumetric efficiency
- Self-healing mechanism
- EIA standard case sizes



Applications

Typical applications include DC/DC converters, notebook PCs, telecommunications, displays, and industrial applications.

Environmental Compliance

- RoHS compliant when ordered with 100% Sn, Ni-Pd-Au or non-magnetic 100% Sn solder
- Halogen-free
- Epoxy compliant with UL94 V-0

Ordering Information

A	700	V	476	M	006	A	T	E018	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR Code	Packaging (C-Spec)
A = Aluminum	700 = Aluminum Polymer	D Q V W X	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	002 = 2 2R5 = 2.5 004 = 4 006 = 6.3 008 = 8 010 = 10 12R = 12.5 016 = 16 025 = 25 035 = 35	A = N/A	T = 100% Matte Tin (Sn)-plated	E = ESR Last three digits specify ESR in mΩ (018 = 18 mΩ)	Blank = 7" Reel 7280 = 13" Reel

A700 Plus Performance

A	700	V	477	M	002	P	T	E009	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR Code	Packaging (C-Spec)
A = Aluminum	700 = Aluminum Polymer	V	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	002 = 2	P = Plus Performance (Extended Life 3,000 hours/125°C)	T = 100% Matte Tin (Sn)-plated	E = ESR Last three digits specify ESR in mΩ (009 = 9 mΩ)	Blank = 7" Reel 7280 = 13" Reel

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	–55°C to 105°C/125°C (Refer to part number for maximum temperature rating)
Rated Capacitance Range	6.8 – 560 µF at 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2 – 35 V
DF (120 Hz)	6%
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	Refer to Part Number Electrical Specification Table If there is any concern about leakage current, please perform pre-conditioning to the part following below conditions: * Temperature: 105°C maximum * Voltage: Rated Voltage * Series Resistor: 1,000 Ω * Charge Time: 1 hour minimum * Measuring: Discharge the capacitor(s), store them for 4 to 24 hours at room temperature and RH ≤ 60%

KEMET a YAGEO company

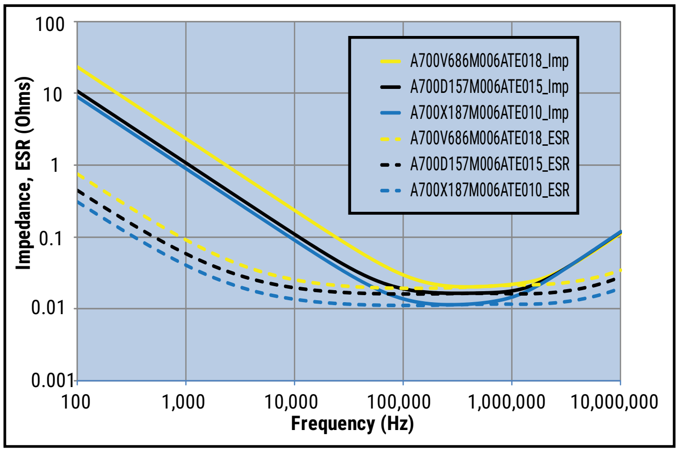
Qualification

<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">105°C/125°C*2 at rated voltage, 2,000 hours*3</td><td>Δ C/C</td><td colspan="3">Within ±10%*4 of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">105°C/125°C*2 at 0 volts, 2,000 hours*3</td><td>Δ C/C</td><td colspan="3">Within ±10%*4 of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Endurance Extended</td><td colspan="2" rowspan="4">A700 Plus Performance
125°C at rated voltage,
3,000 hours</td><td>Δ C/C</td><td colspan="3">Within ±30%</td></tr>
<tr><td>DF</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life Extended</td><td colspan="2" rowspan="4">A700 Plus Performance
125°C at 0 Volts,
3,000 hours</td><td>Δ C/C</td><td colspan="3">Within ±30%</td></tr>
<tr><td>DF</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="3">Humidity</td><td colspan="2" rowspan="3">60°C, 90% RH, 1,000 hours, rated voltage 60°C, 90% RH, 500 hours, no Load</td><td>Δ C/C</td><td colspan="3">Within −5/+30%*5 of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 5.0 x initial limit</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at +25°C, −55°C, +85°C, +105°C/+125°C*2</td><td></td><td>+25°C</td><td>−55°C</td><td>+85°C</td><td>+105°C/125°C</td></tr>
<tr><td>Δ C/C</td><td>IL*1</td><td>±15%</td><td>±15%</td><td>±20%</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>1.2 x IL</td><td>1.5 x IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>10 x IL</td><td>10 x IL</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">105°C / 125°C*2, 1.32 x rated voltage,
33 Ω resistance, 1,000 cycles</td><td>Δ C/C</td><td colspan="3">Within ±10%*4 of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within initial limits</td></tr>
<tr><td rowspan="3">Mechanical Shock/ Vibration</td><td colspan="2" rowspan="3">MIL–STD–202, Method 213, Condition I, 100 G peak
MIL–STD–202, Method 204, Condition D,
10 Hz to 2,000 Hz, 20 G peak</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
</table>

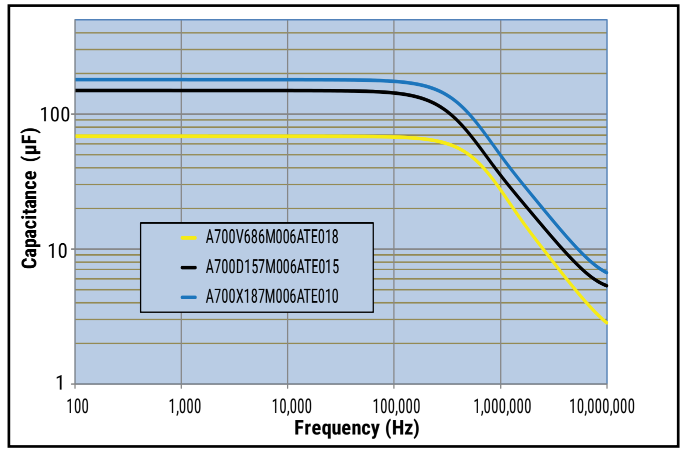
**1 IL = Initial Limit*
**2 Refer to part number specifications for individual temperature classification*
**3 For PN's: A700V337M002AT and A700V337M2R5AT test condition specification goes up to 1,000 hours*
**4 For PN's: A700V337M002AT, A700V337M2R5AT, and A700V477M002AT capacitance change is within ± 20 of intial value*
**5 For PN's: A700V337M002AT, A700V337M2R5AT, and A700V477M002AT capacitance change is within -30/+70% of intial value*

Electrical Characteristics

ESR vs. Frequency

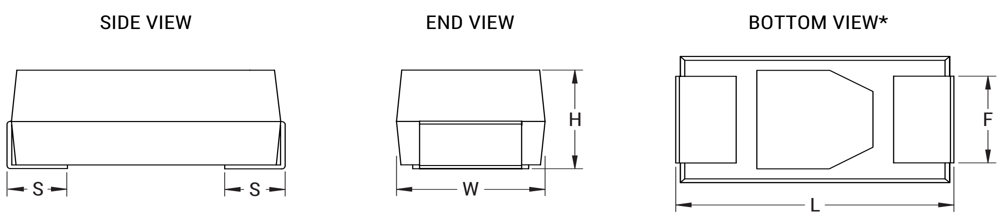


Capacitance vs. Frequency



Dimensions – Millimeters (Inches)

Metric will govern



**Glue pad shape is at KEMET's option*

Case Size		Component					Typical Weight
KEMET	EIA	L	W	H	F ±0.1 ±(0.004)	S ±0.3 ±(0.012)	(mg)
D	7343−31	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	2.8±0.3 (0.110±0.012)	2.4 (0.094)	1.3 (0.051)	196.58
V	7343−20	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	2.0 (0.079) Maximum*	2.4 (0.094)	1.3 (0.051)	132.72
W	7343−15	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	1.4±0.1 (0.055±0.004)	2.4 (0.094)	1.3 (0.051)	305.03
Q	7343−12	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	1.1±0.1 (0.043±0.004)	2.4 (0.094)	1.3 (0.051)	–
X	7343−43	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	4.0±0.3 (0.157±0.012)	2.4 (0.094)	1.3 (0.051)	305.03

Notes: (Ref) – Dimensions provided for reference only.
** Maximum Height is 2.1 for A700V477M002AT/A700V337M2R5AT*

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Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
2	100	V/7343-20	A700V107M002ATE016	12	6	16	4,100	3	125
2	100	V/7343-20	A700V107M002ATE018	12	6	18	3,900	3	125
2	100	V/7343-20	A700V107M002ATE025	12	6	25	3,300	3	125
2	100	V/7343-20	A700V107M002ATE028	12	6	28	3,100	3	125
2	150	V/7343-20	A700V157M002ATE015	18	6	15	4,200	3	125
2	150	V/7343-20	A700V157M002ATE018	18	6	18	3,900	3	125
2	150	V/7343-20	A700V157M002ATE025	18	6	25	3,300	3	125
2	150	V/7343-20	A700V157M002ATE028	18	6	28	3,100	3	125
2	180	D/7343-31	A700D187M002ATE015	22	6	15	4,100	3	125
2	180	D/7343-31	A700D187M002ATE018	22	6	18	3,700	3	125
2	220	Q/7343-12	A700Q227M002ATE009	44	6	9	5,900	3	105
2	220	W/7343-15	A700W227M002ATE006	26	6	6	6,900	3	105
2	220	W/7343-15	A700W227M002ATE009	26	6	9	5,700	3	105
2	220	V/7343-20	A700V227M002ATE009	26	6	9	5,500	3	125
2	220	V/7343-20	A700V227M002ATE015	26	6	15	4,200	3	125
2	220	V/7343-20	A700V227M002ATE018	26	6	18	3,900	3	125
2	220	D/7343-31	A700D227M002ATE009	26	6	9	5,300	3	125
2	220	D/7343-31	A700D227M002ATE012	26	6	12	4,600	3	125
2	220	D/7343-31	A700D227M002ATE015	26	6	15	4,100	3	125
2	220	D/7343-31	A700D227M002ATE018	26	6	18	3,700	3	125
2	270	X/7343-43	A700X277M002ATE010	32	6	10	4,700	3	125
2	270	X/7343-43	A700X277M002ATE012	32	6	12	4,300	3	125
2	270	X/7343-43	A700X277M002ATE015	32	6	15	3,900	3	125
2	330	V/7343-20	A700V337M002ATE4R5	40	6	4.5	7,750	3	125
2	330	V/7343-20	A700V337M002ATE006	40	6	6	6,700	3	125
2	330	V/7343-20	A700V337M002ATE009	40	6	9	5,500	3	125
2	330	D/7343-31	A700D337M002ATE007	40	6	7	6,000	3	125
2	330	D/7343-31	A700D337M002ATE009	40	6	9	5,300	3	125
2	330	D/7343-31	A700D337M002ATE012	40	6	12	4,600	3	125
2	330	X/7343-43	A700X337M002ATE010	40	6	10	4,700	3	125
2	330	X/7343-43	A700X337M002ATE015	40	6	15	3,900	3	125
2	390	X/7343-43	A700X397M002ATE010	47	6	10	4,700	3	125
2	390	X/7343-43	A700X397M002ATE015	47	6	15	3,900	3	125
2	470	V/7343-20	A700V477M002ATE4R5	56	6	4.5	7,750	3	125
2	470	V/7343-20	A700V477M002ATE006	56	6	6	6,700	3	125
2	470	V/7343-20	A700V477M002ATE009	56	6	9	5,500	3	125
2	470	V/7343-20	A700V477M002PTE009	56	6	9	5,500	3	125
2	470	D/7343-31	A700D477M002ATE005	56	6	5	7,100	3	125
2	470	D/7343-31	A700D477M002ATE006	56	6	6	6,500	3	125
2	470	X/7343-43	A700X477M002ATE005	56	6	5	6,700	3	125
2	470	X/7343-43	A700X477M002ATE007	56	6	7	5,700	3	125
2	470	X/7343-43	A700X477M002ATE010	56	6	10	4,700	3	125
2	470	X/7343-43	A700X477M002ATE015	56	6	15	3,900	3	125
2	560	X/7343-43	A700X567M002ATE4R5	67	6	4.5	7,000	3	125
2	560	X/7343-43	A700X567M002ATE005	67	6	5	6,700	3	125
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

KEMET a YAGEO company

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
2	560	X/7343-43	A700X567M002ATE006	67	6	6	6,100	3	125
2	560	X/7343-43	A700X567M002ATE009	67	6	9	5,000	3	125
2.5	68	V/7343-20	A700V686M2R5ATE020	10	6	20	3,700	3	125
2.5	68	V/7343-20	A700V686M2R5ATE028	10	6	28	3,100	3	125
2.5	82	V/7343-20	A700V826M2R5ATE018	12	6	18	3,900	3	125
2.5	82	V/7343-20	A700V826M2R5ATE025	12	6	25	3,300	3	125
2.5	82	V/7343-20	A700V826M2R5ATE028	12	6	28	3,100	3	125
2.5	100	D/7343-31	A700D107M2R5ATE018	15	6	18	3,700	3	125
2.5	100	D/7343-31	A700D107M2R5ATE025	15	6	25	3,200	3	125
2.5	100	D/7343-31	A700D107M2R5ATE028	15	6	28	3,000	3	125
2.5	120	D/7343-31	A700D127M2R5ATE015	18	6	15	4,100	3	125
2.5	120	D/7343-31	A700D127M2R5ATE018	18	6	18	3,700	3	125
2.5	150	D/7343-31	A700D157M2R5ATE015	23	6	15	4,100	3	125
2.5	150	D/7343-31	A700D157M2R5ATE018	23	6	18	3,700	3	125
2.5	180	D/7343-31	A700D187M2R5ATE015	27	6	15	4,100	3	125
2.5	180	D/7343-31	A700D187M2R5ATE018	27	6	18	3,700	3	125
2.5	180	X/7343-43	A700X187M2R5ATE010	27	6	10	4,700	3	125
2.5	180	X/7343-43	A700X187M2R5ATE015	27	6	15	3,900	3	125
2.5	180	X/7343-43	A700X187M2R5ATE018	27	6	18	3,500	3	125
2.5	220	Q/7343-12	A700Q227M2R5ATE009	55	6	9	5,900	3	105
2.5	220	W/7343-15	A700W227M2R5ATE006	33	6	6	6,900	3	105
2.5	220	W/7343-15	A700W227M2R5ATE009	33	6	9	5,700	3	105
2.5	220	X/7343-43	A700X227M2R5ATE009	33	6	9	5,000	3	125
2.5	220	X/7343-43	A700X227M2R5ATE010	33	6	10	4,700	3	125
2.5	220	X/7343-43	A700X227M2R5ATE015	33	6	15	3,900	3	125
2.5	330	V/7343-20	A700V337M2R5ATE4R5	50	6	4.5	7,750	3	125
2.5	330	V/7343-20	A700V337M2R5ATE006	50	6	6	6,700	3	125
2.5	330	V/7343-20	A700V337M2R5ATE009	50	6	9	5,500	3	125
2.5	330	X/7343-43	A700X337M2R5ATE010	50	6	10	4,700	3	125
2.5	330	X/7343-43	A700X337M2R5ATE015	50	6	15	3,900	3	125
2.5	470	V/7343-20	A700V477M2R5ATE4R5	70.5	6	4.5	7,750	3	105
2.5	470	V/7343-20	A700V477M2R5ATE006	70.5	6	6	6,700	3	105
2.5	470	V/7343-20	A700V477M2R5ATE009	70.5	6	9	5,480	3	105
2.5	470	X/7343-43	A700X477M2R5ATE005	70	6	5	6,700	3	125
2.5	470	X/7343-43	A700X477M2R5ATE007	70	6	7	5,700	3	125
2.5	470	X/7343-43	A700X477M2R5ATE010	70	6	10	4,700	3	125
2.5	470	X/7343-43	A700X477M2R5ATE015	70	6	15	3,900	3	125
2.5	560	X/7343-43	A700X567M2R5ATE4R5	84	6	4.5	7,000	3	125
2.5	560	X/7343-43	A700X567M2R5ATE006	84	6	6	6,100	3	125
2.5	560	X/7343-43	A700X567M2R5ATE009	84	6	9	5,000	3	125
4	68	V/7343-20	A700V686M004ATE020	16	6	20	3,700	3	125
4	68	V/7343-20	A700V686M004ATE028	16	6	28	3,100	3	125
4	82	V/7343-20	A700V826M004ATE016	20	6	16	4,100	3	125
4	82	V/7343-20	A700V826M004ATE018	20	6	18	3,900	3	125
4	82	V/7343-20	A700V826M004ATE025	20	6	25	3,300	3	125
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp.

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Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
4	82	V/7343-20	A700V826M004ATE028	20	6	28	3,100	3	125
4	100	D/7343-31	A700D107M004ATE018	24	6	18	3,700	3	125
4	100	D/7343-31	A700D107M004ATE025	24	6	25	3,200	3	125
4	100	D/7343-31	A700D107M004ATE028	24	6	28	3,000	3	125
4	100	V/7343-20	A700V107M004ATE025	24	6	25	3,300	3	125
4	100	V/7343-20	A700V107M004ATE028	24	6	28	3,100	3	125
4	120	D/7343-31	A700D127M004ATE015	29	6	15	4,100	3	125
4	120	D/7343-31	A700D127M004ATE018	29	6	18	3,700	3	125
4	150	D/7343-31	A700D157M004ATE015	36	6	15	4,100	3	125
4	150	D/7343-31	A700D157M004ATE018	36	6	18	3,700	3	125
4	150	V/7343-20	A700V157M004ATE015	36	6	15	4,200	3	125
4	150	V/7343-20	A700V157M004ATE016	36	6	16	4,100	3	125
4	150	V/7343-20	A700V157M004ATE018	36	6	18	3,900	3	125
4	180	D/7343-31	A700D187M004ATE012	43	6	12	4,600	3	125
4	180	D/7343-31	A700D187M004ATE015	43	6	15	4,100	3	125
4	180	D/7343-31	A700D187M004ATE018	43	6	18	3,700	3	125
4	180	X/7343-43	A700X187M004ATE010	43	6	10	4,700	3	125
4	180	X/7343-43	A700X187M004ATE015	43	6	15	3,900	3	125
4	180	X/7343-43	A700X187M004ATE018	43	6	18	3,500	3	125
4	220	D/7343-31	A700D227M004ATE009	53	6	9	5,300	3	125
4	220	D/7343-31	A700D227M004ATE010	53	6	10	5,000	3	125
4	220	D/7343-31	A700D227M004ATE015	53	6	15	4,100	3	125
4	220	X/7343-43	A700X227M004ATE009	53	6	9	5,000	3	125
4	220	X/7343-43	A700X227M004ATE010	53	6	10	4,700	3	125
4	220	X/7343-43	A700X227M004ATE015	53	6	15	3,900	3	125
4	270	X/7343-43	A700X277M004ATE010	65	6	10	4,700	3	125
4	270	X/7343-43	A700X277M004ATE015	65	6	15	3,900	3	125
4	330	X/7343-43	A700X337M004ATE008	79	6	8	5,300	3	125
4	330	X/7343-43	A700X337M004ATE010	79	6	10	4,700	3	125
4	330	X/7343-43	A700X337M004ATE015	79	6	15	3,900	3	125
6.3	10	V/7343-20	A700V106M006ATE055	3	6	55	2,200	3	125
6.3	22	V/7343-20	A700V226M006ATE028	6	6	28	3,100	3	125
6.3	22	V/7343-20	A700V226M006ATE045	6	6	45	2,400	3	125
6.3	33	V/7343-20	A700V336M006ATE018	8	6	18	3,900	3	125
6.3	33	V/7343-20	A700V336M006ATE025	8	6	25	3,300	3	125
6.3	33	V/7343-20	A700V336M006ATE028	8	6	28	3,100	3	125
6.3	47	V/7343-20	A700V476M006ATE018	12	6	18	3,900	3	125
6.3	47	V/7343-20	A700V476M006ATE025	12	6	25	3,300	3	125
6.3	47	V/7343-20	A700V476M006ATE028	12	6	28	3,100	3	125
6.3	56	V/7343-20	A700V566M006ATE018	14	6	18	3,900	3	125
6.3	56	V/7343-20	A700V566M006ATE025	14	6	25	3,300	3	125
6.3	56	V/7343-20	A700V566M006ATE028	14	6	28	3,100	3	125
6.3	68	V/7343-20	A700V686M006ATE015	17	6	15	4,200	3	125
6.3	68	V/7343-20	A700V686M006ATE018	17	6	18	3,900	3	125
6.3	68	V/7343-20	A700V686M006ATE025	17	6	25	3,300	3	125
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at -55°C to 125°C	Reflow Temp ≤ 260°C	°C
6.3	68	V/7343-20	A700V686M006ATE028	17	6	28	3,100	3	125
6.3	82	V/7343-20	A700V826M006ATE018	21	6	18	3,900	3	125
6.3	82	V/7343-20	A700V826M006ATE025	21	6	25	3,300	3	125
6.3	82	V/7343-20	A700V826M006ATE028	21	6	28	3,100	3	125
6.3	100	V/7343-20	A700V107M006ATE015	25	6	15	4,200	3	125
6.3	100	V/7343-20	A700V107M006ATE018	25	6	18	3,900	3	125
6.3	100	V/7343-20	A700V107M006ATE025	25	6	25	3,300	3	125
6.3	100	D/7343-31	A700D107M006ATE015	25	6	15	4,100	3	125
6.3	100	D/7343-31	A700D107M006ATE018	25	6	18	3,700	3	125
6.3	120	D/7343-31	A700D127M006ATE012	30	6	12	4,600	3	125
6.3	120	D/7343-31	A700D127M006ATE015	30	6	15	4,100	3	125
6.3	120	D/7343-31	A700D127M006ATE018	30	6	18	3,700	3	125
6.3	150	D/7343-31	A700D157M006ATE010	38	6	10	5,000	3	125
6.3	150	D/7343-31	A700D157M006ATE012	38	6	12	4,600	3	125
6.3	150	D/7343-31	A700D157M006ATE015	38	6	15	4,100	3	125
6.3	150	X/7343-43	A700X157M006ATE010	38	6	10	4,700	3	125
6.3	150	X/7343-43	A700X157M006ATE012	38	6	12	4,300	3	125
6.3	150	X/7343-43	A700X157M006ATE015	38	6	15	3,900	3	125
6.3	180	D/7343-31	A700D187M006ATE010	45	6	10	5,000	3	125
6.3	180	D/7343-31	A700D187M006ATE015	45	6	15	4100	3	125
6.3	180	X/7343-43	A700X187M006ATE010	45	6	10	4,700	3	125
6.3	180	X/7343-43	A700X187M006ATE015	45	6	15	3,900	3	125
6.3	220	X/7343-43	A700X227M006ATE007	55	6	7	5,700	3	125
6.3	220	X/7343-43	A700X227M006ATE010	55	6	10	4,700	3	125
6.3	220	X/7343-43	A700X227M006ATE015	55	6	15	3,900	3	125
8	10	V/7343-20	A700V106M008ATE055	3	6	55	2,200	3	125
8	22	V/7343-20	A700V226M008ATE028	7	6	28	3,100	3	125
8	22	V/7343-20	A700V226M008ATE045	7	6	45	2,400	3	125
8	33	V/7343-20	A700V336M008ATE018	11	6	18	3,900	3	125
8	33	V/7343-20	A700V336M008ATE025	11	6	25	3,300	3	125
8	33	V/7343-20	A700V336M008ATE028	11	6	28	3,100	3	125
8	56	D/7343-31	A700D566M008ATE015	18	6	15	4,100	3	125
8	56	D/7343-31	A700D566M008ATE018	18	6	18	3,700	3	125
8	68	D/7343-31	A700D686M008ATE015	22	6	15	4,100	3	125
8	68	D/7343-31	A700D686M008ATE018	22	6	18	3,700	3	125
8	100	X/7343-43	A700X107M008ATE010	32	6	10	4,700	3	125
8	100	X/7343-43	A700X107M008ATE012	32	6	12	4,300	3	125
8	100	X/7343-43	A700X107M008ATE015	32	6	15	3,900	3	125
10	10	V/7343-20	A700V106M010ATE055	4	6	55	2,200	3	125
10	22	V/7343-20	A700V226M010ATE028	9	6	28	3,100	3	125
10	22	V/7343-20	A700V226M010ATE045	9	6	45	2,400	3	125
10	33	V/7343-20	A700V336M010ATE018	13	6	18	3,900	3	125
10	33	V/7343-20	A700V336M010ATE025	13	6	25	3,300	3	125
10	33	V/7343-20	A700V336M010ATE028	13	6	28	3,100	3	125
10	47	V/7343-20	A700V476M010ATE025	19	6	25	3,300	3	125
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at -55°C to 125°C	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

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Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
10	47	V/7343-20	A700V476M010ATE028	19	6	28	3,100	3	125
10	56	D/7343-31	A700D566M010ATE015	22	6	15	4,100	3	125
10	56	D/7343-31	A700D566M010ATE018	22	6	18	3,700	3	125
10	68	D/7343-31	A700D686M010ATE015	27	6	15	4,100	3	125
10	68	D/7343-31	A700D686M010ATE018	27	6	18	3,700	3	125
10	100	X/7343-43	A700X107M010ATE010	40	6	10	4,700	3	125
10	100	X/7343-43	A700X107M010ATE015	40	6	15	3,900	3	125
10	120	X/7343-43	A700X127M010ATE010	48	6	10	4,700	3	125
10	120	X/7343-43	A700X127M010ATE015	48	6	15	3,900	3	125
10	150	X/7343-43	A700X157M010ATE010	60	6	10	4,700	3	125
10	150	X/7343-43	A700X157M010ATE015	60	6	15	3,900	3	125
12.5	10	V/7343-20	A700V106M12RATE040	5	6	40	2,600	3	125
12.5	10	V/7343-20	A700V106M12RATE055	5	6	55	2,200	3	125
12.5	10	V/7343-20	A700V106M12RATE060	5	6	60	2,100	3	125
12.5	15	V/7343-20	A700V156M12RATE040	8	6	40	2,600	3	125
12.5	15	V/7343-20	A700V156M12RATE045	8	6	45	2,400	3	125
12.5	22	V/7343-20	A700V226M12RATE030	11	6	30	3,000	3	125
12.5	33	V/7343-20	A700V336M12RATE025	17	6	25	3,300	3	125
12.5	56	D/7343-31	A700D566M12RATE020	28	6	20	3,500	3	125
12.5	47	D/7343-31	A700D476M12RATE020	24	6	20	3,500	3	125
12.5	47	D/7343-31	A700D476M12RATE025	24	6	25	3,200	3	125
12.5	47	D/7343-31	A700D476M12RATE040	24	6	40	2,500	3	125
12.5	100	X/7343-43	A700X107M12RATE012	50	6	12	4,300	3	125
12.5	100	X/7343-43	A700X107M12RATE015	50	6	15	3,900	3	125
12.5	100	X/7343-43	A700X107M12RATE018	50	6	18	3,500	3	125
12.5	100	X/7343-43	A700X107M12RATE025	50	6	25	3,000	3	125
16	6.8	V/7343-20	A700V685M016ATE070	4	6	70	2,000	3	125
16	8.2	V/7343-20	A700V825M016ATE045	5	6	45	2,400	3	125
16	10	V/7343-20	A700V106M016ATE045	6	6	45	2,400	3	125
16	10	V/7343-20	A700V106M016ATE060	6	6	60	2,100	3	125
16	15	V/7343-20	A700V156M016ATE040	10	6	40	2,600	3	125
16	22	V/7343-20	A700V226M016ATE018	35	6	18	3,900	3	125
16	22	V/7343-20	A700V226M016ATE025	35	6	25	3,300	3	125
16	22	V/7343-20	A700V226M016ATE030	35	6	30	3,000	3	125
16	22	D/7343-31	A700D226M016ATE018	14	6	18	3,700	3	125
16	22	D/7343-31	A700D226M016ATE025	14	6	25	3,200	3	125
16	22	D/7343-31	A700D226M016ATE030	14	6	30	2,900	3	125
16	33	V/7343-20	A700V336M016ATE025	53	6	25	3,300	3	125
16	33	V/7343-20	A700V336M016ATE040	53	6	40	2,600	3	125
25	15	V/7343-20	A700V156M025ATE040	15	6	40	2,600	3	125
35	15	D/7343-31	A700D156M035ATE040	53	6	40	2,500	3	125
35	22	X/7343-43	A700X226M035ATE025	77	6	25	3,000	3	125
35	22	X/7343-43	A700X226M035ATE040	77	6	40	2,400	3	125
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Derating Guidelines

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 µs)
	−55°C to 125°C	
2 – 35 V	V_R	V_R

V_R = Rated Voltage

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage which may be applied is limited by two criteria

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage, in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage. See the Reverse Voltage section for allowable limits

Power capability is determined based on a 20°C temperature rise. A higher temperature rise and therefore higher power capability is allowable as long as the ambient temperature plus temperature rise due to ripple current does not exceed the rated temperature of the part.
The maximum power dissipation by case size can be determined using the below table.

KEMET Series and Case Code	EIA Case Code	Maximum Power Dissipation (Pmax) mWatts at 25°C with +20°C Rise
A700Q	7343-12	320
A700W	7343-15	290
A700V	7343-20	270
A700D	7343-31	250
A700X	7343-43	225

Using the Pmax of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{Pmax/R}$
$E(max) = Z\sqrt{Pmax/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
Pmax = maximum power dissipation(watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (Ohms)

Refer to part number listings for permittable Arms limits.

Reverse Voltage

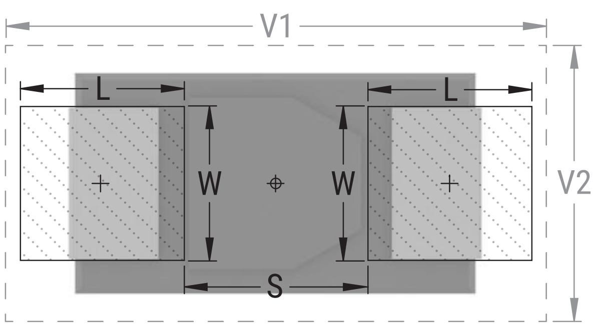
Polymer aluminum capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a certain degree of transient voltage reversal for short periods as shown in the below table. Please note that these parts may not be operated continuously in reverse, even within these limits.

Temperature	Permissible Transient Reverse Voltage
25°C	60% of Rated Voltage
55°C	50% of Rated Voltage
85°C	40% of Rated Voltage
125°C	30% of Rated Voltage

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
D	7343–31	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
Q	7343–12	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
V	7343–20	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
W	7343–15	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
X[1]	7343–43	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84

***Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
***Density Level B:** For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
***Density Level C:** For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] Height of these chips may create problems in wave soldering.



Soldering Process

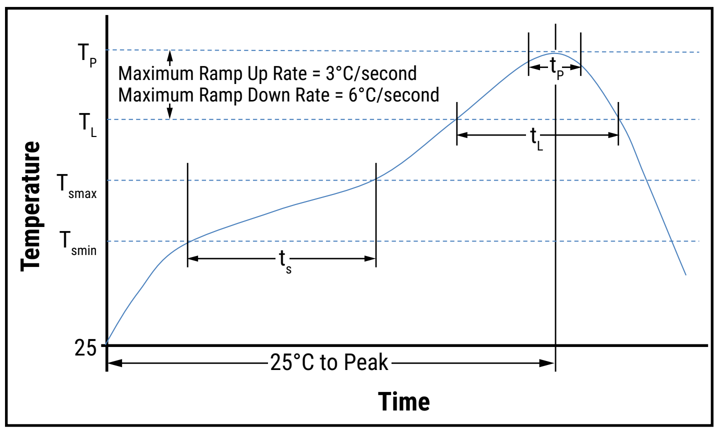
KEMET's families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{smin})	100°C	150°C
Temperature Maximum (T_{smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/seconds maximum	3°C/seconds maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/seconds maximum	6°C/seconds maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



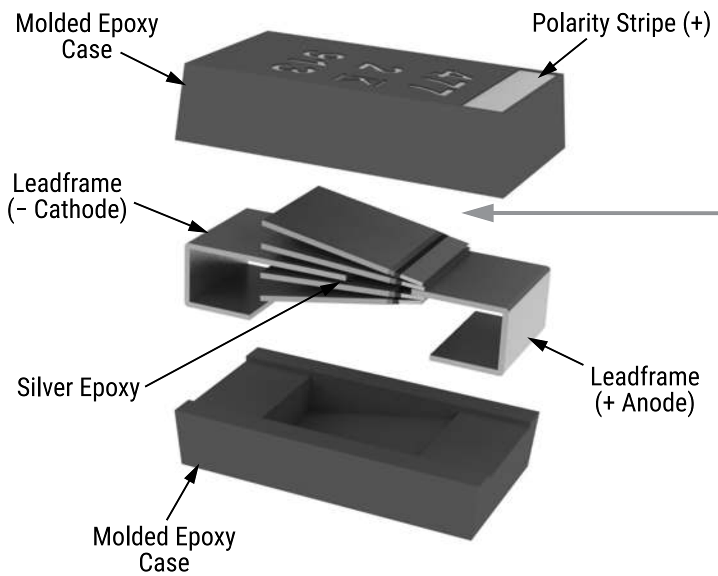
Storage

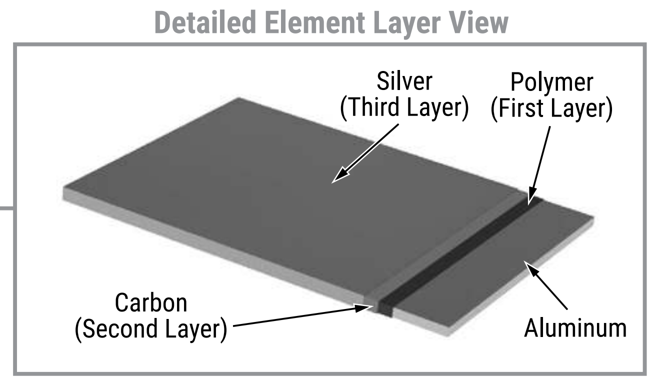
All AO-CAP Series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J–STD–020 and packaged per IPC/JEDEC J–STD–033. MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

The calculated shelf life in a sealed bag would be 12 months from a bag seal date in a storage environment of < 40°C and humidity < 90% RH. It should be 24 months from a bag seal date in a storage environment of < 30°C and humidity < 70% RH.

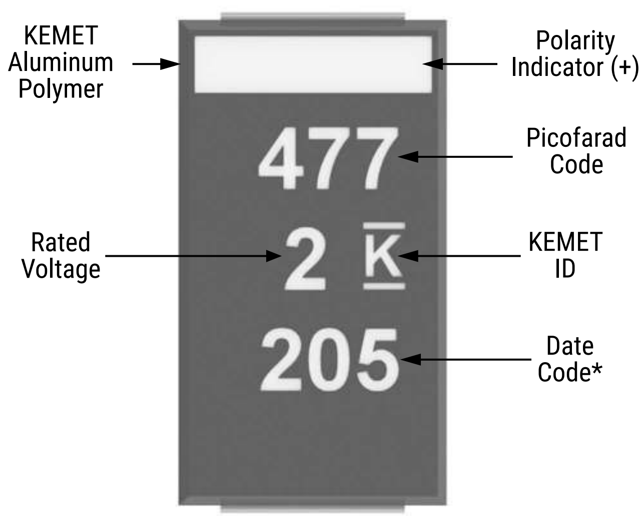
If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure.

Construction





Capacitor Marking



* 205 = 5th week of 2022

Date Code *	
1st digit = Last number of Year	9 = 2019 0 = 2020 1 = 2021 2 = 2022 3 = 2023
2nd and 3rd digit = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

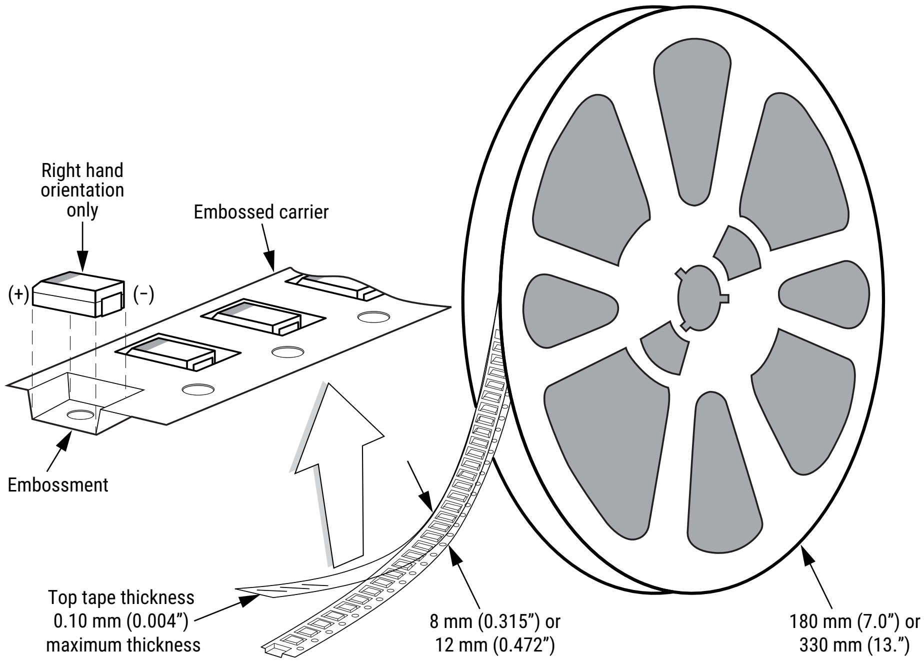


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
P	2012-10	8	3,000	N/A
R	2012-12	8	2,500	10,000
I	3216-10	8	3,000	N/A
S	3216-12	8	3,000	N/A
A	3216-18	8	2,000	N/A
T	3528-12	8	3,000	10,000
M	3528-15	8	2,500	8,000
B	3528-21	8	2,000	8,000
U	6032-15	12	1,000	5,000
L	6032-19	12	1,000	3,000
C	6032-28	12	500	3,000
Q	7343-12	12	1,000	3,000
W	7343-15	12	1,000	3,000
Z	7343-17	12	1,000	3,000
V	7343-19	12	1,000	3,000
D	7343-31	12	500	2,500
Y	7343-40	12	500	2,000
X	7343-43	12	500	2,000
J	7360-15	12	1,000	3,000
H	7360-20	12	1,000	3,000
O	7360-43	12	250	1,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

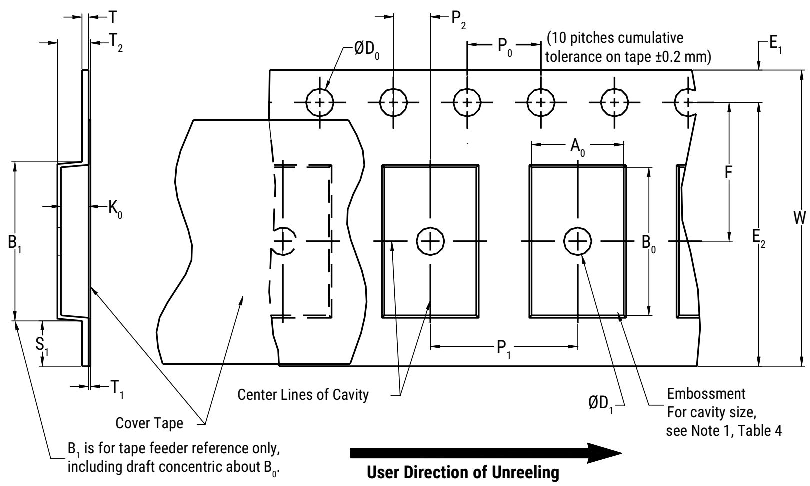


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/−0.0 (0.059 +0.004/−0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0, B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) and Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape, with or without components, shall pass around R without damage (see Figure 4).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
   (e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

Packaging Information Performance Notes

1. Cover tape break force: 1.0 kg minimum.
2. Cover tape peel strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 newton (10 to 100 gf)
12 mm	0.1 to 1.3 newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624*.

Figure 2 – Maximum Component Rotation

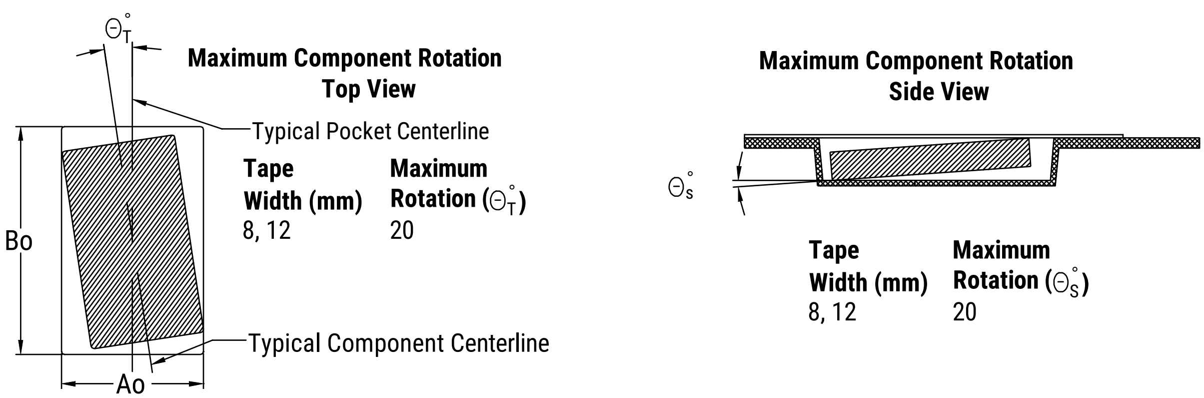


Figure 3 – Maximum Lateral Movement

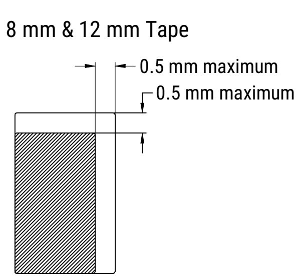


Figure 4 – Bending Radius

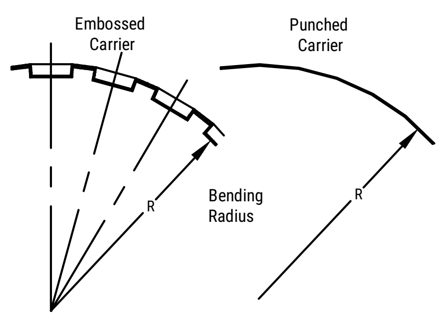
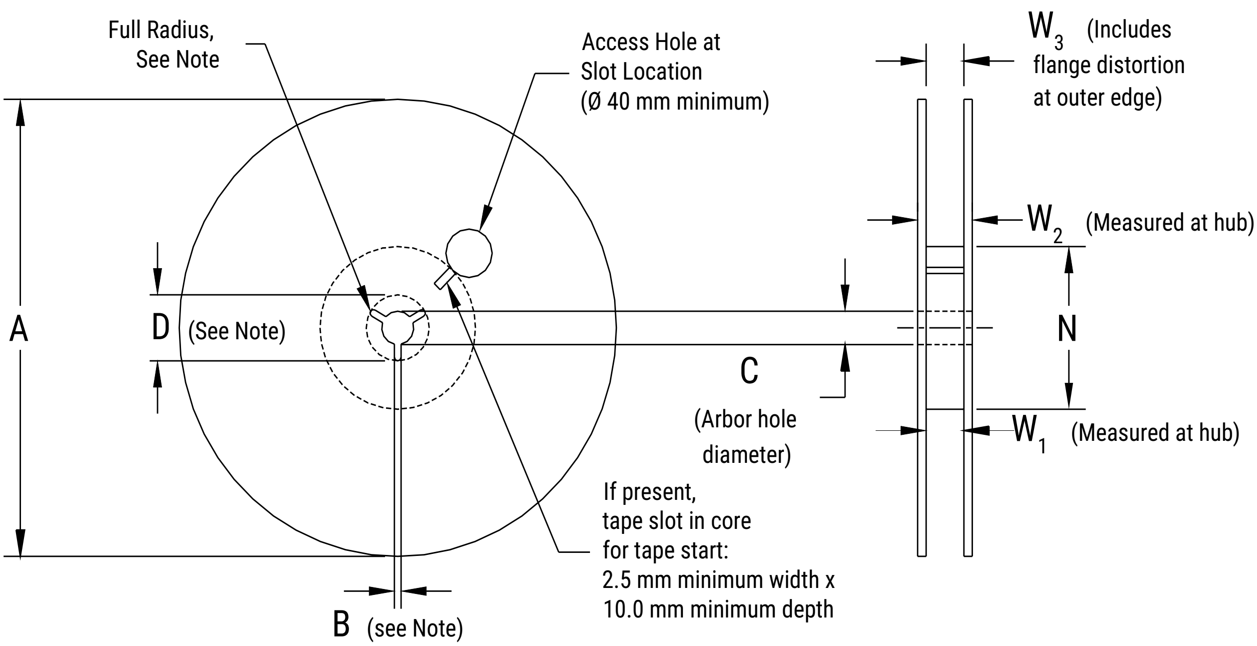


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
12 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

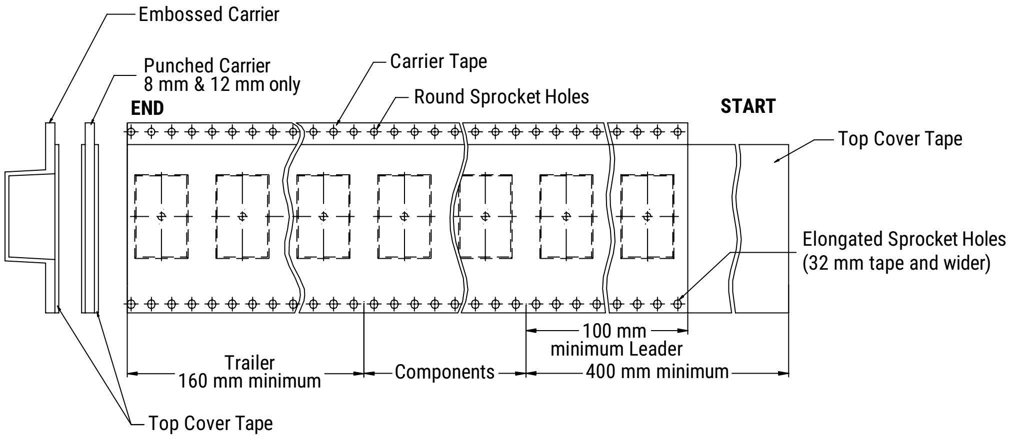
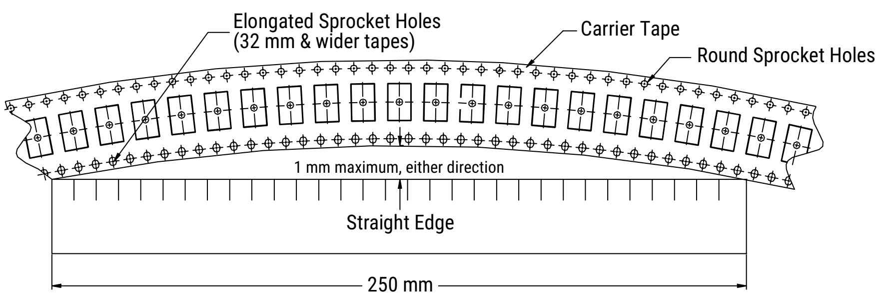


Figure 7 – Maximum Camber



KEMET Organic Capacitor (KO-CAP®) – Industrial

Tantalum Stack Polymer (TSP) Electrolytic Stack, 3 – 63 VDC

Overview

The KEMET Tantalum Stack Polymer (TSP) Electrolytic Capacitor is designed to provide the highest CV (capacitance/voltage) ratings in a surface mount configuration. All of KEMET's Polymer Electrolytic Solutions are available in a stack configuration.The only exceptions are the facedown series (T523, T527, T528, and T529). These capacitors are utilized in stacks of 2, 3, 4, and 6 components to achieve a broad range of capacitance, ESR, and voltage ratings. The TSP series may be operated at steady state voltages up to 90% of rated voltage for part types with rated voltage less than or equal to 10 volts and up to 80% of rated voltage for part types greater than 10 volts. Stacking configurations allow for custom capacitance/voltage solutions and very low ESR options.

The TSP series is the first polymer electrolytic capacitor available with failure rate options when utilizing KEMET's T540 and T541 Series. The failure rate is determined by utilizing accelerated conditions (voltage and temperature) applied to board mounted samples to assess long term device reliability. The failure rates available are B (0.1% per 1,000 hours), C (0.01% per 1,000 hours), and D (0.001% per 1,000 hours).

Note: Custom stacking solutions are also available with other KEMET Polymer Electrolytic Surface Mount products. Please contact KEMET Sales for availability.

Benefits

- Polymer cathode technology
- High capacitance
- Surface mountable
- Capacitance values of 20 – 8,000 µF
- Capacitance can be custom specified
- Voltage ratings of 3 – 63 VDC
- High volumetric efficiency
- Ultra low ESR
- Surge capability
- Operating temperature range of −55°C to +105°C/+125˚C (refer to part number for maximum temperature rating)
- Laser-marked case
- Use up to 90% of rated voltage for part types ≤ 10 V
- Use up to 80% of rated voltage for part types > 10 V
- KEMET's KO-CAP Reliability Assesment method (for the discrete component T540 and T541)

Applications

Typical applications include decoupling, hold-up and filtering in a variety of market segments.
The T540/T541 and T543 Polymer HRA and other tantalum MnO2 HRA and MIL-PRF stack devices can be utilized in defense and aerospace equipment including High Power Amplifiers for radars and multiple applications where GaN active components are part of the design.

Environmental Compliance

RoHS compliant when ordered with 100% Sn solder on both terminations (component and stack)

- Halogen-free
- Epoxy compliant with UL94 V-0
- Molded Epoxy complies for outgassing testing under ASTM E 595.

Ordering Information

T540/T541 Discrete Component

T	SP	2D	207	M	010	A	H	65	20	D	540
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate (Discrete)	Termination Finish (Discrete)	Surge (Discrete)	ESR (Stack)	Termination Finish (Stack)	Discrete Components Series
T = Tantalum	Stacks Polymer Cathode	2B 3B 4B 6B 2C 3C 4C 6C 2D 3D 4D 6D 2O 3O 4O 6O 2X 3X 4X 6X	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	003 = 3 004 = 4 006 = 6.3 010 = 10 016 = 16 025 = 25 035 = 35 050 = 50 063 = 63	A = N/A B = 0.1%/KHrs C = 0.01%/KHrs D = 0.001%/KHrs	H = Standard solder coated (SnPb 5% Pb minimum) T = 100% Matte Tin (Sn)-plated	65 = 4 cycles at 25°C ±5°C 66 = 10 cycles at 25°C 67 = 10 cycles at −55°C +0°C/−5°C and 85°C 85 = 4 cycles at 25°C ±5°C and improved humidity capability 86 = 10 cycles at 25°C ±5°C and improved humidity capability 87 = 10 cycles at −55°C +0°C/−5°C and +85°C ±5°C and improved humidity capability	05 = ESR - High 10 = ESR - Standard 20 = ESR-Low	D = Silver-plated (Ag) H = Solder-plated (SnPb 5% Pb minimum) T = 100% Tin (Sn) X = Leadless stack assembly [*1]	540 = T540 541 = T541

[*1] *Available for O case discrete stack configurations*

Ordering Information cont.

T543 Discrete Component

T	SP	6X	207	M	050	A	H	E	040	D	543
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate (Discrete)	Termination Finish (Discrete)	Surge (Discrete)	ESR (Discrete)	Termination Finish (Stack)	Discrete Components Series
T = Tantalum	Stacks Polymer Cathode	2B 3B 4B 6B 2C 3C 4C 6C 2D 3D 4D 6D 2O 3O 4O 6O 2X 3X 4X 6X	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	003 = 3 004 = 4 006 = 6.3 010 = 10 016 = 16 025 = 25 035 = 35 040 = 40 050 = 50 063 = 63	A = N/A	H = Standard solder coated (SnPb 5% Pb minimum) T = 100% Matte Tin (Sn)-plated	E = None S = 10 cycles at 25°C W = 10 cycles −55°C and 85°C	ESR in mΩ	D = Silver-plated (Ag) H = Solder-plated (SnPb 5% Pb minimum) T = 100% Tin (Sn) X = Leadless stack assembly *1	543 = T543

*1 *Available for O case discrete stack configurations*

T520, T521, T525, T530, T545 Discrete Component

T	SP	2X	667	M	10	A	T	E	002	D	530
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate (Discrete)	Termination Finish (Discrete)	Surge (Discrete)	ESR (Stack)	Termination Finish (Stack)	Discrete Components Series
T = Tantalum	Stacks Polymer Cathode	2B 3B 4B 6B 2C 3C 4C 6C 2D 3D 4D 6D 2O 3O 4O 6O 2X 3X 4X 6X	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	003 = 3 004 = 4 006 = 6.3 010 = 10 016 = 16 025 = 25 035 = 35 050 = 50 063 = 63	A = N/A	H = Standard solder coated (SnPb 5% Pb minimum) T = 100% Matte Tin (Sn)-plated	E = None	ESR in mΩ	D = Silver-plated (Ag) H = Solder-plated (SnPb 5% Pb minimum) T = 100% Tin (Sn)	520 = T520 521 = T521 525 = T525 530 = T530 545 = T545

Note: Custom discrete component stacking solutions are also available with other KEMET Polymer Electrolytic Surface Mount series/products. Please contact KEMET Sales for availability.

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to 105°C/125°C (refer to part number for maximum temperature rating)
Rated Capacitance Range	20 – 8,000 µF at 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	3 – 63 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.1 CV (µA) at rated voltage after 5 minutes

Qualification

Test	Condition	Characteristics	
Endurance	105°C at rated voltage, 2,000 hours 125°C at 2/3 rated voltage, 2,000 hours	Δ C/C	Within −20/+10% of initial value
		DF	≤ initial limit
		DCL	1.25 x IL at 125°C
		ESR	2 x initial limit
Thermal Shock	KEMET specified test, mounted, −55°C to 105°C/125°C*1, 5 cycles	Δ C/C	Within ±5% of initial value
		DF	Within initial limits
		DCL	Within 1.25 x initial limit
		ESR	Within initial limits
Surge Voltage	85°C, 1.15 x rated voltage 1,000 cycles	Δ C/C	Within ±5% of initial value
		DF	Within initial limits
		DCL	Within initial limits
		ESR	Within initial limits
Surge Voltage	105°C/125°C*1, 0.77 x rated voltage 1,000 cycles	Δ C/C	Within ±5% of initial value
		DF	Within initial limits
		DCL	Within initial limits
		ESR	Within initial limits
Mechanical Vibration	MIL–STD–202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak	Δ C/C	Within ±10 of initial value
		DF	Within initial limits
		DCL	Within initial limits

*1 *Refer to part number specifications for individual temperature classification*

Reliability

KO-CAP capacitors have an average failure rate of 0.5 %/1,000 hours at category voltage, U_C, and category temperature, T_C. These capacitors are qualified using industry test standards at U_C and T_C. The minimum test time (1,000 or 2,000 hours) is dependent on the product.

The actual life expectancy of KO-CAP capacitors increases when application voltage, U_A, and application temperature, T_A, are lower than U_C and T_C. As a general guideline, when $U_A < 0.9 * U_C$ and $T_A < 85°C$, the life expectancy will typically exceed the useful lifetime of most hardware (> 10 years).

The lifetime of a KO-CAP capacitor at a specific application voltage and temperature can be modeled using the equations below. A failure is defined as passing enough current to blow a 1-Amp fuse. The calculation is an estimation based on empirical results and is not a guarantee.

$$VAF = \left(\frac{U_C}{U_A}\right)^n$$

where:

VAF = acceleration factor due to voltage, unitless

U_C = category voltage, volt

U_A = application voltage, volt

n = exponent, 16

$$TAF = e^{\left[\frac{E_a}{k}\left(\frac{1}{273+T_A} - \frac{1}{273+T_C}\right)\right]}$$

where:

TAF = acceleration factor due to temperature, unitless

E_a = activation energy, 1.4 eV

k = Boltzmann's constant, 8.617E-5 eV/K

T_A = application temperature, °C

T_C = category temperature, °C

$$AF = VAF * TAF$$

where:

AF = acceleration factor, unitless

TAF = accerlation factor due to temperature, unitless

VAF = acceleration factor due to voltage, unitless

$$Life_{U_A,T_A} = Life_{U_C,T_C} * AF$$

where:

$Life_{UA, TA}$ = estimated life application voltage and temperature, years

$Life_{UC, TC}$ = guaranteed life category voltage and temperature, years

AF = acceleration factor, unitless

Reliability Table 1 – Common temperature range classifications

85°C (T_R) / 85°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 105°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 125°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	1.7	2.7	4.2	5.4	6.7	8.4	10.7	13.4	16.8	23.5	33.5	42.2	50.3

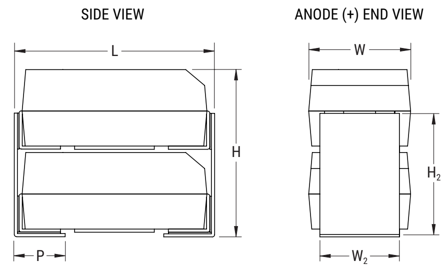
Terms:
Category Voltage, U_C: Maximum recommended peak DC operating voltage for continuous operation at the category temperature, T_C
Rated Voltage, U_R: Maximum recommended peak DC operating voltage for continuous operation up to the rated temperature, T_R
Category Temperature, T_C: Maximum recommended operating temperature; voltage derating may be required at T_C
Rated Temperature, T_R: Maximum recommended operating temperature without voltage derating; T_R is equal to or lower than T_C

Dimensions – Millimeters (Inches)

Metric will govern

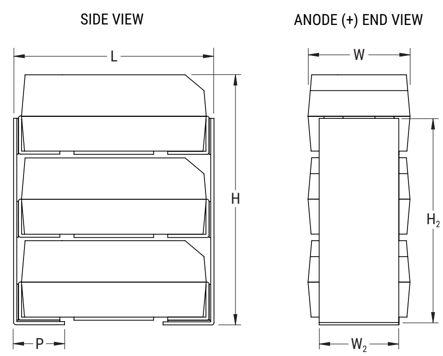
TSP2

KEMET 2 Component Stack Dimensions						
Case Code	L	W	H	W_2	H_2	P
2C	6.5 ±0.38 (0.258 ±0.015)	3.3 ±0.2 (0.130 ±0.008)	5.3 ±0.38 (0.210 ±0.015)	2.5 ±0.2 (0.100 ±0.008)	4.5 ±0.38 (0.176 ±0.015)	1.4 ±0.38 (0.055 ±0.015)
2B	4.1 ±0.38 (0.162 ±0.015)	3.1 ±0.2 (0.122 ±0.008)	4.3 ±0.38 (0.170 ±0.015)	2.3 ±0.2 (0.090 ±0.008)	3.1 ±0.38 (0.124 ±0.015)	0.76 ±0.38 (0.030 ±0.015)
2D	8.0 ±0.38 (0.315 ±0.015)	4.4 ±0.2 (0.174 ±0.008)	6.2 ±0.38 (0.245 ±0.015)	3.0 ±0.2 (0.120 ±0.008)	4.8 ±0.38 (0.192 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
2X	8.0 ±0.38 (0.315 ±0.015)	4.4 ±0.2 (0.174 ±0.008)	8.9 ±0.38 (0.350 ±0.015)	3.0 ±0.2 (0.120 ±0.008)	6.9 ±0.38 (0.272 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
2O	7.9 ±0.38 (0.311 ±0.015)	6.1 ±0.4 (0.240 ±0.016)	8.9 ±0.38 (0.350 ±0.015)	4.1 ±0.4 (0.161 ±0.016)	6.6 ±0.38 (0.260 ±0.015)	1.4 ±0.38 (0.055 ±0.015)



TSP3

KEMET 3 Component Stack Dimensions						
Case Code	L	W	H	W_2	H_2	P
3B	4.1 ±0.38 (0.162 ±0.015)	3.1 ±0.2 (0.122 ±0.008)	6.3 ±0.38 (0.248 ±0.015)	2.3 ±0.2 (0.090 ±0.008)	5.3 ±0.38 (0.210 ±0.015)	0.76 ±0.38 (0.030 ±0.015)
3D	8.0 ±0.38 (0.315 ±0.015)	4.4 ±0.2 (0.174 ±0.008)	9.2 ±0.38 (0.365 ±0.015)	3.0 ±0.2 (0.120 ±0.008)	7.7 ±0.38 (0.304 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
3X	8.0 ±0.38 (0.315 ±0.015)	4.4 ±0.2 (0.174 ±0.008)	13.3 ±0.38 (0.525 ±0.015)	3.0 ±0.2 (0.120 ±0.008)	11.0 ±0.38 (0.436 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
3O	7.9 ±0.38 (0.311 ±0.015)	6.1 ±0.4 (0.240 ±0.016)	13.3 ±0.38 (0.525±0.015)	4.1±0.2 (0.16 ±0.008)	11.0 ±0.38 (0.436 ±0.015)	1.4±0.38 (0.060±0.015))

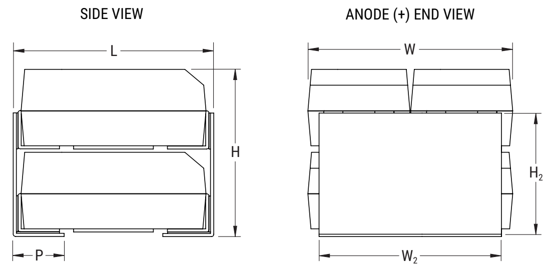


Dimensions – Millimeters (Inches) cont.

Metric will govern

TSP4

KEMET 4 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
4B	4.1 ±0.38 (0.162 ±0.015)	6.1 ±0.2 (0.242 ±0.008)	4.3 ±0.38 (0.170 ±0.015)	5.3 ±0.2 (0.210 ±0.008)	3.1 ±0.38 (0.124 ±0.015)	0.76 ±0.38 (0.030 ±0.015)
4D	8.0 ±0.38 (0.315 ±0.015)	8.9 ±0.2 (0.350 ±0.008)	6.2 ±0.38 (0.245 ±0.015)	7.4 ±0.2 (0.292 ±0.008)	4.8 ±0.38 (0.192 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
4X	8.0 ±0.38 (0.315 ±0.015)	8.9 ±0.2 (0.350 ±0.008)	8.9 ±0.38 (0.350 ±0.015)	7.4 ±0.2 (0.292 ±0.008)	6.9 ±0.38 (0.272 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
4O	7.9 ±0.38 (0.311 ±0.015)	12.2 ±0.4 (0.48 ±0.016)	8.9 ±0.38 (0.350 ±0.015)	10.5 ±0.4 (0.413 ±0.016)	6.6 ±0.38 (0.260± 0.015)	1.4±0.38 (0.055 ± 0.015)



TSP6

KEMET 6 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
6B	4.1 ±0.38 (0.162 ±0.015)	6.1 ±0.2 (0.242 ±0.008)	6.3 ±0.38 (0.248 ±0.015)	5.3 ±0.2 (0.210 ±0.008)	5.3 ±0.38 (0.210 ±0.015)	0.76 ±0.38 (0.030 ±0.015)
6D	8.0 ±0.38 (0.315 ±0.015)	8.9 ±0.2 (0.350 ±0.008)	9.2 ±0.38 (0.365 ±0.015)	7.4 ±0.2 (0.292 ±0.008)	7.7 ±0.38 (0.304 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
6X	8.0 ±0.38 (0.315 ±0.015)	8.9 ±0.2 (0.350 ±0.008)	13.3 ±0.38 (0.525 ±0.015)	7.4 ±0.2 (0.292 ±0.008)	11.0 ±0.38 (0.436 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
6O	8.0± 0.38 (0.315 ±0.015)	12.2 ±0.4 (0.48 ±0.016)	13.3 ±0.38 (0.525 ±0.015)	10.5 ±0.4 (0.413 ±0.016)	11.0 ±0.38 (0.436 ±0.015)	1.4±0.38 (0.055 ± 0.015)

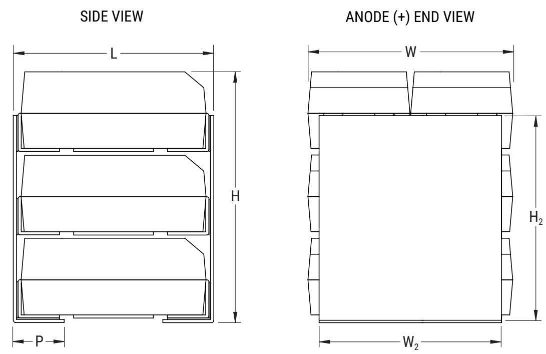


Table 1A – TSP2 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Ultra Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
4	200	2B	TSP2B207(4)004(6)(3)(1)10(5)540	80	8	40	N/A	N/A	125
6.3	130	2B	TSP2B137(4)006(6)(3)(1)10(5)540	86	8	40	N/A	N/A	125
10	66	2B	TSP2B666(4)010(6)(3)(1)10(5)540	66	8	40	N/A	N/A	125
3	660	2D	TSP2D667(4)003(6)(3)(1)10(5)540	198	10	13	N/A	N/A	125
3	1400	2D	TSP2D148(4)003(6)(3)(1)10(5)540	408	10	13	N/A	N/A	125
4	440	2D	TSP2D447(4)004(6)(3)(1)10(5)540	176	10	13	N/A	N/A	125
4	940	2D	TSP2D947(4)004(6)(3)(1)(2)(5)540	376	10	20	13	N/A	125
6.3	660	2D	TSP2D667(4)006(6)(3)(1)(2)(5)540	416	10	20	13	N/A	125
10	200	2D	TSP2D207(4)010(6)(3)(1)(2)(5)540	200	10	28	13	N/A	125
10	300	2D	TSP2D307(4)010(6)(3)(1)(2)(5)540	300	10	28	13	N/A	125
10	440	2D	TSP2D447(4)010(6)(3)(1)10(5)540	440	10	13	N/A	N/A	125
16	94	2D	TSP2D946(4)016(6)(3)(1)(2)(5)540	152	10	33	18	N/A	125
4	1,300	2X	TSP2X138(4)004(6)(3)(1)(2)(5)541	520	10	5	3	N/A	125
4	2,000	2X	TSP2X208(4)004(6)(3)(1)(2)(5)541	800	10	5	3	N/A	125
6.3	940	2X	TSP2X947(4)006(6)(3)(1)(2)(5)541	564	10	5	3	N/A	125
10	660	2X	TSP2X667(4)010(8)(3)(1)(2)(5)541	660	10	5	3	N/A	125
16	300	2X	TSP2X307(4)016(6)(3)(1)(2)(5)541	480	10	20	12	N/A	125
16	440	2X	TSP2X447(4)016(6)(3)(1)(2)(5)541	704	10	20	12	N/A	125
16	660	2X	TSP2X667(4)016(6)(3)(1)(2)(5)541	1,056	10	25	12	N/A	125
25	130	2X	TSP2X137(4)025(6)(3)(1)10(5)541	325	10	25	N/A	N/A	125
35	66	2X	TSP2X666(4)035(8)(3)(1)10(5)541	231	10	30	N/A	N/A	125
35	94	2X	TSP2X946(4)035(8)(3)(1)10(5)541	329	10	30	N/A	N/A	125
50	44	2X	TSP2X446(4)050(8)(3)(1)10(5)541	220	10	40	N/A	N/A	125
50	66	2X	TSP2X666(4)050(8)(3)(1)10(5)541	330	10	40	N/A	N/A	125
63	20	2X	TSP2X206(4)063(8)(3)(1)(2)(5)541	126	10	75	50	N/A	125
63	30	2X	TSP2X306(4)063(8)(3)(1)10(5)541	189	10	25	N/A	N/A	125

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

Table 1A – TSP2 Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Ultra Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	4,000	20	TSP20408M003(6)(3)(1)10(9)541	1,200	10	7	N/A	N/A	125
4	3,000	20	TSP20308M004(6)(3)(1)10(9)541	1,200	10	7	N/A	N/A	125
6.3	2,000	20	TSP20208M006(6)(3)(1)10(9)541	1,260	10	8	N/A	N/A	125
10	1,300	20	TSP20138M010(6)(3)(1)10(9)541	1,300	10	10	N/A	N/A	125
16	940	20	TSP20947M016(6)(3)(1)(2)(9)541	1,504	10	25	15	N/A	125
25	300	20	TSP20307M025(6)(3)(1)10(9)541	750	10	25	N/A	N/A	125
30	300	20	TSP20307M030(8)(3)(1)(2)(9)541	900	10	30	20	N/A	125
35	**130**	**20**	**TSP20137M035(8)(3)(1)10(9)541**	**455**	**10**	**25**	**N/A**	**N/A**	**125**
50	**94**	**20**	**TSP20946M050(8)(3)(1)10(9)541**	**470**	**10**	**35**	**N/A**	**N/A**	**125**
63	**44**	**20**	**TSP20446M063(8)(3)(1)10(9)541**	**277**	**10**	**25**	**N/A**	**N/A**	**125**
3	4,000	20	TSP20408M003A(3)(7)010(9)543	1,200	10	7	N/A	N/A	105
4	3,000	20	TSP20308M004A(3)(7)010(9)543	1,200	10	7	N/A	N/A	105
6.3	2,000	20	TSP20208M006A(3)(7)015(9)543	1,260	10	10	N/A	N/A	105
6.3	2,000	20	TSP20208M006A(3)(7)010(9)543	1,260	10	N/A	7	N/A	105
10	1,300	20	TSP20138M010A(3)(7)015(9)543	1,300	10	10	N/A	N/A	105
16	940	20	TSP20947M016A(3)(7)040(9)543	1,504	10	25	N/A	N/A	105
16	940	20	TSP20947M016A(3)(7)020(9)543	1,504	10	N/A	15	N/A	105
25	300	20	TSP20307M025A(3)(7)045(9)543	750	10	25	N/A	N/A	105
30	300	20	TSP20307M030A(3)(7)055(9)543	900	10	30	N/A	N/A	105
30	300	20	TSP20307M030A(3)(7)045(9)543	900	10	N/A	25	N/A	105
30	300	20	TSP20307M030A(3)(7)030(9)543	900	10	N/A	N/A	20	105
35	130	20	TSP20137M035A(3)(7)045(9)543	455	10	25	N/A	N/A	105
35	130	20	TSP20137M035A(3)(7)025(9)543	455	10	N/A	15	N/A	105
40	140	20	TSP20147M040A(3)(7)035(9)543	560	10	20	N/A	N/A	105
50	94	20	TSP20946M050A(3)(7)060(9)543	470	10	35	N/A	N/A	105
63	44	20	TSP20446M063A(3)(7)040(9)543	277	10	25	N/A	N/A	105
63	44	20	TSP20446M063A(3)(7)030(9)543	277	10	N/A	20	N/A	105

((1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.
Part numbers marked in blue font are under development.

Table 1B – TSP3 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	450	3B	TSP3B457(4)003(6)(3)(1)10(5)540	135	8	27	N/A	125
4	300	3B	TSP3B307(4)004(6)(3)(1)10(5)540	120	8	27	N/A	125
6.3	200	3B	TSP3B207(4)006(6)(3)(1)10(5)540	129	8	27	N/A	125
10	99	3B	TSP3B996(4)010(6)(3)(1)10(5)540	99	8	27	N/A	125
3	2,000	3D	TSP3D208(4)003(6)(3)(1)10(5)540	612	10	9	N/A	125
4	1,400	3D	TSP3D148(4)004(6)(3)(1)(2)(5)540	564	10	14	9	125
6.3	990	3D	TSP3D997(4)006(6)(3)(1)(2)(5)540	624	10	14	9	125
10	660	3D	TSP3D667(4)010(6)(3)(1)10(5)540	660	10	9	N/A	125
16	140	3D	TSP3D147(4)016(6)(3)(1)(2)(5)540	226	10	22	12	125
4	2,000	3X	TSP3X208(4)004(6)(3)(1)(2)(5)541	800	10	3	2	125
4	3,000	3X	TSP3X308(4)004(6)(3)(1)(2)(5)541	1,200	10	3	2	125
6.3	1,400	3X	TSP3X148(4)006(6)(3)(1)(2)(5)541	840	10	3	2	125
10	990	3X	TSP3X997(4)010(8)(3)(1)(2)(5)541	990	10	3	2	125
16	450	3X	TSP3X457(4)016(6)(3)(1)(2)(5)541	720	10	15	9	125
16	660	3X	TSP3X667(4)016(6)(3)(1)(2)(5)541	1,056	10	15	9	125
16	990	3X	TSP3X997(4)016(6)(3)(1)(2)(5)541	1,584	10	18	9	125
25	200	3X	TSP3X207(4)025(6)(3)(1)10(5)541	500	10	18	N/A	125
35	100	3X	TSP3X107(4)035(8)(3)(1)10(5)541	350	10	20	N/A	125
35	140	3X	TSP3X147(4)035(8)(3)(1)10(5)541	490	10	20	N/A	125
50	66	3X	TSP3X666(4)050(8)(3)(1)10(5)541	330	10	25	N/A	125
50	100	3X	TSP3X107(4)050(8)(3)(1)10(5)541	500	10	25	N/A	125
63	30	3X	TSP3X306(4)063(8)(3)(1)(2)(5)541	189	10	50	35	125
63	45	3X	TSP3X456(4)063(8)(3)(1)10(5)541	283.5	10	18	N/A	125

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

Table 1B – TSP3 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	6,000	30	TSP30608M003(6)(3)(1)10(9)541	1,800	10	5	N/A	125
4	4,500	30	TSP30458M004(6)(3)(1)10(9)541	1,800	10	5	N/A	125
6.3	3,000	30	TSP30308M006(6)(3)(1)10(9)541	1,890	10	6	N/A	125
10	2,000	30	TSP30208M010(6)(3)(1)10(9)541	2,040	10	7	N/A	125
16	1,400	30	TSP30148M016(6)(3)(1)(2)(9)541	2,256	10	15	9	125
25	450	30	TSP30457M025(6)(3)(1)10(9)541	1,125	10	17	N/A	125
30	450	30	TSP30457M030(6)(3)(1)(2)(9)541	1,350	10	20	12	125
35	130	30	TSP30137M035(6)(3)(1)10(9)541	714	10	17	N/A	125
50	94	30	TSP30946M050(6)(3)(1)10(9)541	705	10	22	N/A	125
3	6,000	30	TSP30608M003A(3)(7)010(9)543	1,800	10	5	N/A	105
4	4,500	30	TSP30458M004A(3)(7)010(9)543	1,800	10	5	N/A	105
6.3	3,000	30	TSP30308M006A(3)(7)010(9)543	1,890	10	8	N/A	105
6.3	3,000	30	TSP30308M006A(3)(7)015(9)543	1,890	10	7	N/A	105
10	2,000	30	TSP30208M010A(3)(7)015(9)543	2,040	10	7	N/A	105
16	1,400	30	TSP30148M016A(3)(7)020(9)543	2,256	10	9	N/A	105
16	1,400	30	TSP30148M016A(3)(7)040(9)543	2,256	10	15	N/A	105
25	450	30	TSP30457M025A(3)(7)045(9)543	1,125	10	17	N/A	105
30	450	30	TSP30457M030A(3)(7)030(9)543	1350	10	12	N/A	105
30	450	30	TSP30457M030A(3)(7)045(9)543	1350	10	17	N/A	105
30	450	30	TSP30457M030A(3)(7)055(9)543	1350	10	20	N/A	105
35	200	30	TSP30207M035A(3)(7)025(9)543	714	10	10	N/A	105
35	200	30	TSP30207M035A(3)(7)045(9)543	714	10	17	N/A	105
40	200	30	TSP30207M040A(3)(7)035(9)543	816	10	14	N/A	105
40	240	30	TSP30247M040A(3)(7)055(9)543	984	10	20	N/A	105
50	140	30	TSP30147M050A(3)(7)060(9)543	705	10	22	N/A	105

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

Table 1C – TSP4 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Ultra Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	600	4B	TSP4B607(4)003(6)(3)(1)10(5)540	180	8	20	N/A	N/A	125
4	400	4B	TSP4B407(4)004(6)(3)(1)10(5)540	160	8	20	N/A	N/A	125
6.3	270	4B	TSP4B277(4)006(6)(3)(1)10(5)540	172	8	20	N/A	N/A	125
10	130	4B	TSP4B137(4)010(6)(3)(1)10(5)540	132	8	20	N/A	N/A	125
3	2,700	4D	TSP4D278(4)003(6)(3)(1)10(5)540	816	10	7	N/A	N/A	125
4	880	4D	TSP4D887(4)004(6)(3)(1)10(5)540	352	10	7	N/A	N/A	125
4	1,900	4D	TSP4D198(4)004(6)(3)(1)(2)(5)540	752	10	10	7	N/A	125
6.3	1,300	4D	TSP4D138(4)006(6)(3)(1)(2)(5)540	832	10	10	7	N/A	125
10	400	4D	TSP4D407(4)010(6)(3)(1)(2)(5)540	400	10	14	7	N/A	125
10	880	4D	TSP4D887(4)010(6)(3)(1)10(5)540	880	10	7	N/A	N/A	125
16	190	4D	TSP4D197(4)016(6)(3)(1)(2)(5)540	301	10	17	9	N/A	125
4	2,700	4X	TSP4X278(4)004(6)(3)(1)(2)(5)541	1,080	10	3	2	N/A	125
4	4,000	4X	TSP4X408(4)004(6)(3)(1)(2)(5)541	1,600	10	3	2	N/A	125
6.3	1,900	4X	TSP4X198(4)006(6)(3)(1)(2)(5)541	1,140	10	3	2	N/A	125
10	1,300	4X	TSP4X138(4)010(8)(3)(1)(2)(5)541	1,300	10	3	2	N/A	125
16	600	4X	TSP4X607(4)016(6)(3)(1)(2)(5)541	960	10	10	8	N/A	125
16	880	4X	TSP4X887(4)016(6)(3)(1)(2)(5)541	1,408	10	10	8	N/A	125
16	1,300	4X	TSP4X138(4)016(6)(3)(1)(2)(5)541	2,080	10	12	8	N/A	125
25	260	4X	TSP4X267(4)025(6)(3)(1)10(5)541	650	10	12	N/A	N/A	125
35	130	4X	TSP4X137(4)035(8)(3)(1)10(5)541	455	10	15	N/A	N/A	125
35	190	4X	TSP4X197(4)035(8)(3)(1)10(5)541	665	10	15	N/A	N/A	125
50	88	4X	TSP4X886(4)050(8)(3)(1)10(5)541	440	10	20	N/A	N/A	125
50	130	4X	TSP4X137(4)050(8)(3)(1)10(5)541	650	10	20	N/A	N/A	125
63	40	4X	TSP4X406(4)063(8)(3)(1)(2)(5)541	252	10	40	25	N/A	125
63	60	4X	TSP4X606(4)063(8)(3)(1)10(5)541	378	10	12	N/A	N/A	125

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

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Table 1C – TSP4 Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Ultra Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	8,000	40	TSP40808M003(6)(3)(1)10(9)541	2,400	10	5	N/A	N/A	125
4	6,000	40	TSP40608M004(6)(3)(1)10(9)541	2,400	10	5	N/A	N/A	125
6.3	4,000	40	TSP40408M006(6)(3)(1)10(9)541	2,520	10	5	N/A	N/A	125
10	2,700	40	TSP40278M010(6)(3)(1)10(9)541	2,700	10	6	N/A	N/A	125
16	1,900	40	TSP40198M016(6)(3)(1)(2)(9)541	3,040	10	15	7	N/A	125
25	600	40	TSP40607M025(6)(3)(1)10(9)541	1,500	10	15	N/A	N/A	125
30	600	40	TSP40607M030(8)(3)(1)(2)(9)541	1,800	10	20	10	N/A	125
35	270	40	TSP40277M035(8)(3)(1)10(9)541	952	10	15	N/A	N/A	125
50	190	40	TSP40197M050(8)(3)(1)10(9)541	950	10	20	N/A	N/A	125
63	88	40	TSP40886M063(8)(3)(1)10(9)541	554	10	15	N/A	N/A	125
3	8,000	40	TSP40808M003A(3)(7)010(9)543	2,400	10	5	N/A	N/A	105
4	6,000	40	TSP40608M004A(3)(7)010(9)543	2,400	10	5	N/A	N/A	105
6.3	4,000	40	TSP40408M006A(3)(7)015(9)543	2,520	10	6	N/A	N/A	105
6.3	4,000	40	TSP40408M006A(3)(7)010(9)543	2,520	10	N/A	5	N/A	105
10	2,700	40	TSP40278M010A(3)(7)010(9)543	2,700	10	6	N/A	N/A	105
16	1,900	40	TSP40198M016A(3)(7)040(9)543	3,040	10	15	N/A	N/A	105
16	1,900	40	TSP40198M016A(3)(7)020(9)543	3,040	10	N/A	7	N/A	105
25	600	40	TSP40607M025A(3)(7)045(9)543	1,500	10	15	N/A	N/A	105
30	600	40	TSP40607M030A(3)(7)055(9)543	1,800	10	20	N/A	N/A	105
30	600	40	TSP40607M030A(3)(7)045(9)543	1,800	10	N/A	15	N/A	105
30	600	40	TSP40607M030A(3)(7)030(9)543	1,800	10	N/A	N/A	10	105
35	270	40	TSP40277M035A(3)(7)045(9)543	952	10	15	N/A	N/A	105
35	270	40	TSP40277M035A(3)(7)025(9)543	952	10	N/A	8	N/A	105
40	270	40	TSP40277M040A(3)(7)035(9)543	1,080	10	15	N/A	N/A	105
50	190	40	TSP40197M050A(3)(7)060(9)543	950	10	20	N/A	N/A	105
63	88	40	TSP40886M063A(3)(7)040(9)543	554	10	15	N/A	N/A	105
63	88	40	TSP40886M063A(3)(7)030(9)543	554	10	N/A	10	N/A	105

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.
Part numbers marked in blue font are under development.

Table 1D – TSP6 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Maximum Operating Temp
VDC at 105°C	μF	KEMET/EIA	(See below for part options)	μA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	900	6B	TSP6B907(4)003(6)(3)(1)10(5)540	270	8	14	N/A	125
4	600	6B	TSP6B607(4)004(6)(3)(1)10(5)540	240	8	14	N/A	125
6.3	400	6B	TSP6B407(4)006(6)(3)(1)10(5)540	258	8	14	N/A	125
10	200	6B	TSP6B207(4)010(6)(3)(1)10(5)540	198	8	14	N/A	125
3	4,100	6D	TSP6D418(4)003(6)(3)(1)10(5)540	1,224	10	5	N/A	125
4	2,800	6D	TSP6D288(4)004(6)(3)(1)(2)(5)540	1,128	10	7	5	125
6.3	2,000	6D	TSP6D208(4)006(6)(3)(1)(2)(5)540	1,248	10	7	5	125
10	900	6D	TSP6D907(4)010(6)(3)(1)(2)(5)540	900	10	10	5	125
10	1,300	6D	TSP6D138(4)010(6)(3)(1)10(5)540	1,320	10	5	N/A	125
16	280	6D	TSP6D287(4)016(6)(3)(1)(2)(5)540	452	10	11	6	125
4	4,000	6X	TSP6X408(4)004(6)(3)(1)(2)(5)541	1,600	10	2	1	125
4	6,000	6X	TSP6X608(4)004(6)(3)(1)(2)(5)541	2,400	10	2	1	125
6.3	2,800	6X	TSP6X288(4)006(6)(3)(1)(2)(5)541	1,680	10	2	1	125
10	2,000	6X	TSP6X208(4)010(8)(3)(1)(2)(5)541	2,000	10	2	1	125
16	900	6X	TSP6X907(4)016(6)(3)(1)(2)(5)541	1,440	10	8	5	125
16	1,300	6X	TSP6X138(4)016(6)(3)(1)(2)(5)541	2,080	10	8	5	125
16	2,000	6X	TSP6X208(4)016(6)(3)(1)(2)(5)541	3,200	10	9	5	125
25	400	6X	TSP6X407(4)025(6)(3)(1)10(5)541	1,000	10	9	N/A	125
35	200	6X	TSP6X207(4)035(8)(3)(1)10(5)541	700	10	10	N/A	125
35	280	6X	TSP6X287(4)035(8)(3)(1)10(5)541	980	10	10	N/A	125
50	130	6X	TSP6X137(4)050(8)(3)(1)10(5)541	650	10	12	N/A	125
50	200	6X	TSP6X207(4)050(8)(3)(1)10(5)541	1,000	10	12	N/A	125
63	60	6X	TSP6X606(4)063(8)(3)(1)(2)(5)541	378	10	25	20	125
63	90	6X	TSP6X906(4)063(8)(3)(1)10(5)541	567	10	9	N/A	125

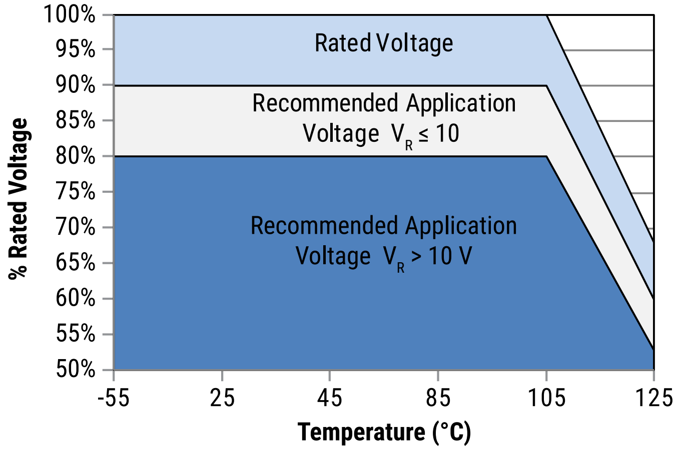
(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

Table 1D – TSP6 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	12,000	60	TSP60129M003(8)(3)(1)10(9)541	3,600	10	4	N/A	125
4	9,000	60	TSP60908M004(8)(3)(1)10(9)541	3,600	10	4	N/A	125
6.3	6,000	60	TSP60608M006(8)(3)(1)10(9)541	3,780	10	4	N/A	125
10	4,000	60	TSP60408M010(8)(3)(1)10(9)541	4,080	10	5	N/A	125
16	2,800	60	TSP60288M016(8)(3)(1)(2)(9)541	4,512	10	9	5	125
25	900	60	TSP60907M025(8)(3)(1)10(9)541	2,250	10	10	N/A	125
30	900	60	TSP60907M030(8)(3)(1)(2)(9)541	2,700	10	11	7	125
35	400	60	TSP60407M035(8)(3)(1)10(9)541	1,428	10	10	N/A	125
50	280	60	TSP60287M050(8)(3)(1)10(9)541	1,410	10	12	N/A	125
3	12,000	60	TSP60129M003A(3)(7)010(9)543	3,600	10	4	N/A	105
4	9,000	60	TSP60908M004A(3)(7)010(9)543	3,600	10	4	N/A	105
6.3	6,000	60	TSP60608M006A(3)(7)010(9)543	3,780	10	4	N/A	105
6.3	6,000	60	TSP60608M006A(3)(7)015(9)543	3,780	10	5	N/A	105
10	4,000	60	TSP60408M010A(3)(7)015(9)543	4,080	10	5	N/A	105
16	2,800	60	TSP60288M016A(3)(7)020(9)543	4,512	10	5	N/A	105
16	2,800	60	TSP60288M016A(3)(7)040(9)543	4,512	10	9	N/A	105
25	900	60	TSP60907M025A(3)(7)045(9)543	2,250	10	10	N/A	105
30	900	60	TSP60907M030A(3)(7)030(9)543	2,700	10	7	N/A	105
30	900	60	TSP60907M030A(3)(7)045(9)543	2,700	10	10	N/A	105
30	900	60	TSP60907M030A(3)(7)055(9)543	2,700	10	11	N/A	105
35	400	60	TSP60407M035A(3)(7)025(9)543	1,428	10	6	N/A	105
35	400	60	TSP60407M035A(3)(7)035(9)543	1,428	10	8	N/A	105
35	400	60	TSP60407M035A(3)(7)045(9)543	1,428	10	10	N/A	105
40	480	60	TSP60487M040A(3)(7)055(9)543	1,968	10	11	N/A	105
50	280	60	TSP60287M050A(3)(7)060(9)543	1,410	10	12	N/A	105

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

Derating Guidelines



Recommended Application Voltage
KO-CAPs are solid state capacitors that demonstrate no wearout mechanism when operated within their recommended guidelines. While the KO-CAP can be operated at full rated voltage, most circuit designers seek a minimum level of assurance in long term reliability, which should be demonstrated with data. A voltage derating can provide the desired level of demonstrated reliability based on industry accepted acceleration models. Since most applications do require long term reliability, KEMET recommends that designers consider a voltage derating, according the graphic above, for the maximum steady state voltage.

Voltage Rating	Maximum Recommended Steady State Voltage	
	−55°C to 105°C	105°C to 125°C
10 V ≤ V_R	90% of V_R	90% of V_R, See Chart
V_R > 10	80% of V_R	54% of V_R, See Chart

V_R = Rated Voltage

Reverse Voltage

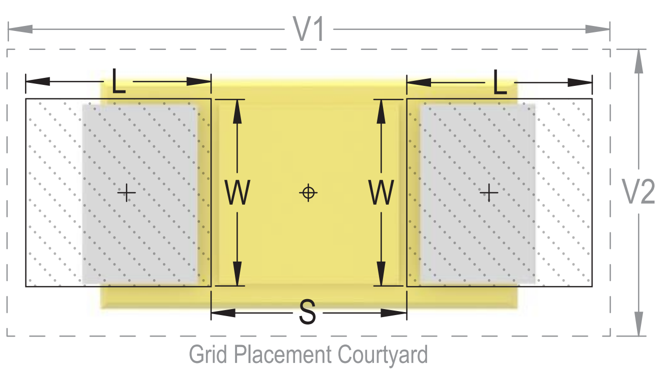
Solid electrolytic capacitors are polar devices and may be permanently damaged or destroyed if connected with the wrong polarity. The positive terminal is identified on the capacitor body by a stripe plus in some cases a beveled edge. A small degree of transient reverse voltage is permissible for short periods per the table. The capacitors should not be operated continuously in reverse mode, even within these limits.

Temperature	Permissible Transient Reverse Voltage
25°C	15% of Rated Voltage
85°C	5% of Rated Voltage
125°C	1% of Rated Voltage

Table 2 – Land Dimensions/Courtyard

KEMET	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	L	W	S	V1	V2	L	W	S	V1	V2	L	W	S	V1	V2
TSP2B	2.34	2.54	1.41	7.10	4.30	1.94	2.42	1.61	6.00	3.80	1.56	2.32	1.77	5.14	3.54
TSP2C	2.98	2.74	2.53	9.50	4.50	2.58	2.62	2.73	8.40	4.00	2.20	2.52	2.89	7.54	3.74
TSP2D	3.48	3.24	3.03	11.00	5.60	3.08	3.12	3.23	9.90	5.10	2.70	3.02	3.39	9.04	4.84
TSP2X	3.48	3.24	3.03	11.00	5.60	3.08	3.12	3.23	9.90	5.10	2.70	3.02	3.39	9.04	4.84
TSP2O	3.48	4.53	3.87	11.00	7.50	3.08	4.41	4.07	9.90	7.00	2.70	4.31	4.23	9.07	6.74
TSP3B	2.34	2.54	1.41	7.10	4.30	1.94	2.42	1.61	6.00	3.80	1.56	2.32	1.77	5.14	3.54
TSP3D	3.48	3.24	3.03	11.00	5.60	3.08	3.12	3.23	9.90	5.10	2.70	3.02	3.39	9.04	4.84
TSP3X	3.48	3.24	3.03	11.00	5.60	3.08	3.12	3.23	9.90	5.10	2.70	3.02	3.39	9.04	4.84
TSP3O	3.48	4.53	3.87	11.00	7.50	3.08	4.41	4.07	9.90	7.00	2.70	4.31	4.23	9.07	6.74
TSP4B	2.34	5.54	1.41	7.10	7.30	1.94	5.42	1.61	6.00	6.80	1.56	5.32	1.77	5.14	6.54
TSP4D	3.48	7.64	3.03	11.00	10.10	3.08	7.52	3.23	9.90	9.60	2.70	7.42	3.39	9.04	9.34
TSP4X	3.48	7.64	3.03	11.00	10.10	3.08	7.52	3.23	9.90	9.60	2.70	7.42	3.39	9.04	9.34
TSP4O	3.48	10.93	3.87	11.00	13.64	3.08	10.81	4.07	9.90	13.14	2.70	10.71	4.23	9.07	12.88
TSP6B	2.34	5.54	1.41	7.10	7.30	1.94	5.42	1.61	6.00	6.80	1.56	5.32	1.77	5.14	6.54
TSP6D	3.48	7.64	3.03	11.00	10.10	3.08	7.52	3.23	9.90	9.60	2.70	7.42	3.39	9.04	9.34
TSP6X	3.48	7.64	3.03	11.00	10.10	3.08	7.52	3.23	9.90	9.60	2.70	7.42	3.39	9.04	9.34
TSP6O	3.48	10.93	3.87	11.00	13.64	3.08	10.81	4.07	9.90	13.14	2.70	10.71	4.23	9.07	12.88

Density Level A: *For low-density Product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC-7351).*



Soldering Process

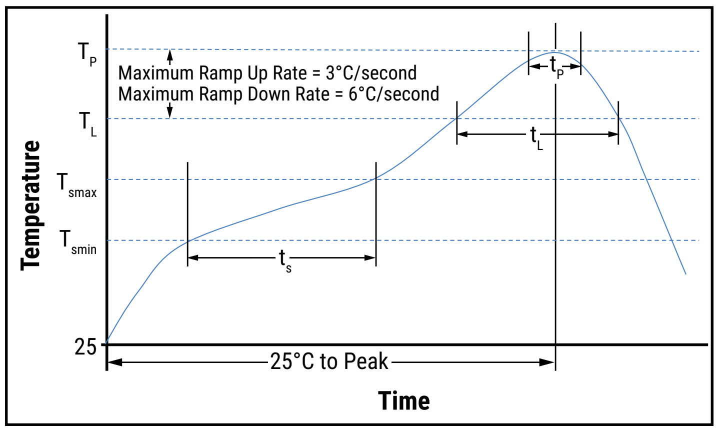
KEMET's families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/seconds maximum	3°C/seconds maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C	250°C
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/seconds maximum	6°C/seconds maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.



Storage

All KO-Cap Series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC).
These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J-STD-020 and packaged per IPC/JEDEC J–STD–033
MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity
Unused capacitors should be sealed in a MBB with fresh desiccant.
Calculated shelf life in sealed bag:
– 12 months from bag seal date in a storage environment of <40°C and humidity <90% RH
– 24 months from bag seal date in a storage environment of <30°C and humidity <70% RH
If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure

Packaging Information

KEMET Tantalum Stack Polymer (TSP) are packed in plastic trays
This packaging method is for manual board placement

Packaging Quantity

Case Code	Min pcs/tray	Max pcs/tray
2X	1	50
3X	1	50
4X	1	50
6X	1	50

X denotes the different stacks letter (B, C, D, X and O)

T528 Low ESL Polymer Electrolytic for CPU/GPU Decoupling

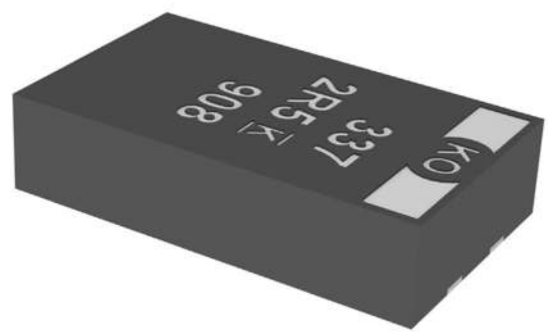
Overview

The KEMET Organic Capacitor (KO-CAP) is a solid electrolytic capacitor with a conductive polymer cathode capable of delivering very low ESR and improved capacitance retention at high frequencies. KO-CAP combines the low ESR of multilayer ceramic, the high capacitance of aluminum electrolytic, and the volumetric efficiency of tantalum into a single surface mount package. Unlike liquid electrolyte-based capacitors, KO-CAP has a very long operational life and high ripple current capabilities.

The T528 low ESL Facedown Terminal Polymer Electrolytic combines ultra-low ESR and high capacitance in a package design that offers the lowest ESL in the market. This series offers exceptional performance for high-speed microprocessor, FPGA, or ASIC decoupling designs. The T528 utilizes a unique termination design that allows for a reduction in the inductance loop area and comes in a low profile 1.7 mm case height. This series offers improved capacitance retention at frequencies of up to 1 MHz.

Benefits

- Low ESL < 0.7 nH at 20 MHz
- Improved volumetric efficiency
- High frequency capacitance retention
- 100% accelerated steady state aging
- 100% surge current tested
- EIA standard case sizes
- Halogen-free epoxy and RoHS compliant
- Lead free 260°C reflow capable



Applications

Typical applications include high speed server, microprocessor decoupling and high ripple current applications.

Environmental Compliance

RoHS Compliant when ordered with 100% Sn or Ni-Pd-Au.

- Halogen-free
- Epoxy compliant with UL94 V-0
- Molded Epoxy complies for outgassing testing under ASTM E 595.

Ordering Information

T	528	Z	337	M	2R5	A	T	E009	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR Code	Packaging (C-Spec)
T = Tantalum	528 = Low ESL Facedown Terminal Polymer	B W Z	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	002 = 2 2R5 = 2.5 004 = 4 006 = 6.3	A = N/A	T = 100% Matte Tin (Sn)-plated P = Ni-Pd-Au-plated	E = ESR last three digits specify ESR in mΩ (009 = 9 mΩ)	Blank = 7" reel 7280 = 13" reel

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	–55°C to 105°C
Rated Capacitance Range	150 – 470 µF at 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2 – 6.3 V
DF (120 Hz)	≤ 10% - Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.1 CV (µA) at rated voltage after 5 minutes

Qualification

Test	Condition		Characteristics			
Endurance	105°C at rated voltage, 2,000 hours		Δ C/C	Within −20/+10% of initial value		
			DF	≤ Initial Limit		
			DCL	Within 1.25 x initial limit		
			ESR	Within 2.0 x initial limit		
Storage Life	105°C at 0 volts, 2,000 hours		Δ C/C	Within −20/+10% of initial value		
			DF	Within initial limits		
			DCL	Within 1.25 x initial limit		
			ESR	Within 2.0 x initial limit		
Humidity	60°C, 90% RH, No Load, 500 hours		Δ C/C	Within −5/+35% of initial value		
			DF	≤ Initial limit		
			DCL	Within 5.0 x initial limit		
			ESR	Within 2.0 x initial limit		
Temperature Stability	Extreme temperature exposure at a succession of continuous steps at −55°C, +25°C, +85°C, +105°C		+25°C	−55°C	+85°C	+105°C
		Δ C/C	IL*	±20%	±20%	±30%
		DF	IL	IL	1.2 x IL	1.5 x IL
		DCL	IL	N/A	10 x IL	10 x IL
Surge Voltage	105°C, 1.32 x rated voltage 1,000 cycles		Δ C/C	Within −20/+10% of initial value		
			DF	Within initial limits		
			DCL	Within initial limits		
			ESR	Within initial limits		
Mechanical Shock/ Vibration	MIL-STD-202, Method 213, Condition I, 100 G peak MIL-STD-202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak		Δ C/C	Within ±10% of initial value		
			DF	Within initial limits		
			DCL	Within initial limits		

**IL = Initial limit*

Reliability

KO-CAP capacitors have an average failure rate of 0.5 %/1,000 hours at category voltage, U_C, and category temperature, T_C. These capacitors are qualified using industry test standards at U_C and T_C. The minimum test time (1,000 or 2,000 hours) is dependent on the product.

The actual life expectancy of KO-CAP capacitors increases when application voltage, U_A, and application temperature, T_A, are lower than U_C and T_C. As a general guideline, when $U_A < 0.9 * U_C$ and $T_A < 85°C$, the life expectancy will typically exceed the useful lifetime of most hardware (> 10 years).

The lifetime of a KO-CAP capacitor at a specific application voltage and temperature can be modeled using the equations below. A failure is defined as passing enough current to blow a 1-Amp fuse. The calculation is an estimation based on empirical results and is not a guarantee.

$$VAF = \left(\frac{U_C}{U_A}\right)^n$$

where:
VAF = acceleration factor due to voltage, unitless
U_C = category voltage, volt
U_A = application voltage, volt
n = exponent, 16

$$TAF = e^{\left[\frac{E_a}{k}\left(\frac{1}{273+T_A} - \frac{1}{273+T_C}\right)\right]}$$

where:
TAF = acceleration factor due to temperature, unitless
E_a = activation energy, 1.4 eV
k = Boltzmann's constant, 8.617E-5 eV/K
T_A = application temperature, °C
T_C = category temperature, °C

$$AF = VAF * TAF$$

where:
AF = acceleration factor, unitless
TAF = accerlation factor due to temperature, unitless
VAF = acceleration factor due to voltage, unitless

$$Life_{U_A,T_A} = Life_{U_C,T_C} * AF$$

where:
$Life_{UA,TA}$ = estimated life application voltage and temperature, years
$Life_{UC,TC}$ = guaranteed life category voltage and temperature, years
AF = acceleration factor, unitless

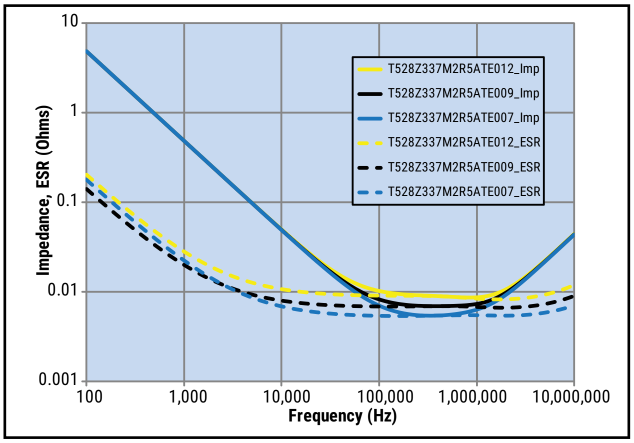
Reliability Table 1 – Common temperature range classifications

85°C (T_R)/ 85°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R)/ 105°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R)/ 125°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	1.7	2.7	4.2	5.4	6.7	8.4	10.7	13.4	16.8	23.5	33.5	42.2	50.3

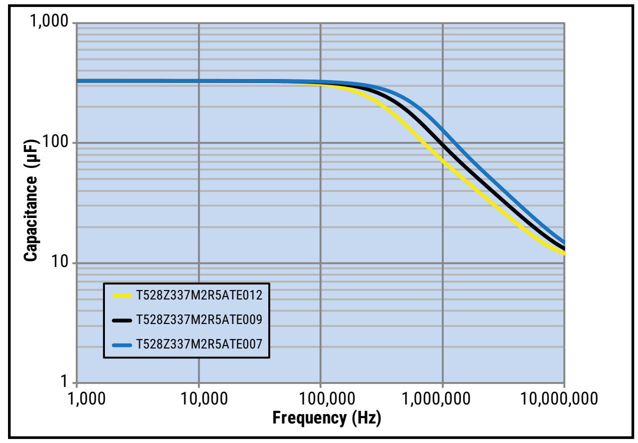
Terms:
Category Voltage, U_C: Maximum recommended peak DC operating voltage for continuous operation at the category temperature, T_C
Rated Voltage, U_R: Maximum recommended peak DC operating voltage for continuous operation up to the rated temperature, T_R
Category Temperature, T_C: Maximum recommended operating temperature; voltage derating may be required at T_C
Rated Temperature, T_R: Maximum recommended operating temperature without voltage derating; T_R is equal to or lower than T_C

Electrical Characteristics

ESR vs. Frequency

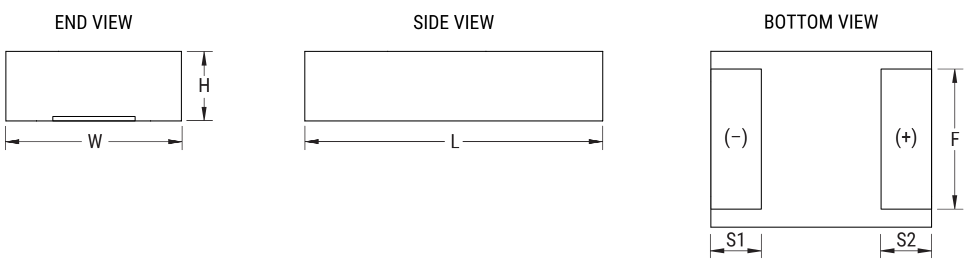


Capacitance vs. Frequency

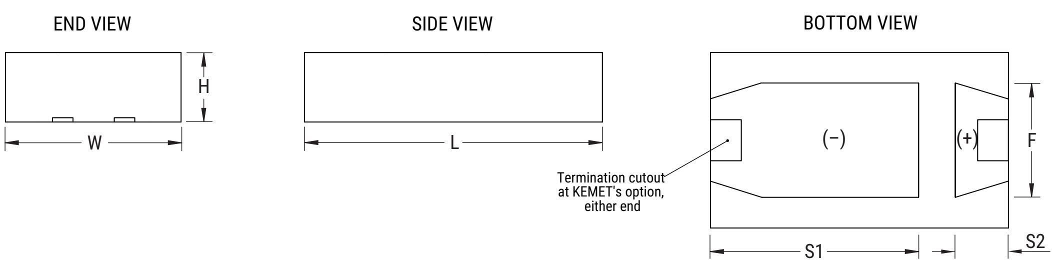


Dimensions – Millimeters

B Case



W and Z Cases



Case Size		Component Dimensions						Typical Weight
KEMET	EIA	L	W	H	F ±0.2	S1	S2	(mg)
B	3528–20	3.5 ±0.2	2.8 ±0.2	1.9 ±0.1	2.2	0.8 ±0.3	0.8 ±0.3	94.85
W	7343–15	7.3 ±0.4	4.3 ±0.3	1.4 ±0.1	2.8	5.0 ±0.4	1.3 ±0.2	222.95
Z	7343–17	7.3 ±0.4	4.3 ±0.3	1.6 ±0.1	2.8	5.0 ±0.4	1.3 ±0.2	206.33

These weights are provided as reference. If exact weights are needed, please contact your KEMET Sales Representative

Table 1 – Ratings & Part Number Reference

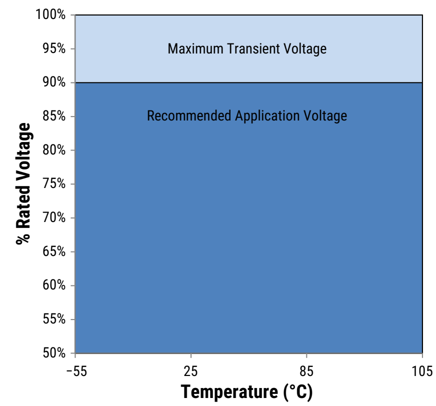
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at +25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
2	270	B/3528-20	T528B277M002APE006	54.0	8	6	3,900	3	105
2	270	B/3528-20	T528B277M002APE009	54.0	8	9	3,200	3	105
2.5	220	Z/7343-17	T528Z227M2R5ATE006	55.0	10	6	7,400	3	105
2.5	270	B/3528-20	T528B277M2R5APE006	67.5	10	6	3,900	3	105
2.5	270	B/3528-20	T528B277M2R5APE009	67.5	10	9	3,200	3	105
2.5	330	W/7343-15	T528W337M2R5ATE009	82.5	10	9	6,000	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE005	82.5	10	5	8,100	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE006	82.5	10	6	7,400	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE007	82.5	10	7	6,800	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE008	82.5	10	8	6,400	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE009	82.5	10	9	6,000	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE012	82.5	10	12	5,200	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE005	117.5	10	5	8,100	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE006	117.5	10	6	7,400	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE008	117.5	10	8	6,400	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE009	117.5	10	9	6,000	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE012	117.5	10	12	5,200	3	105
4	220	Z/7343-17	T528Z227M004ATE007	88.0	10	7	6,800	3	105
4	220	Z/7343-17	T528Z227M004ATE008	88.0	10	8	6,400	3	105
4	220	Z/7343-17	T528Z227M004ATE009	88.0	10	9	6,000	3	105
4	220	Z/7343-17	T528Z227M004ATE012	88.0	10	12	5,200	3	105
4	330	Z/7343-17	T528Z337M004ATE009	132.0	10	9	6,000	3	105
4	330	Z/7343-17	T528Z337M004ATE012	132.0	10	12	5,200	3	105
6.3	150	Z/7343-17	T528Z157M006ATE007	94.5	10	7	6,800	3	105
6.3	150	Z/7343-17	T528Z157M006ATE008	94.5	10	8	6,400	3	105
6.3	150	Z/7343-17	T528Z157M006ATE009	94.5	10	9	6,000	3	105
6.3	150	Z/7343-17	T528Z157M006ATE012	94.5	10	12	5,200	3	105
6.3	220	Z/7343-17	T528Z227M006ATE009	138.6	10	9	6,000	3	105
6.3	220	Z/7343-17	T528Z227M006ATE012	138.6	10	12	5,200	3	105
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at +25°C 100 kHz Maximum	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

Other part number options:
1- Standard with tin terminations (14th character = T). Tin/lead terminations is also available (14th character = H).
Also available on large (13 inch) reels. Add 7280 to the end of the part number.
Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Derating Guidelines

Voltage Rating	Maximum Recommended Steady State Voltage
−55°C to 105°C	
2 V ≤ V_R ≤ 6.3 V	90% of V_R

V_R = Rated Voltage



Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage which may be applied is limited by two criteria:

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage. See the Reverse Voltage section for allowable limits.

The maximum power dissipation by case size can be determined using the table at right. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Refer to the table below for temperature compensation requirements.

Temperature Compensation Multipliers for Maximum Ripple Current		
T ≤ 45°C	45° C < T ≤ 85°C	85°C < T ≤ 125°C
1.00	0.70	0.25

T = Environmental Temperature

The maximum power dissipation rating must be reduced with increasing environmental operating temperatures. Refer to the Temperature Compensation Multiplier table for details.

KEMET Case Code	EIA Case Code	Maximum Power Dissipation (Pmax) mWatts at 45°C with +30°C Rise
B	3528-20	127
W	7343-15	325
Z	7343-17	325

Using the P max of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{P\ max/R}$
$E(max) = Z\ \sqrt{P\ max/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
P max = maximum power dissipation (watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (ohms)

Reverse Voltage

Polymer electrolytic capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a small degree of transient voltage reversal for short periods as shown in the below table.

Temperature	Permissible Transient Reverse Voltage
25°C	15% of Rated Voltage
55°C	10% of Rated Voltage
85°C	5% of Rated Voltage
105°C	3% of Rated Voltage
125°C*	1% of Rated Voltage

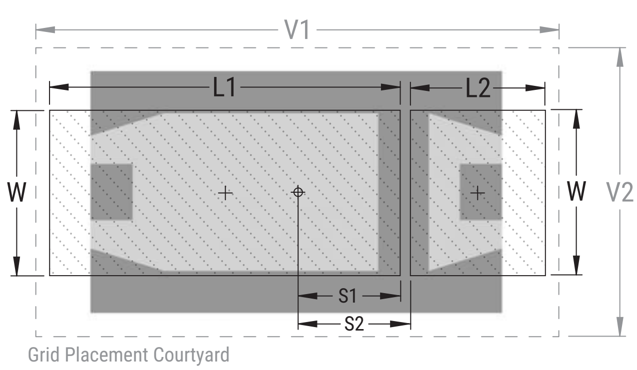
**For Series Rated to 125°C*

Table 2 – Land Dimensions/Courtyard

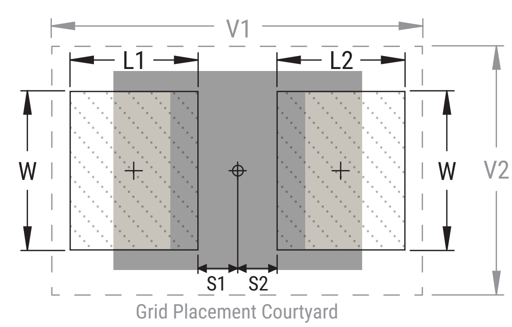
KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)							Density Level B: Median (Nominal) Land Protrusion (mm)							Density Level C: Minimum (Least) Land Protrusion (mm)						
Case	EIA	L1	L2	W	S1	S2	V1	V2	L1	L2	W	S1	S2	V1	V2	L1	L2	W	S1	S2	V1	V2
B	3528-20	2.20	2.20	2.35	0.46	0.46	6.32	4.00	1.80	1.80	2.23	0.56	0.56	5.22	3.50	1.42	1.42	2.13	0.64	0.64	4.36	3.24
W[1]	7343-15	6.48	2.68	3.04	-1.82	1.98	10.32	5.60	6.18	2.38	2.92	-1.82	1.98	9.22	5.10	5.82	2.02	2.82	-1.76	2.04	8.36	4.84
Z[1]	7343-17	6.48	2.68	3.04	-1.82	1.98	10.32	5.60	6.18	2.38	2.92	-1.82	1.98	9.22	5.10	5.82	2.02	2.82	-1.76	2.04	8.36	4.84

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] Negative values of S1 mean that pad lies at the center's right side.

W, Z Case



B Case



Soldering Process

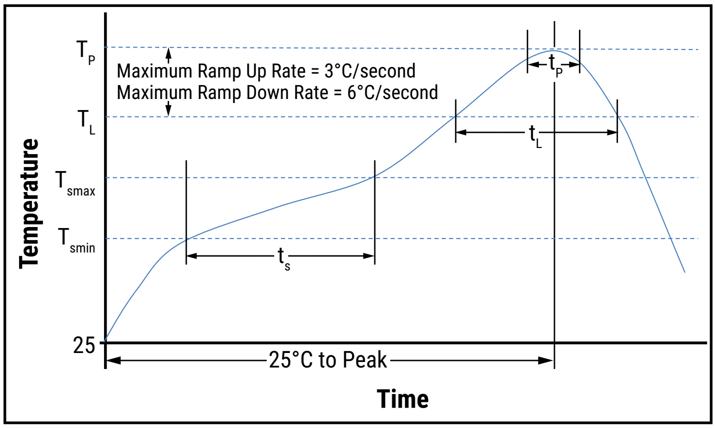
KEMET's families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/second maximum	3°C/second maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/second maximum	6°C/second maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



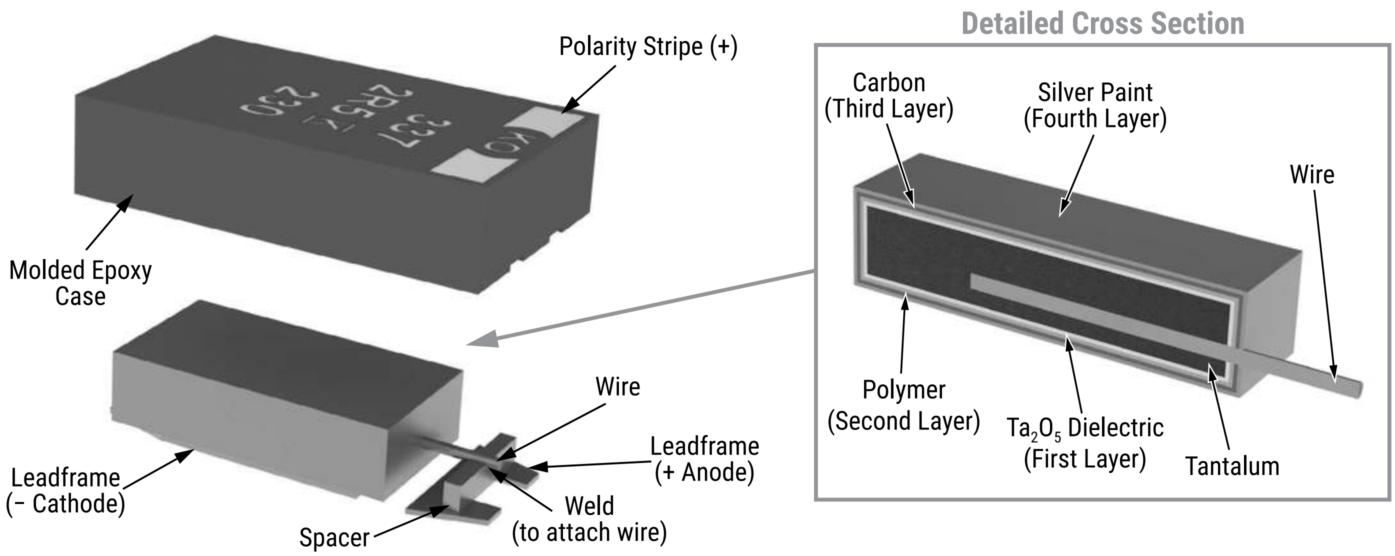
Storage

All KO-CAP series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J–STD–020 and packaged per IPC/JEDEC J–STD–033. MSL3 specifies a floor time of 168 H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

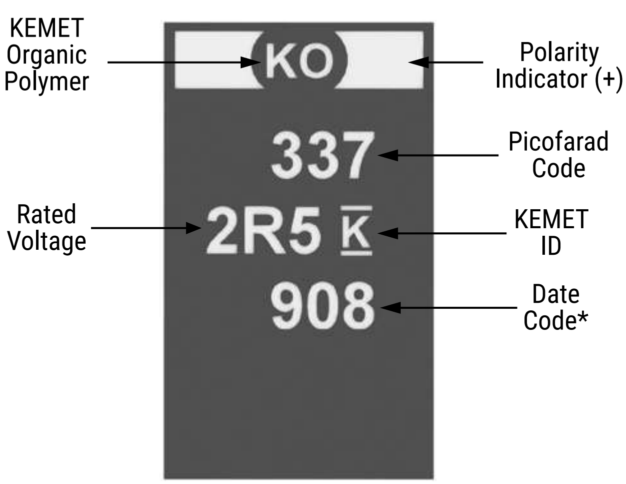
The calculated shelf life in a sealed bag would be 12 months from a bag seal date in a storage environment of < 40°C and humidity < 90% RH. It should be 24 months from a bag seal date in a storage environment of < 30°C and humidity < 70% RH.

If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure.

Construction



Capacitor Marking



* 908 = 8th week of 2019

Date Code *	
1st digit = last number of year	6 = 2016 7 = 2017 8 = 2018 9 = 2019 0 = 2020
2nd and 3rd digit = week of the year	01 = 1st week of the year to 52 = 52nd week of the year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

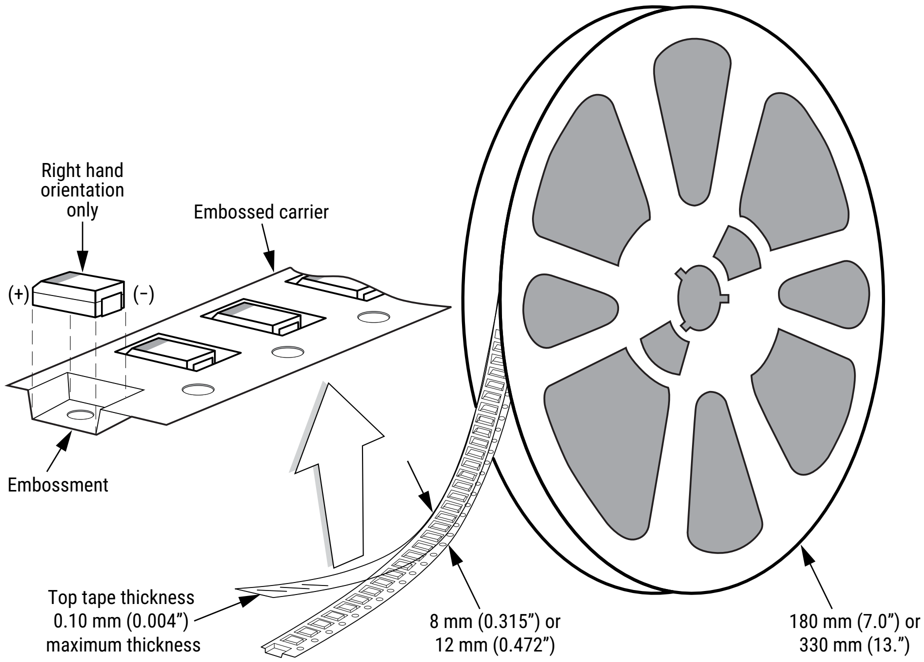


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
P	2012-10	8	3,000	N/A
R	2012-12	8	2,500	10,000
I	3216-10	8	3,000	N/A
S	3216-12	8	2,500	10,000
A	3216-18	8	2,000	N/A
T	3528-12	8	3,000	10,000
M	3528-15	8	2,500	8,000
B	3528-21	8	2,000	8,000
U	6032-15	12	1,000	5,000
L	6032-19	12	1,000	3,000
C	6032-28	12	500	3,000
Q	7343-12	12	1,000	3,000
W	7343-15	12	1,000	3,000
Z	7343-17	12	1,000	3,000
V	7343-19	12	1,000	3,000
D	7343-31	12	500	2,500
Y	7343-40	12	500	2,000
X	7343-43	12	500	2,000
J	7360-15	12	1,000	3,000
H	7360-20	12	1,000	3,000
O	7360-43	12	250	1,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

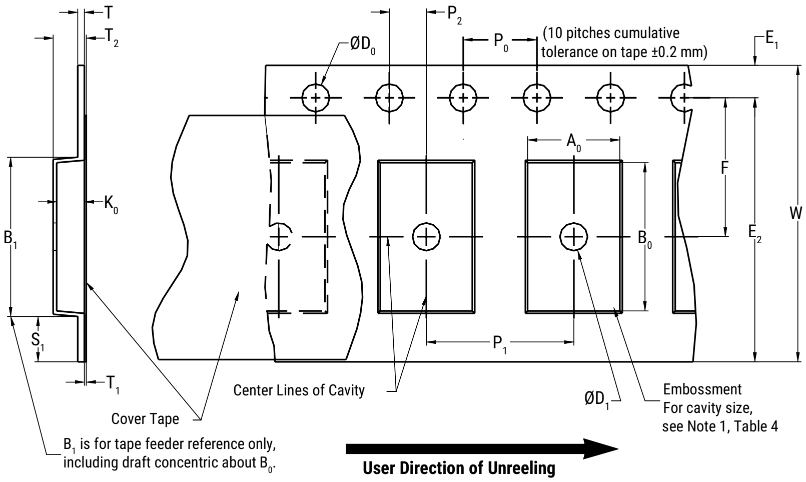


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/−0.0 (0.059 +0.004/−0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0, B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) and Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape, with or without components, shall pass around R without damage (see Figure 4).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
   (e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

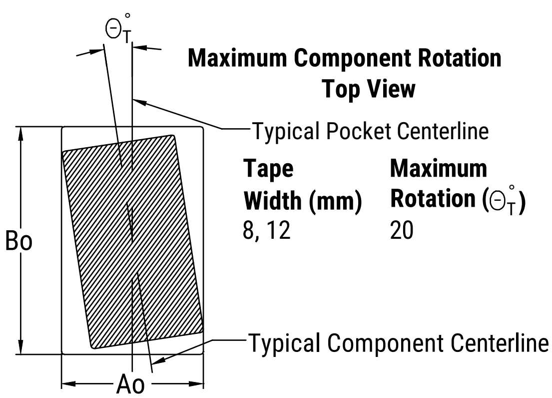
Packaging Information Performance Notes

1. Cover tape break force: 1.0 kg minimum.
2. Cover tape peel strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 newton (10 to 100 gf)
12 mm	0.1 to 1.3 newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624*.

Figure 2 – Maximum Component Rotation



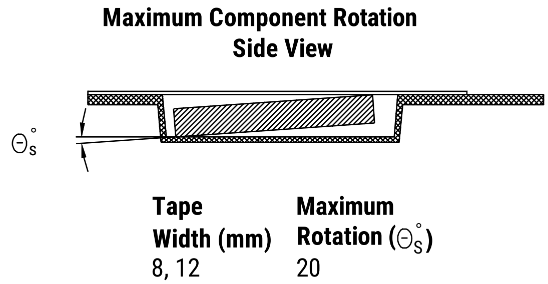


Figure 3 – Maximum Lateral Movement

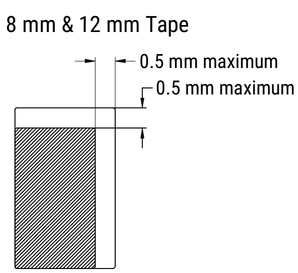


Figure 4 – Bending Radius

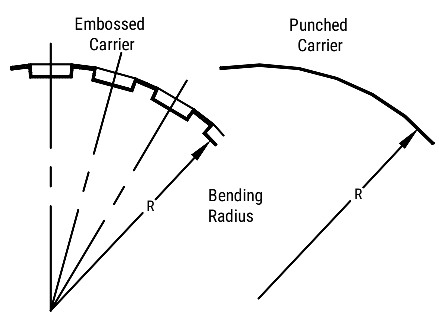
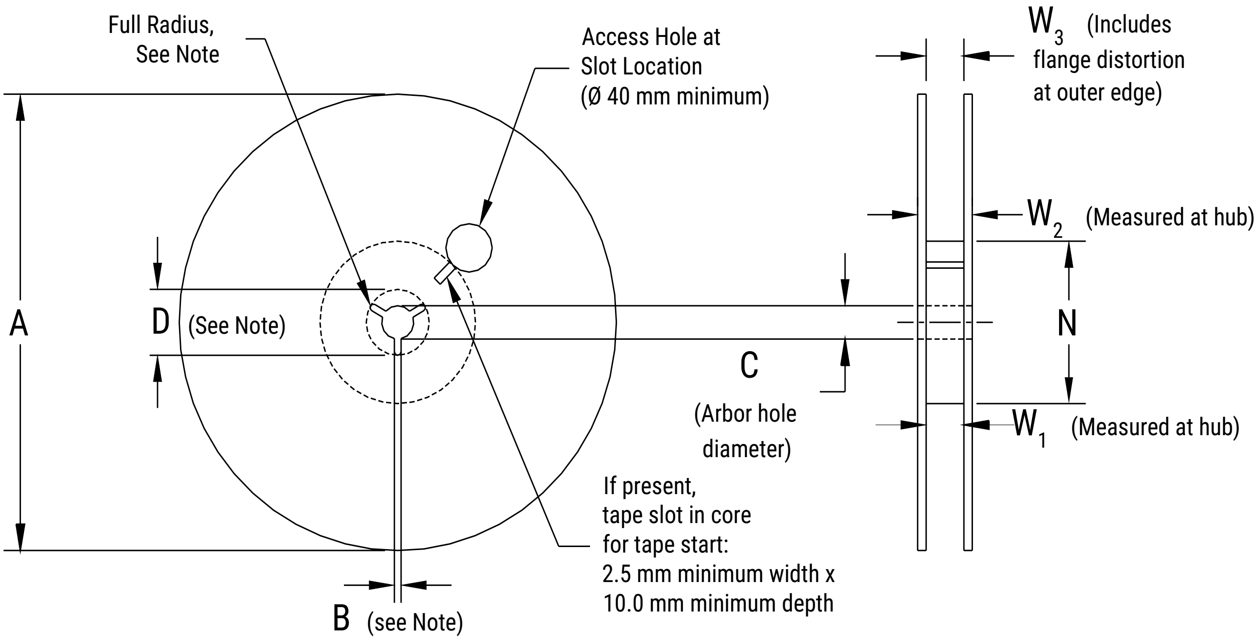


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
12 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

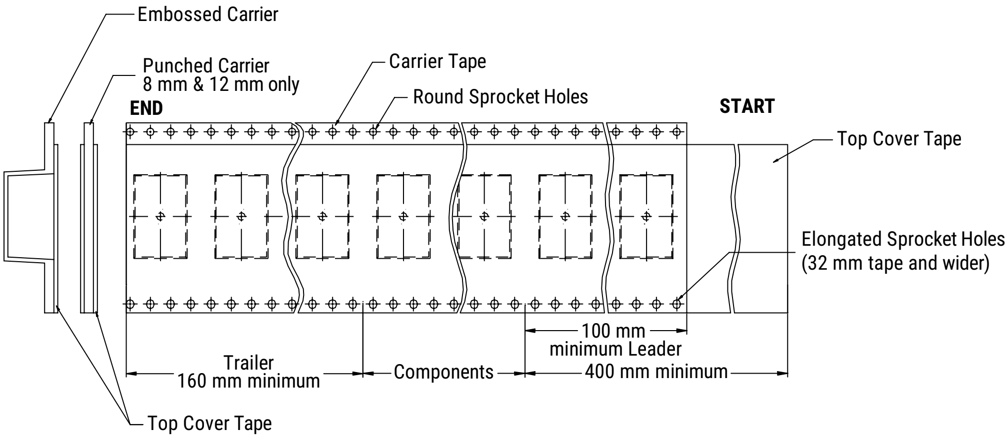
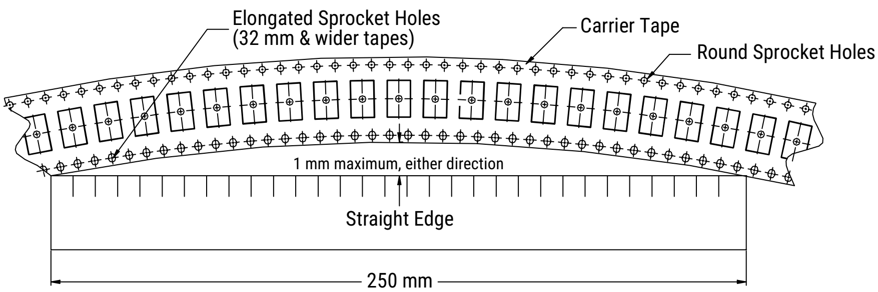


Figure 7 – Maximum Camber



A700 Polymer Aluminum, 2 – 35 VDC

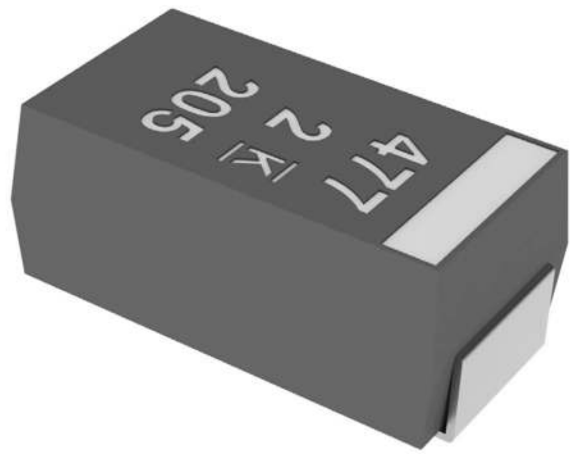
Overview

The KEMET Aluminum Organic Capacitor (AO-CAP) is a solid state aluminum capacitor. The cathode is a conductive organic polymer, which results in very low ESR and improved capacitance retention at high frequency. AO-CAPs may be operated at steady state voltages up to 100% of rated voltage without the need to de-rate.

Since there is no liquid electrolyte, the A700 offers long operational lifetimes, low ESR, and high operational temperatures. The inherent low ESR renders the A700 suitable for high ripple current handling. The small package size, high ripple current capability, high operating temperature, low parasistics, and high capacitance makes the A700 ideal for high performance microprocessor, FPGA, and ASIC decoupling designs.

Benefits

- ESR: 4.5 – 70 mΩ
- Polymer cathode technology
- Plus performance grade with extended life up to 3,000 hours at 125°C
- High frequency capacitance retention
- Non-ignition failure mode
- 100% accelerated steady state aging
- 100% surge current tested
- Volumetric efficiency
- Self-healing mechanism
- EIA standard case sizes



Applications

Typical applications include DC/DC converters, notebook PCs, telecommunications, displays, and industrial applications.

Environmental Compliance

- RoHS compliant when ordered with 100% Sn, Ni-Pd-Au or non-magnetic 100% Sn solder
- Halogen-free
- Epoxy compliant with UL94 V-0

Ordering Information

A	700	V	476	M	006	A	T	E018	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR Code	Packaging (C-Spec)
A = Aluminum	700 = Aluminum Polymer	D Q V W X	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	002 = 2 2R5 = 2.5 004 = 4 006 = 6.3 008 = 8 010 = 10 12R = 12.5 016 = 16 025 = 25 035 = 35	A = N/A	T = 100% Matte Tin (Sn)-plated	E = ESR Last three digits specify ESR in mΩ (018 = 18 mΩ)	Blank = 7" Reel 7280 = 13" Reel

A700 Plus Performance

A	700	V	477	M	002	P	T	E009	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR Code	Packaging (C-Spec)
A = Aluminum	700 = Aluminum Polymer	V	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	002 = 2	P = Plus Performance (Extended Life 3,000 hours/125°C)	T = 100% Matte Tin (Sn)-plated	E = ESR Last three digits specify ESR in mΩ (009 = 9 mΩ)	Blank = 7" Reel 7280 = 13" Reel

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to 105°C/125°C (Refer to part number for maximum temperature rating)
Rated Capacitance Range	6.8 – 560 µF at 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2 – 35 V
DF (120 Hz)	6%
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	Refer to Part Number Electrical Specification Table If there is any concern about leakage current, please perform pre-conditioning to the part following below conditions: * Temperature: 105°C maximum * Voltage: Rated Voltage * Series Resistor: 1,000 Ω * Charge Time: 1 hour minimum * Measuring: Discharge the capacitor(s), store them for 4 to 24 hours at room temperature and RH ≤ 60%

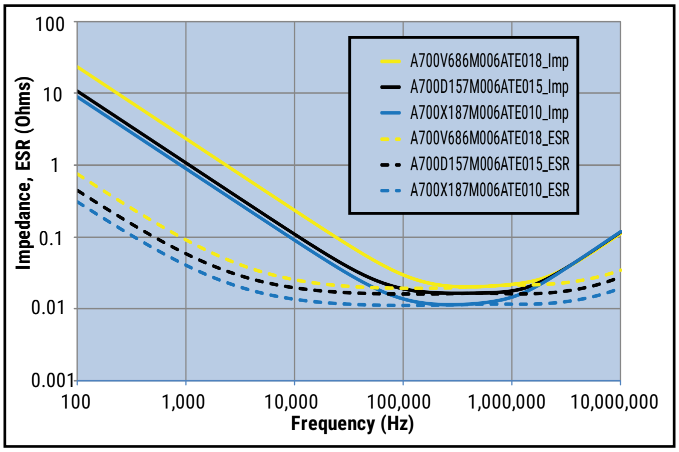
Qualification

<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">105°C/125°C[*2] at rated voltage, 2,000 hours[*3]</td><td>Δ C/C</td><td colspan="3">Within ±10%[*4] of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">105°C/125°C[*2] at 0 volts, 2,000 hours[*3]</td><td>Δ C/C</td><td colspan="3">Within ±10%[*4] of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Endurance Extended</td><td colspan="2" rowspan="4">A700 Plus Performance
125°C at rated voltage,
3,000 hours</td><td>Δ C/C</td><td colspan="3">Within ±30%</td></tr>
<tr><td>DF</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life Extended</td><td colspan="2" rowspan="4">A700 Plus Performance
125°C at 0 Volts,
3,000 hours</td><td>Δ C/C</td><td colspan="3">Within ±30%</td></tr>
<tr><td>DF</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="3">Humidity</td><td colspan="2" rowspan="3">60°C, 90% RH, 1,000 hours, rated voltage 60°C, 90% RH, 500 hours, no Load</td><td>Δ C/C</td><td colspan="3">Within −5/+30%[*5] of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 5.0 x initial limit</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at +25°C, −55°C, +85°C, +105°C/+125°C[*2]</td><td></td><td>+25°C</td><td>−55°C</td><td>+85°C</td><td>+105°C/125°C</td></tr>
<tr><td>Δ C/C</td><td>IL[*1]</td><td>±15%</td><td>±15%</td><td>±20%</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>1.2 x IL</td><td>1.5 x IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>10 x IL</td><td>10 x IL</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">105°C / 125°C[*2], 1.32 x rated voltage,
33 Ω resistance, 1,000 cycles</td><td>Δ C/C</td><td colspan="3">Within ±10%[*4] of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within initial limits</td></tr>
<tr><td rowspan="3">Mechanical Shock/
Vibration</td><td colspan="2" rowspan="3">MIL–STD–202, Method 213, Condition I, 100 G peak
MIL–STD–202, Method 204, Condition D,
10 Hz to 2,000 Hz, 20 G peak</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
</table>

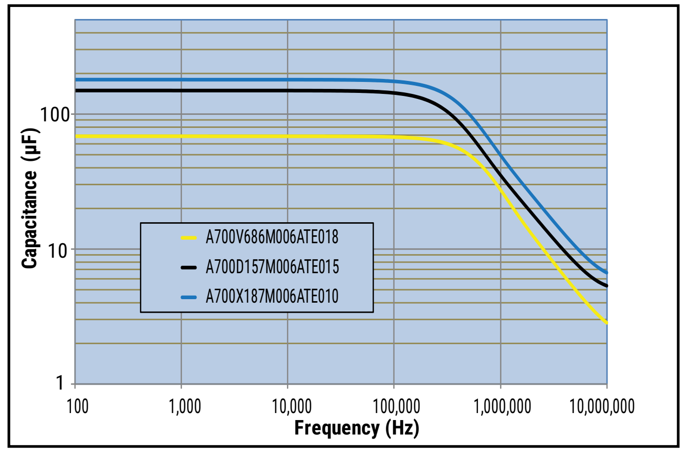
*[*1] IL = Initial Limit*
*[*2] Refer to part number specifications for individual temperature classification*
*[*3] For PN's: A700V337M002AT and A700V337M2R5AT test condition specification goes up to 1,000 hours*
*[*4] For PN's: A700V337M002AT, A700V337M2R5AT, and A700V477M002AT capacitance change is within ± 20 of intial value*
*[*5] For PN's: A700V337M002AT, A700V337M2R5AT, and A700V477M002AT capacitance change is within -30/+70% of intial value*

Electrical Characteristics

ESR vs. Frequency

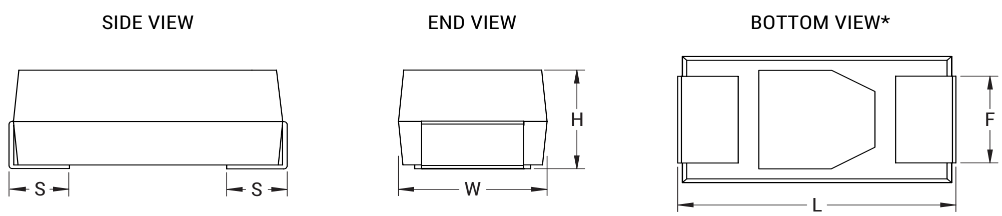


Capacitance vs. Frequency



Dimensions – Millimeters (Inches)

Metric will govern



**Glue pad shape is at KEMET's option*

Case Size		Component					Typical Weight
KEMET	EIA	L	W	H	F ±0.1 ±(0.004)	S ±0.3 ±(0.012)	(mg)
D	7343−31	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	2.8±0.3 (0.110±0.012)	2.4 (0.094)	1.3 (0.051)	196.58
V	7343−20	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	2.0 (0.079) Maximum*	2.4 (0.094)	1.3 (0.051)	132.72
W	7343−15	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	1.4±0.1 (0.055±0.004)	2.4 (0.094)	1.3 (0.051)	305.03
Q	7343−12	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	1.1±0.1 (0.043±0.004)	2.4 (0.094)	1.3 (0.051)	–
X	7343−43	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	4.0±0.3 (0.157±0.012)	2.4 (0.094)	1.3 (0.051)	305.03

Notes: (Ref) – Dimensions provided for reference only.
** Maximum Height is 2.1 for A700V477M002AT/A700V337M2R5AT*

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
2	100	V/7343-20	A700V107M002ATE016	12	6	16	4,100	3	125
2	100	V/7343-20	A700V107M002ATE018	12	6	18	3,900	3	125
2	100	V/7343-20	A700V107M002ATE025	12	6	25	3,300	3	125
2	100	V/7343-20	A700V107M002ATE028	12	6	28	3,100	3	125
2	150	V/7343-20	A700V157M002ATE015	18	6	15	4,200	3	125
2	150	V/7343-20	A700V157M002ATE018	18	6	18	3,900	3	125
2	150	V/7343-20	A700V157M002ATE025	18	6	25	3,300	3	125
2	150	V/7343-20	A700V157M002ATE028	18	6	28	3,100	3	125
2	180	D/7343-31	A700D187M002ATE015	22	6	15	4,100	3	125
2	180	D/7343-31	A700D187M002ATE018	22	6	18	3,700	3	125
2	220	Q/7343-12	A700Q227M002ATE009	44	6	9	5,900	3	105
2	220	W/7343-15	A700W227M002ATE006	26	6	6	6,900	3	105
2	220	W/7343-15	A700W227M002ATE009	26	6	9	5,700	3	105
2	220	V/7343-20	A700V227M002ATE009	26	6	9	5,500	3	125
2	220	V/7343-20	A700V227M002ATE015	26	6	15	4,200	3	125
2	220	V/7343-20	A700V227M002ATE018	26	6	18	3,900	3	125
2	220	D/7343-31	A700D227M002ATE009	26	6	9	5,300	3	125
2	220	D/7343-31	A700D227M002ATE012	26	6	12	4,600	3	125
2	220	D/7343-31	A700D227M002ATE015	26	6	15	4,100	3	125
2	220	D/7343-31	A700D227M002ATE018	26	6	18	3,700	3	125
2	270	X/7343-43	A700X277M002ATE010	32	6	10	4,700	3	125
2	270	X/7343-43	A700X277M002ATE012	32	6	12	4,300	3	125
2	270	X/7343-43	A700X277M002ATE015	32	6	15	3,900	3	125
2	330	V/7343-20	A700V337M002ATE4R5	40	6	4.5	7,750	3	125
2	330	V/7343-20	A700V337M002ATE006	40	6	6	6,700	3	125
2	330	V/7343-20	A700V337M002ATE009	40	6	9	5,500	3	125
2	330	D/7343-31	A700D337M002ATE007	40	6	7	6,000	3	125
2	330	D/7343-31	A700D337M002ATE009	40	6	9	5,300	3	125
2	330	D/7343-31	A700D337M002ATE012	40	6	12	4,600	3	125
2	330	X/7343-43	A700X337M002ATE010	40	6	10	4,700	3	125
2	330	X/7343-43	A700X337M002ATE015	40	6	15	3,900	3	125
2	390	X/7343-43	A700X397M002ATE010	47	6	10	4,700	3	125
2	390	X/7343-43	A700X397M002ATE015	47	6	15	3,900	3	125
2	470	V/7343-20	A700V477M002ATE4R5	56	6	4.5	7,750	3	125
2	470	V/7343-20	A700V477M002ATE006	56	6	6	6,700	3	125
2	470	V/7343-20	A700V477M002ATE009	56	6	9	5,500	3	125
2	470	V/7343-20	A700V477M002PTE009	56	6	9	5,500	3	125
2	470	D/7343-31	A700D477M002ATE005	56	6	5	7,100	3	125
2	470	D/7343-31	A700D477M002ATE006	56	6	6	6,500	3	125
2	470	X/7343-43	A700X477M002ATE005	56	6	5	6,700	3	125
2	470	X/7343-43	A700X477M002ATE007	56	6	7	5,700	3	125
2	470	X/7343-43	A700X477M002ATE010	56	6	10	4,700	3	125
2	470	X/7343-43	A700X477M002ATE015	56	6	15	3,900	3	125
2	560	X/7343-43	A700X567M002ATE4R5	67	6	4.5	7,000	3	125
2	560	X/7343-43	A700X567M002ATE005	67	6	5	6,700	3	125
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at -55°C to 125°C	Reflow Temp ≤ 260°C	°C
2	560	X/7343-43	A700X567M002ATE006	67	6	6	6,100	3	125
2	560	X/7343-43	A700X567M002ATE009	67	6	9	5,000	3	125
2.5	68	V/7343-20	A700V686M2R5ATE020	10	6	20	3,700	3	125
2.5	68	V/7343-20	A700V686M2R5ATE028	10	6	28	3,100	3	125
2.5	82	V/7343-20	A700V826M2R5ATE018	12	6	18	3,900	3	125
2.5	82	V/7343-20	A700V826M2R5ATE025	12	6	25	3,300	3	125
2.5	82	V/7343-20	A700V826M2R5ATE028	12	6	28	3,100	3	125
2.5	100	D/7343-31	A700D107M2R5ATE018	15	6	18	3,700	3	125
2.5	100	D/7343-31	A700D107M2R5ATE025	15	6	25	3,200	3	125
2.5	100	D/7343-31	A700D107M2R5ATE028	15	6	28	3,000	3	125
2.5	120	D/7343-31	A700D127M2R5ATE015	18	6	15	4,100	3	125
2.5	120	D/7343-31	A700D127M2R5ATE018	18	6	18	3,700	3	125
2.5	150	D/7343-31	A700D157M2R5ATE015	23	6	15	4,100	3	125
2.5	150	D/7343-31	A700D157M2R5ATE018	23	6	18	3,700	3	125
2.5	180	D/7343-31	A700D187M2R5ATE015	27	6	15	4,100	3	125
2.5	180	D/7343-31	A700D187M2R5ATE018	27	6	18	3,700	3	125
2.5	180	X/7343-43	A700X187M2R5ATE010	27	6	10	4,700	3	125
2.5	180	X/7343-43	A700X187M2R5ATE015	27	6	15	3,900	3	125
2.5	180	X/7343-43	A700X187M2R5ATE018	27	6	18	3,500	3	125
2.5	220	Q/7343-12	A700Q227M2R5ATE009	55	6	9	5,900	3	105
2.5	220	W/7343-15	A700W227M2R5ATE006	33	6	6	6,900	3	105
2.5	220	W/7343-15	A700W227M2R5ATE009	33	6	9	5,700	3	105
2.5	220	X/7343-43	A700X227M2R5ATE009	33	6	9	5,000	3	125
2.5	220	X/7343-43	A700X227M2R5ATE010	33	6	10	4,700	3	125
2.5	220	X/7343-43	A700X227M2R5ATE015	33	6	15	3,900	3	125
2.5	330	V/7343-20	A700V337M2R5ATE4R5	50	6	4.5	7,750	3	125
2.5	330	V/7343-20	A700V337M2R5ATE006	50	6	6	6,700	3	125
2.5	330	V/7343-20	A700V337M2R5ATE009	50	6	9	5,500	3	125
2.5	330	X/7343-43	A700X337M2R5ATE010	50	6	10	4,700	3	125
2.5	330	X/7343-43	A700X337M2R5ATE015	50	6	15	3,900	3	125
2.5	470	V/7343-20	A700V477M2R5ATE4R5	70.5	6	4.5	7,750	3	105
2.5	470	V/7343-20	A700V477M2R5ATE006	70.5	6	6	6,700	3	105
2.5	470	V/7343-20	A700V477M2R5ATE009	70.5	6	9	5,480	3	105
2.5	470	X/7343-43	A700X477M2R5ATE005	70	6	5	6,700	3	125
2.5	470	X/7343-43	A700X477M2R5ATE007	70	6	7	5,700	3	125
2.5	470	X/7343-43	A700X477M2R5ATE010	70	6	10	4,700	3	125
2.5	470	X/7343-43	A700X477M2R5ATE015	70	6	15	3,900	3	125
2.5	560	X/7343-43	A700X567M2R5ATE4R5	84	6	4.5	7,000	3	125
2.5	560	X/7343-43	A700X567M2R5ATE006	84	6	6	6,100	3	125
2.5	560	X/7343-43	A700X567M2R5ATE009	84	6	9	5,000	3	125
4	68	V/7343-20	A700V686M004ATE020	16	6	20	3,700	3	125
4	68	V/7343-20	A700V686M004ATE028	16	6	28	3,100	3	125
4	82	V/7343-20	A700V826M004ATE016	20	6	16	4,100	3	125
4	82	V/7343-20	A700V826M004ATE018	20	6	18	3,900	3	125
4	82	V/7343-20	A700V826M004ATE025	20	6	25	3,300	3	125
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at -55°C to 125°C	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at –55°C to 125°C	Reflow Temp ≤ 260°C	°C
4	82	V/7343-20	A700V826M004ATE028	20	6	28	3,100	3	125
4	100	D/7343-31	A700D107M004ATE018	24	6	18	3,700	3	125
4	100	D/7343-31	A700D107M004ATE025	24	6	25	3,200	3	125
4	100	D/7343-31	A700D107M004ATE028	24	6	28	3,000	3	125
4	100	V/7343-20	A700V107M004ATE025	24	6	25	3,300	3	125
4	100	V/7343-20	A700V107M004ATE028	24	6	28	3,100	3	125
4	120	D/7343-31	A700D127M004ATE015	29	6	15	4,100	3	125
4	120	D/7343-31	A700D127M004ATE018	29	6	18	3,700	3	125
4	150	D/7343-31	A700D157M004ATE015	36	6	15	4,100	3	125
4	150	D/7343-31	A700D157M004ATE018	36	6	18	3,700	3	125
4	150	V/7343-20	A700V157M004ATE015	36	6	15	4,200	3	125
4	150	V/7343-20	A700V157M004ATE016	36	6	16	4,100	3	125
4	150	V/7343-20	A700V157M004ATE018	36	6	18	3,900	3	125
4	180	D/7343-31	A700D187M004ATE012	43	6	12	4,600	3	125
4	180	D/7343-31	A700D187M004ATE015	43	6	15	4,100	3	125
4	180	D/7343-31	A700D187M004ATE018	43	6	18	3,700	3	125
4	180	X/7343-43	A700X187M004ATE010	43	6	10	4,700	3	125
4	180	X/7343-43	A700X187M004ATE015	43	6	15	3,900	3	125
4	180	X/7343-43	A700X187M004ATE018	43	6	18	3,500	3	125
4	220	D/7343-31	A700D227M004ATE009	53	6	9	5,300	3	125
4	220	D/7343-31	A700D227M004ATE010	53	6	10	5,000	3	125
4	220	D/7343-31	A700D227M004ATE015	53	6	15	4,100	3	125
4	220	X/7343-43	A700X227M004ATE009	53	6	9	5,000	3	125
4	220	X/7343-43	A700X227M004ATE010	53	6	10	4,700	3	125
4	220	X/7343-43	A700X227M004ATE015	53	6	15	3,900	3	125
4	270	X/7343-43	A700X277M004ATE010	65	6	10	4,700	3	125
4	270	X/7343-43	A700X277M004ATE015	65	6	15	3,900	3	125
4	330	X/7343-43	A700X337M004ATE008	79	6	8	5,300	3	125
4	330	X/7343-43	A700X337M004ATE010	79	6	10	4,700	3	125
4	330	X/7343-43	A700X337M004ATE015	79	6	15	3,900	3	125
6.3	10	V/7343-20	A700V106M006ATE055	3	6	55	2,200	3	125
6.3	22	V/7343-20	A700V226M006ATE028	6	6	28	3,100	3	125
6.3	22	V/7343-20	A700V226M006ATE045	6	6	45	2,400	3	125
6.3	33	V/7343-20	A700V336M006ATE018	8	6	18	3,900	3	125
6.3	33	V/7343-20	A700V336M006ATE025	8	6	25	3,300	3	125
6.3	33	V/7343-20	A700V336M006ATE028	8	6	28	3,100	3	125
6.3	47	V/7343-20	A700V476M006ATE018	12	6	18	3,900	3	125
6.3	47	V/7343-20	A700V476M006ATE025	12	6	25	3,300	3	125
6.3	47	V/7343-20	A700V476M006ATE028	12	6	28	3,100	3	125
6.3	56	V/7343-20	A700V566M006ATE018	14	6	18	3,900	3	125
6.3	56	V/7343-20	A700V566M006ATE025	14	6	25	3,300	3	125
6.3	56	V/7343-20	A700V566M006ATE028	14	6	28	3,100	3	125
6.3	68	V/7343-20	A700V686M006ATE015	17	6	15	4,200	3	125
6.3	68	V/7343-20	A700V686M006ATE018	17	6	18	3,900	3	125
6.3	68	V/7343-20	A700V686M006ATE025	17	6	25	3,300	3	125
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at –55°C to 125°C	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
6.3	68	V/7343-20	A700V686M006ATE028	17	6	28	3,100	3	125
6.3	82	V/7343-20	A700V826M006ATE018	21	6	18	3,900	3	125
6.3	82	V/7343-20	A700V826M006ATE025	21	6	25	3,300	3	125
6.3	82	V/7343-20	A700V826M006ATE028	21	6	28	3,100	3	125
6.3	100	V/7343-20	A700V107M006ATE015	25	6	15	4,200	3	125
6.3	100	V/7343-20	A700V107M006ATE018	25	6	18	3,900	3	125
6.3	100	V/7343-20	A700V107M006ATE025	25	6	25	3,300	3	125
6.3	100	D/7343-31	A700D107M006ATE015	25	6	15	4,100	3	125
6.3	100	D/7343-31	A700D107M006ATE018	25	6	18	3,700	3	125
6.3	120	D/7343-31	A700D127M006ATE012	30	6	12	4,600	3	125
6.3	120	D/7343-31	A700D127M006ATE015	30	6	15	4,100	3	125
6.3	120	D/7343-31	A700D127M006ATE018	30	6	18	3,700	3	125
6.3	150	D/7343-31	A700D157M006ATE010	38	6	10	5,000	3	125
6.3	150	D/7343-31	A700D157M006ATE012	38	6	12	4,600	3	125
6.3	150	D/7343-31	A700D157M006ATE015	38	6	15	4,100	3	125
6.3	150	X/7343-43	A700X157M006ATE010	38	6	10	4,700	3	125
6.3	150	X/7343-43	A700X157M006ATE012	38	6	12	4,300	3	125
6.3	150	X/7343-43	A700X157M006ATE015	38	6	15	3,900	3	125
6.3	180	D/7343-31	A700D187M006ATE010	45	6	10	5,000	3	125
6.3	180	D/7343-31	A700D187M006ATE015	45	6	15	4100	3	125
6.3	180	X/7343-43	A700X187M006ATE010	45	6	10	4,700	3	125
6.3	180	X/7343-43	A700X187M006ATE015	45	6	15	3,900	3	125
6.3	220	X/7343-43	A700X227M006ATE007	55	6	7	5,700	3	125
6.3	220	X/7343-43	A700X227M006ATE010	55	6	10	4,700	3	125
6.3	220	X/7343-43	A700X227M006ATE015	55	6	15	3,900	3	125
8	10	V/7343-20	A700V106M008ATE055	3	6	55	2,200	3	125
8	22	V/7343-20	A700V226M008ATE028	7	6	28	3,100	3	125
8	22	V/7343-20	A700V226M008ATE045	7	6	45	2,400	3	125
8	33	V/7343-20	A700V336M008ATE018	11	6	18	3,900	3	125
8	33	V/7343-20	A700V336M008ATE025	11	6	25	3,300	3	125
8	33	V/7343-20	A700V336M008ATE028	11	6	28	3,100	3	125
8	56	D/7343-31	A700D566M008ATE015	18	6	15	4,100	3	125
8	56	D/7343-31	A700D566M008ATE018	18	6	18	3,700	3	125
8	68	D/7343-31	A700D686M008ATE015	22	6	15	4,100	3	125
8	68	D/7343-31	A700D686M008ATE018	22	6	18	3,700	3	125
8	100	X/7343-43	A700X107M008ATE010	32	6	10	4,700	3	125
8	100	X/7343-43	A700X107M008ATE012	32	6	12	4,300	3	125
8	100	X/7343-43	A700X107M008ATE015	32	6	15	3,900	3	125
10	10	V/7343-20	A700V106M010ATE055	4	6	55	2,200	3	125
10	22	V/7343-20	A700V226M010ATE028	9	6	28	3,100	3	125
10	22	V/7343-20	A700V226M010ATE045	9	6	45	2,400	3	125
10	33	V/7343-20	A700V336M010ATE018	13	6	18	3,900	3	125
10	33	V/7343-20	A700V336M010ATE025	13	6	25	3,300	3	125
10	33	V/7343-20	A700V336M010ATE028	13	6	28	3,100	3	125
10	47	V/7343-20	A700V476M010ATE025	19	6	25	3,300	3	125
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
10	47	V/7343-20	A700V476M010ATE028	19	6	28	3,100	3	125
10	56	D/7343-31	A700D566M010ATE015	22	6	15	4,100	3	125
10	56	D/7343-31	A700D566M010ATE018	22	6	18	3,700	3	125
10	68	D/7343-31	A700D686M010ATE015	27	6	15	4,100	3	125
10	68	D/7343-31	A700D686M010ATE018	27	6	18	3,700	3	125
10	100	X/7343-43	A700X107M010ATE010	40	6	10	4,700	3	125
10	100	X/7343-43	A700X107M010ATE015	40	6	15	3,900	3	125
10	120	X/7343-43	A700X127M010ATE010	48	6	10	4,700	3	125
10	120	X/7343-43	A700X127M010ATE015	48	6	15	3,900	3	125
10	150	X/7343-43	A700X157M010ATE010	60	6	10	4,700	3	125
10	150	X/7343-43	A700X157M010ATE015	60	6	15	3,900	3	125
12.5	10	V/7343-20	A700V106M12RATE040	5	6	40	2,600	3	125
12.5	10	V/7343-20	A700V106M12RATE055	5	6	55	2,200	3	125
12.5	10	V/7343-20	A700V106M12RATE060	5	6	60	2,100	3	125
12.5	15	V/7343-20	A700V156M12RATE040	8	6	40	2,600	3	125
12.5	15	V/7343-20	A700V156M12RATE045	8	6	45	2,400	3	125
12.5	22	V/7343-20	A700V226M12RATE030	11	6	30	3,000	3	125
12.5	33	V/7343-20	A700V336M12RATE025	17	6	25	3,300	3	125
12.5	56	D/7343-31	A700D566M12RATE020	28	6	20	3,500	3	125
12.5	47	D/7343-31	A700D476M12RATE020	24	6	20	3,500	3	125
12.5	47	D/7343-31	A700D476M12RATE025	24	6	25	3,200	3	125
12.5	47	D/7343-31	A700D476M12RATE040	24	6	40	2,500	3	125
12.5	100	X/7343-43	A700X107M12RATE012	50	6	12	4,300	3	125
12.5	100	X/7343-43	A700X107M12RATE015	50	6	15	3,900	3	125
12.5	100	X/7343-43	A700X107M12RATE018	50	6	18	3,500	3	125
12.5	100	X/7343-43	A700X107M12RATE025	50	6	25	3,000	3	125
16	6.8	V/7343-20	A700V685M016ATE070	4	6	70	2,000	3	125
16	8.2	V/7343-20	A700V825M016ATE045	5	6	45	2,400	3	125
16	10	V/7343-20	A700V106M016ATE045	6	6	45	2,400	3	125
16	10	V/7343-20	A700V106M016ATE060	6	6	60	2,100	3	125
16	15	V/7343-20	A700V156M016ATE040	10	6	40	2,600	3	125
16	22	V/7343-20	A700V226M016ATE018	35	6	18	3,900	3	125
16	22	V/7343-20	A700V226M016ATE025	35	6	25	3,300	3	125
16	22	V/7343-20	A700V226M016ATE030	35	6	30	3,000	3	125
16	22	D/7343-31	A700D226M016ATE018	14	6	18	3,700	3	125
16	22	D/7343-31	A700D226M016ATE025	14	6	25	3,200	3	125
16	22	D/7343-31	A700D226M016ATE030	14	6	30	2,900	3	125
16	33	V/7343-20	A700V336M016ATE025	53	6	25	3,300	3	125
16	33	V/7343-20	A700V336M016ATE040	53	6	40	2,600	3	125
25	15	V/7343-20	A700V156M025ATE040	15	6	40	2,600	3	125
35	15	D/7343-31	A700D156M035ATE040	53	6	40	2,500	3	125
35	22	X/7343-43	A700X226M035ATE025	77	6	25	3,000	3	125
35	22	X/7343-43	A700X226M035ATE040	77	6	40	2,400	3	125
(V)	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 125°C	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Derating Guidelines

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 µs)
	−55°C to 125°C	
2 – 35 V	V_R	V_R

V_R = Rated Voltage

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage which may be applied is limited by two criteria

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage, in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage. See the Reverse Voltage section for allowable limits

Power capability is determined based on a 20°C temperature rise. A higher temperature rise and therefore higher power capability is allowable as long as the ambient temperature plus temperature rise due to ripple current does not exceed the rated temperature of the part.
The maximum power dissipation by case size can be determined using the below table.

KEMET Series and Case Code	EIA Case Code	Maximum Power Dissipation (Pmax) mWatts at 25°C with +20°C Rise
A700Q	7343-12	320
A700W	7343-15	290
A700V	7343-20	270
A700D	7343-31	250
A700X	7343-43	225

Using the Pmax of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{Pmax/R}$
$E(max) = Z \sqrt{Pmax/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
Pmax = maximum power dissipation(watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (Ohms)

Refer to part number listings for permittable Arms limits.

Reverse Voltage

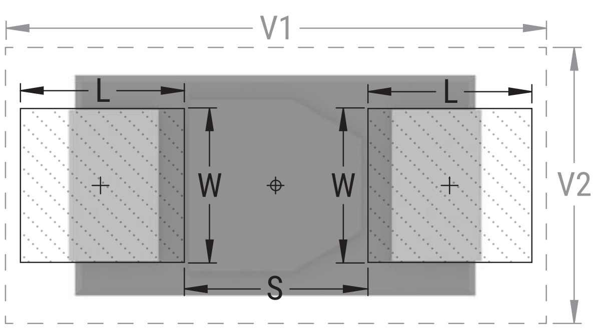
Polymer aluminum capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a certain degree of transient voltage reversal for short periods as shown in the below table. Please note that these parts may not be operated continuously in reverse, even within these limits.

Temperature	Permissible Transient Reverse Voltage
25°C	60% of Rated Voltage
55°C	50% of Rated Voltage
85°C	40% of Rated Voltage
125°C	30% of Rated Voltage

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
D	7343–31	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
Q	7343–12	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
V	7343–20	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
W	7343–15	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
X[1]	7343–43	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] *Height of these chips may create problems in wave soldering.*



Grid Placement Courtyard

Soldering Process

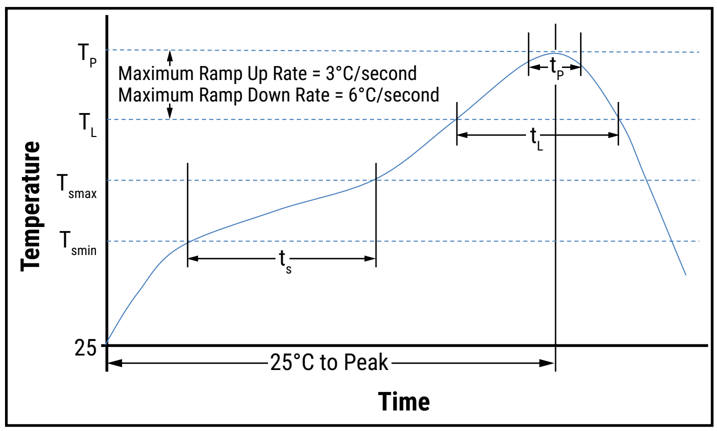
KEMET's families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/seconds maximum	3°C/seconds maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/seconds maximum	6°C/seconds maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



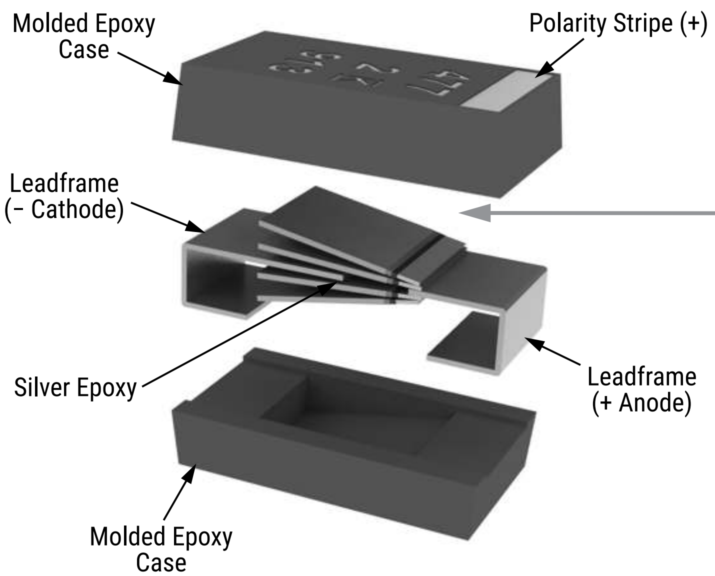
Storage

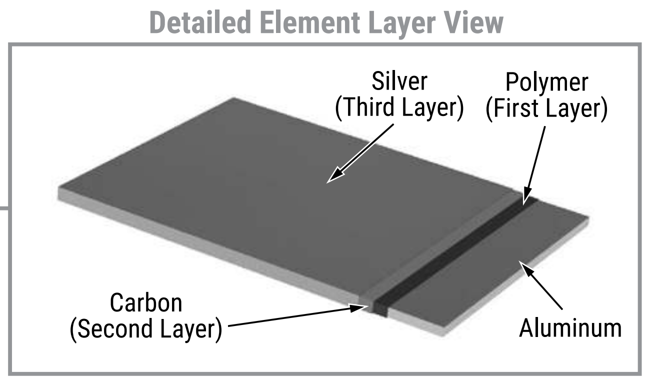
All AO-CAP Series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J–STD–020 and packaged per IPC/JEDEC J–STD–033. MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

The calculated shelf life in a sealed bag would be 12 months from a bag seal date in a storage environment of < 40°C and humidity < 90% RH. It should be 24 months from a bag seal date in a storage environment of < 30°C and humidity < 70% RH.

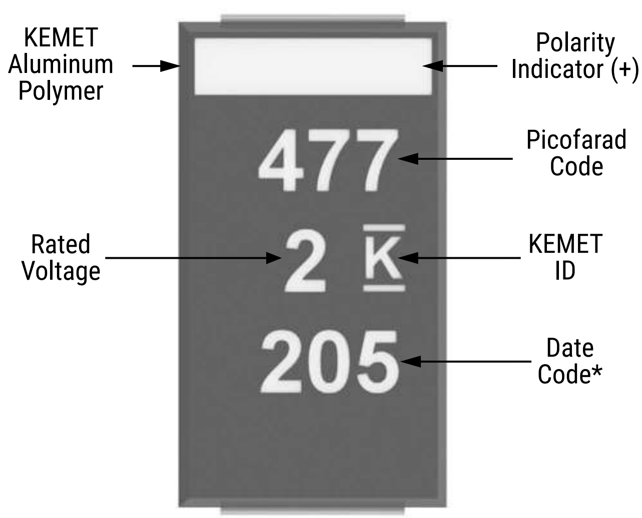
If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure.

Construction





Capacitor Marking



* 205 = 5th week of 2022

Date Code *	
1st digit = Last number of Year	9 = 2019 0 = 2020 1 = 2021 2 = 2022 3 = 2023
2nd and 3rd digit = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

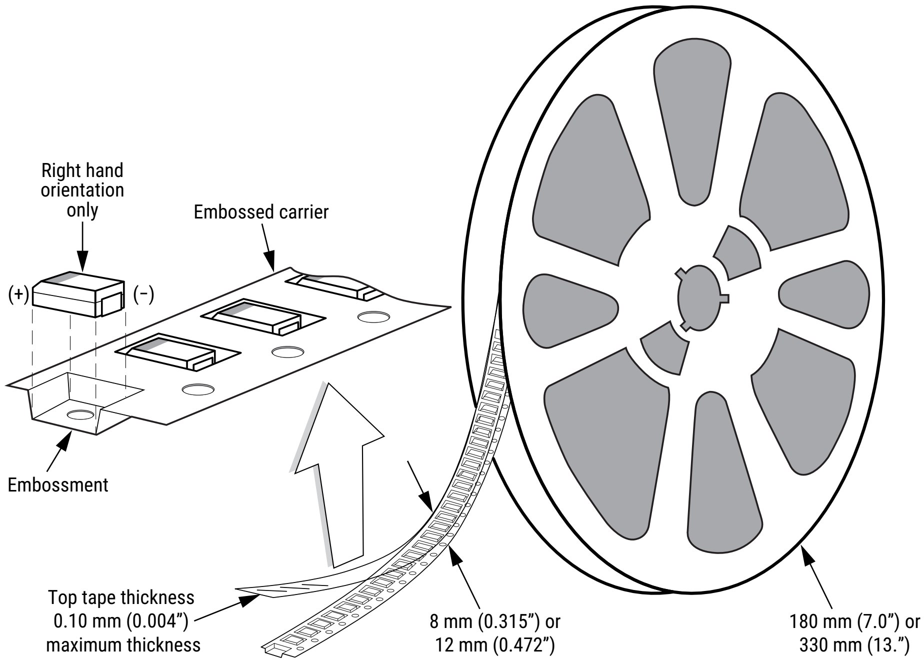


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
P	2012-10	8	3,000	N/A
R	2012-12	8	2,500	10,000
I	3216-10	8	3,000	N/A
S	3216-12	8	3,000	N/A
A	3216-18	8	2,000	N/A
T	3528-12	8	3,000	10,000
M	3528-15	8	2,500	8,000
B	3528-21	8	2,000	8,000
U	6032-15	12	1,000	5,000
L	6032-19	12	1,000	3,000
C	6032-28	12	500	3,000
Q	7343-12	12	1,000	3,000
W	7343-15	12	1,000	3,000
Z	7343-17	12	1,000	3,000
V	7343-19	12	1,000	3,000
D	7343-31	12	500	2,500
Y	7343-40	12	500	2,000
X	7343-43	12	500	2,000
J	7360-15	12	1,000	3,000
H	7360-20	12	1,000	3,000
O	7360-43	12	250	1,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

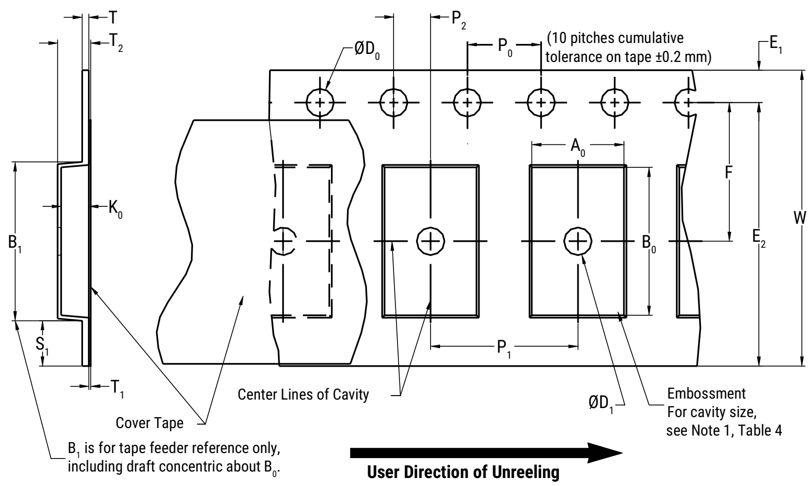


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

<table>
<tr><th colspan="10">Constant Dimensions — Millimeters (Inches)</th></tr>
<tr><th>Tape Size</th><th>D_0</th><th>D_1 Minimum Note 1</th><th>E_1</th><th>P_0</th><th>P_2</th><th>R Reference Note 2</th><th>S_1 Minimum Note 3</th><th>T Maximum</th><th>T_1 Maximum</th></tr>
<tr><td>8 mm</td><td rowspan="2">1.5 +0.10/−0.0 (0.059 +0.004/−0.0)</td><td>1.0 (0.039)</td><td rowspan="2">1.75 ±0.10 (0.069 ±0.004)</td><td rowspan="2">4.0 ±0.10 (0.157 ±0.004)</td><td rowspan="2">2.0 ±0.05 (0.079 ±0.002)</td><td>25.0 (0.984)</td><td rowspan="2">0.600 (0.024)</td><td rowspan="2">0.600 (0.024)</td><td rowspan="2">0.100 (0.004)</td></tr>
<tr><td>12 mm</td><td>1.5 (0.059)</td><td>30 (1.181)</td></tr>
</table>

<table>
<tr><th colspan="9">Variable Dimensions — Millimeters (Inches)</th></tr>
<tr><th>Tape Size</th><th>Pitch</th><th>B_1 Maximum Note 4</th><th>E_2 Minimum</th><th>F</th><th>P_1</th><th>T_2 Maximum</th><th>W Maximum</th><th>A_0, B_0 & K_0</th></tr>
<tr><td>8 mm</td><td>Single (4 mm)</td><td>4.35 (0.171)</td><td>6.25 (0.246)</td><td>3.5 ±0.05 (0.138 ±0.002)</td><td>2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)</td><td>2.5 (0.098)</td><td>8.3 (0.327)</td><td rowspan="2">Note 5</td></tr>
<tr><td>12 mm</td><td>Single (4 mm) and Double (8 mm)</td><td>8.2 (0.323)</td><td>10.25 (0.404)</td><td>5.5 ±0.05 (0.217 ±0.002)</td><td>2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)</td><td>4.6 (0.181)</td><td>12.3 (0.484)</td></tr>
</table>

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape, with or without components, shall pass around R without damage (see Figure 4).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
   (e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

Packaging Information Performance Notes

1. Cover tape break force: 1.0 kg minimum.
2. Cover tape peel strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 newton (10 to 100 gf)
12 mm	0.1 to 1.3 newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624*.

Figure 2 – Maximum Component Rotation

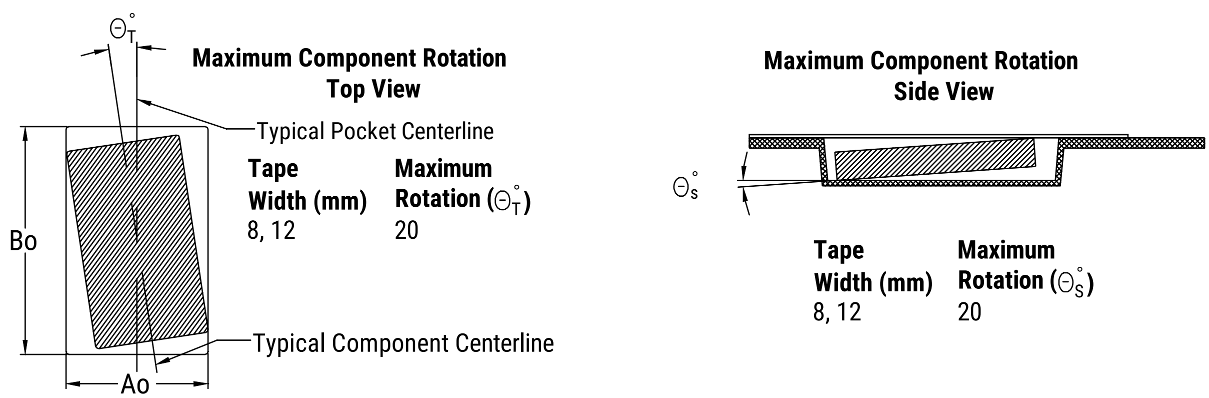


Figure 3 – Maximum Lateral Movement

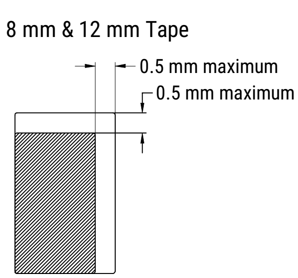


Figure 4 – Bending Radius

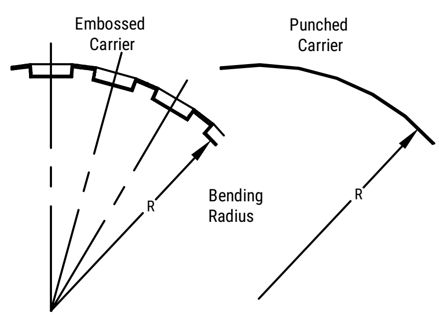
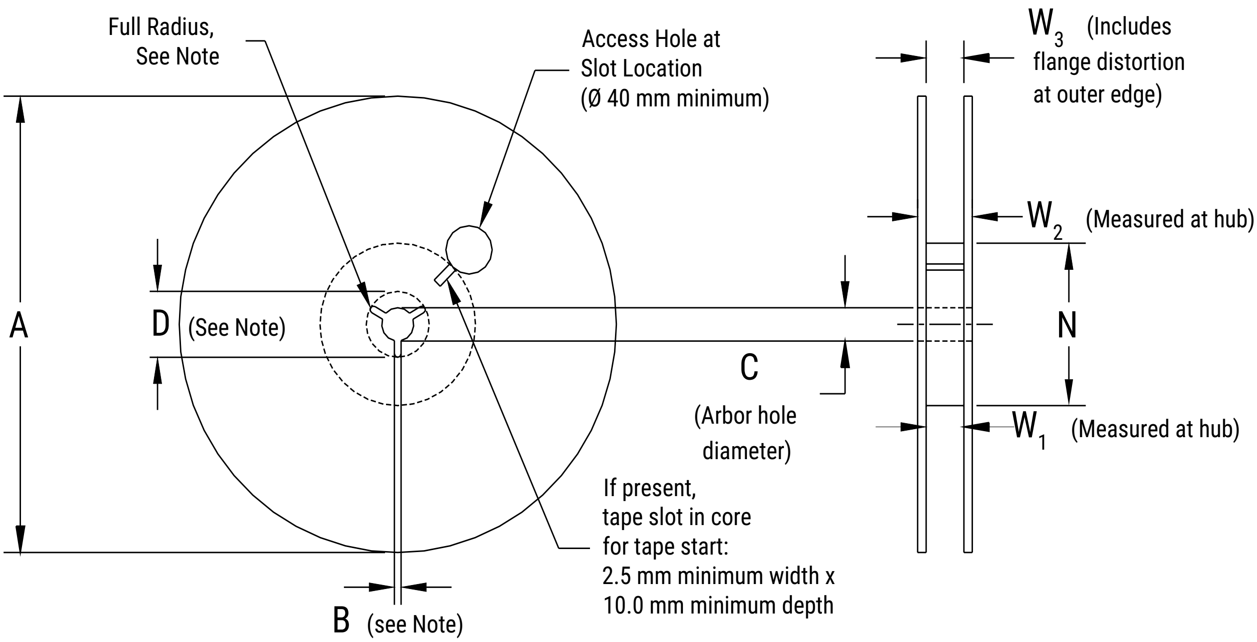


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
12 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

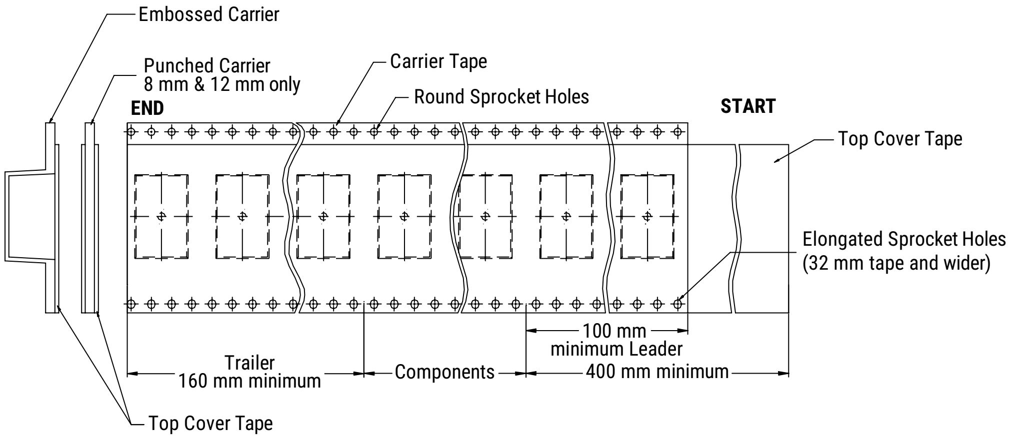
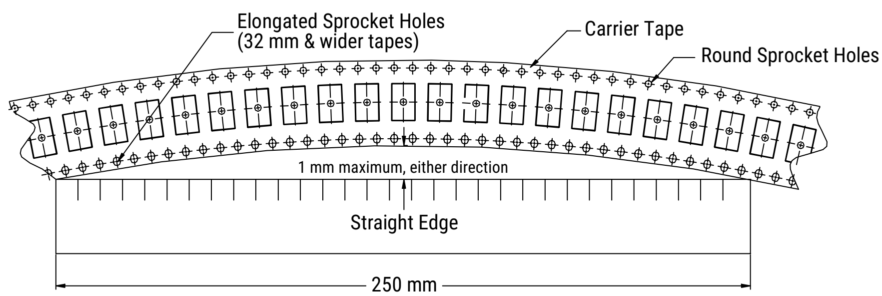


Figure 7 – Maximum Camber



Tantalum Stack Polymer (TSP) Electrolytic Stack, 3 – 63 VDC

Overview

The KEMET Tantalum Stack Polymer (TSP) Electrolytic Capacitor is designed to provide the highest CV (capacitance/voltage) ratings in a surface mount configuration. All of KEMET's Polymer Electrolytic Solutions are available in a stack configuration.The only exceptions are the facedown series (T523, T527, T528, and T529). These capacitors are utilized in stacks of 2, 3, 4, and 6 components to achieve a broad range of capacitance, ESR, and voltage ratings. The TSP series may be operated at steady state voltages up to 90% of rated voltage for part types with rated voltage less than or equal to 10 volts and up to 80% of rated voltage for part types greater than 10 volts. Stacking configurations allow for custom capacitance/voltage solutions and very low ESR options.

The TSP series is the first polymer electrolytic capacitor available with failure rate options when utilizing KEMET's T540 and T541 Series. The failure rate is determined by utilizing accelerated conditions (voltage and temperature) applied to board mounted samples to assess long term device reliability. The failure rates available are B (0.1% per 1,000 hours), C (0.01% per 1,000 hours), and D (0.001% per 1,000 hours).

Note: Custom stacking solutions are also available with other KEMET Polymer Electrolytic Surface Mount products. Please contact KEMET Sales for availability.

Benefits

- Polymer cathode technology
- High capacitance
- Surface mountable
- Capacitance values of 20 – 8,000 µF
- Capacitance can be custom specified
- Voltage ratings of 3 – 63 VDC
- High volumetric efficiency
- Ultra low ESR
- Surge capability
- Operating temperature range of −55°C to +105°C/+125˚C (refer to part number for maximum temperature rating)
- Laser-marked case
- Use up to 90% of rated voltage for part types ≤ 10 V
- Use up to 80% of rated voltage for part types > 10 V
- KEMET's KO-CAP Reliability Assesment method (for the discrete component T540 and T541)

Applications

Typical applications include decoupling, hold-up and filtering in a variety of market segments.
The T540/T541 and T543 Polymer HRA and other tantalum MnO2 HRA and MIL-PRF stack devices can be utilized in defense and aerospace equipment including High Power Amplifiers for radars and multiple applications where GaN active components are part of the design.

Environmental Compliance

RoHS compliant when ordered with 100% Sn solder on both terminations (component and stack)
- Halogen-free
- Epoxy compliant with UL94 V-0
- Molded Epoxy complies for outgassing testing under ASTM E 595.

Ordering Information

T540/T541 Discrete Component

T	SP	2D	207	M	010	A	H	65	20	D	540
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate (Discrete)	Termination Finish (Discrete)	Surge (Discrete)	ESR (Stack)	Termination Finish (Stack)	Discrete Components Series
T = Tantalum	Stacks Polymer Cathode	2B 3B 4B 6B 2C 3C 4C 6C 2D 3D 4D 6D 2O 3O 4O 6O 2X 3X 4X 6X	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	003 = 3 004 = 4 006 = 6.3 010 = 10 016 = 16 025 = 25 035 = 35 050 = 50 063 = 63	A = N/A B = 0.1%/KHrs C = 0.01%/KHrs D = 0.001%/KHrs	H = Standard solder coated (SnPb 5% Pb minimum) T = 100% Matte Tin (Sn)-plated	65 = 4 cycles at 25°C ±5°C 66 = 10 cycles at 25°C 67 = 10 cycles at −55°C +0°C/−5°C and 85°C 85 = 4 cycles at 25°C ±5°C and improved humidity capability 86 = 10 cycles at 25°C ±5°C and improved humidity capability 87 = 10 cycles at −55°C +0°C/−5°C and +85°C ±5°C and improved humidity capability	05 = ESR - High 10 = ESR - Standard 20 = ESR-Low	D = Silver-plated (Ag) H = Solder-plated (SnPb 5% Pb minimum) T = 100% Tin (Sn) X = Leadless stack assembly [*1]	540 = T540 541 = T541

[*1] *Available for O case discrete stack configurations*

Ordering Information cont.

T543 Discrete Component

T	SP	6X	207	M	050	A	H	E	040	D	543
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate (Discrete)	Termination Finish (Discrete)	Surge (Discrete)	ESR (Discrete)	Termination Finish (Stack)	Discrete Components Series
T = Tantalum	Stacks Polymer Cathode	2B 3B 4B 6B 2C 3C 4C 6C 2D 3D 4D 6D 2O 3O 4O 6O 2X 3X 4X 6X	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	003 = 3 004 = 4 006 = 6.3 010 = 10 016 = 16 025 = 25 035 = 35 040 = 40 050 = 50 063 = 63	A = N/A	H = Standard solder coated (SnPb 5% Pb minimum) T = 100% Matte Tin (Sn)-plated	E = None S = 10 cycles at 25°C W = 10 cycles −55°C and 85°C	ESR in mΩ	D = Silver-plated (Ag) H = Solder-plated (SnPb 5% Pb minimum) T = 100% Tin (Sn) X = Leadless stack assembly *1	543 = T543

*1 *Available for O case discrete stack configurations*

T520, T521, T525, T530, T545 Discrete Component

T	SP	2X	667	M	10	A	T	E	002	D	530
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate (Discrete)	Termination Finish (Discrete)	Surge (Discrete)	ESR (Stack)	Termination Finish (Stack)	Discrete Components Series
T = Tantalum	Stacks Polymer Cathode	2B 3B 4B 6B 2C 3C 4C 6C 2D 3D 4D 6D 2O 3O 4O 6O 2X 3X 4X 6X	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	003 = 3 004 = 4 006 = 6.3 010 = 10 016 = 16 025 = 25 035 = 35 050 = 50 063 = 63	A = N/A	H = Standard solder coated (SnPb 5% Pb minimum) T = 100% Matte Tin (Sn)-plated	E = None	ESR in mΩ	D = Silver-plated (Ag) H = Solder-plated (SnPb 5% Pb minimum) T = 100% Tin (Sn)	520 = T520 521 = T521 525 = T525 530 = T530 545 = T545

Note: Custom discrete component stacking solutions are also available with other KEMET Polymer Electrolytic Surface Mount series/products. Please contact KEMET Sales for availability.

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to 105°C/125°C (refer to part number for maximum temperature rating)
Rated Capacitance Range	20 – 8,000 µF at 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	3 – 63 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.1 CV (µA) at rated voltage after 5 minutes

Qualification

Test	Condition	Characteristics	
Endurance	105°C at rated voltage, 2,000 hours 125°C at 2/3 rated voltage, 2,000 hours	Δ C/C	Within −20/+10% of initial value
		DF	≤ initial limit
		DCL	1.25 x IL at 125°C
		ESR	2 x initial limit
Thermal Shock	KEMET specified test, mounted, −55°C to 105°C/125°C*1, 5 cycles	Δ C/C	Within ±5% of initial value
		DF	Within initial limits
		DCL	Within 1.25 x initial limit
		ESR	Within initial limits
Surge Voltage	85°C, 1.15 x rated voltage 1,000 cycles	Δ C/C	Within ±5% of initial value
		DF	Within initial limits
		DCL	Within initial limits
		ESR	Within initial limits
Surge Voltage	105°C/125°C*1, 0.77 x rated voltage 1,000 cycles	Δ C/C	Within ±5% of initial value
		DF	Within initial limits
		DCL	Within initial limits
		ESR	Within initial limits
Mechanical Vibration	MIL–STD–202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak	Δ C/C	Within ±10 of initial value
		DF	Within initial limits
		DCL	Within initial limits

*1 *Refer to part number specifications for individual temperature classification*

Reliability

KO-CAP capacitors have an average failure rate of 0.5 %/1,000 hours at category voltage, U_C, and category temperature, T_C. These capacitors are qualified using industry test standards at U_C and T_C. The minimum test time (1,000 or 2,000 hours) is dependent on the product.

The actual life expectancy of KO-CAP capacitors increases when application voltage, U_A, and application temperature, T_A, are lower than U_C and T_C. As a general guideline, when $U_A < 0.9 * U_C$ and $T_A < 85°C$, the life expectancy will typically exceed the useful lifetime of most hardware (> 10 years).

The lifetime of a KO-CAP capacitor at a specific application voltage and temperature can be modeled using the equations below. A failure is defined as passing enough current to blow a 1-Amp fuse. The calculation is an estimation based on empirical results and is not a guarantee.

$$VAF = \left(\frac{U_C}{U_A}\right)^n$$

where:

VAF = acceleration factor due to voltage, unitless

U_C = category voltage, volt

U_A = application voltage, volt

n = exponent, 16

$$TAF = e^{\left[\frac{E_a}{k}\left(\frac{1}{273+T_A} - \frac{1}{273+T_C}\right)\right]}$$

where:

TAF = acceleration factor due to temperature, unitless

E_a = activation energy, 1.4 eV

k = Boltzmann's constant, 8.617E-5 eV/K

T_A = application temperature, °C

T_C = category temperature, °C

$$AF = VAF * TAF$$

where:

AF = acceleration factor, unitless

TAF = accerlation factor due to temperature, unitless

VAF = acceleration factor due to voltage, unitless

$$Life_{U_A,T_A} = Life_{U_C,T_C} * AF$$

where:

$Life_{UA, TA}$ = estimated life application voltage and temperature, years

$Life_{UC, TC}$ = guaranteed life category voltage and temperature, years

AF = acceleration factor, unitless

Reliability Table 1 – Common temperature range classifications

85°C (T_R) / 85°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 105°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 125°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	1.7	2.7	4.2	5.4	6.7	8.4	10.7	13.4	16.8	23.5	33.5	42.2	50.3

Terms:

Category Voltage, U_C: Maximum recommended peak DC operating voltage for continuous operation at the category temperature, T_C

Rated Voltage, U_R: Maximum recommended peak DC operating voltage for continuous operation up to the rated temperature, T_R

Category Temperature, T_C: Maximum recommended operating temperature; voltage derating may be required at T_C

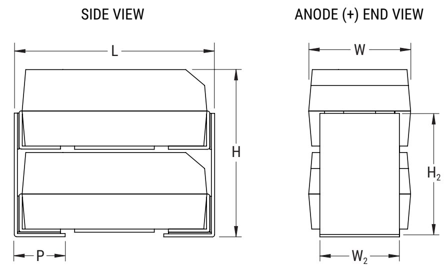
Rated Temperature, T_R: Maximum recommended operating temperature without voltage derating; T_R is equal to or lower than T_C

Dimensions – Millimeters (Inches)

Metric will govern

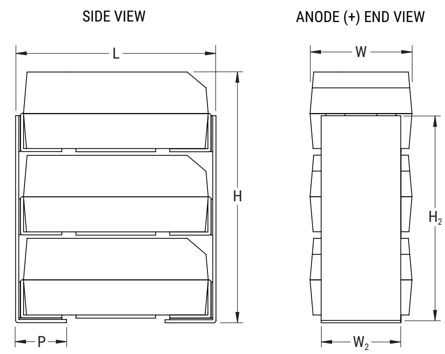
TSP2

KEMET 2 Component Stack Dimensions						
Case Code	L	W	H	W_2	H_2	P
2C	6.5 ±0.38 (0.258 ±0.015)	3.3 ±0.2 (0.130 ±0.008)	5.3 ±0.38 (0.210 ±0.015)	2.5 ±0.2 (0.100 ±0.008)	4.5 ±0.38 (0.176 ±0.015)	1.4 ±0.38 (0.055 ±0.015)
2B	4.1 ±0.38 (0.162 ±0.015)	3.1 ±0.2 (0.122 ±0.008)	4.3 ±0.38 (0.170 ±0.015)	2.3 ±0.2 (0.090 ±0.008)	3.1 ±0.38 (0.124 ±0.015)	0.76 ±0.38 (0.030 ±0.015)
2D	8.0 ±0.38 (0.315 ±0.015)	4.4 ±0.2 (0.174 ±0.008)	6.2 ±0.38 (0.245 ±0.015)	3.0 ±0.2 (0.120 ±0.008)	4.8 ±0.38 (0.192 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
2X	8.0 ±0.38 (0.315 ±0.015)	4.4 ±0.2 (0.174 ±0.008)	8.9 ±0.38 (0.350 ±0.015)	3.0 ±0.2 (0.120 ±0.008)	6.9 ±0.38 (0.272 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
2O	7.9 ±0.38 (0.311 ±0.015)	6.1 ±0.4 (0.240 ±0.016)	8.9 ±0.38 (0.350 ±0.015)	4.1 ±0.4 (0.161 ±0.016)	6.6 ±0.38 (0.260 ±0.015)	1.4 ±0.38 (0.055 ±0.015)



TSP3

KEMET 3 Component Stack Dimensions						
Case Code	L	W	H	W_2	H_2	P
3B	4.1 ±0.38 (0.162 ±0.015)	3.1 ±0.2 (0.122 ±0.008)	6.3 ±0.38 (0.248 ±0.015)	2.3 ±0.2 (0.090 ±0.008)	5.3 ±0.38 (0.210 ±0.015)	0.76 ±0.38 (0.030 ±0.015)
3D	8.0 ±0.38 (0.315 ±0.015)	4.4 ±0.2 (0.174 ±0.008)	9.2 ±0.38 (0.365 ±0.015)	3.0 ±0.2 (0.120 ±0.008)	7.7 ±0.38 (0.304 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
3X	8.0 ±0.38 (0.315 ±0.015)	4.4 ±0.2 (0.174 ±0.008)	13.3 ±0.38 (0.525 ±0.015)	3.0 ±0.2 (0.120 ±0.008)	11.0 ±0.38 (0.436 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
3O	7.9 ±0.38 (0.311 ±0.015)	6.1 ±0.4 (0.240 ±0.016)	13.3 ±0.38 (0.525±0.015)	4.1±0.2 (0.16 ±0.008)	11.0 ±0.38 (0.436 ±0.015)	1.4±0.38 (0.060±0.015))

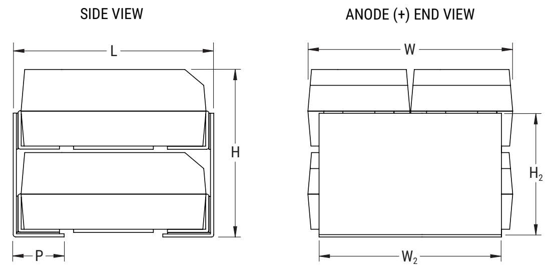


Dimensions – Millimeters (Inches) cont.

Metric will govern

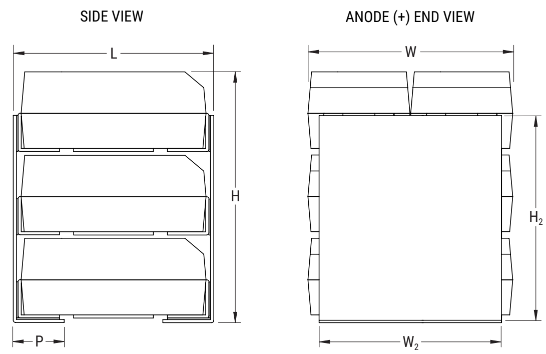
TSP4

KEMET 4 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
4B	4.1 ±0.38 (0.162 ±0.015)	6.1 ±0.2 (0.242 ±0.008)	4.3 ±0.38 (0.170 ±0.015)	5.3 ±0.2 (0.210 ±0.008)	3.1 ±0.38 (0.124 ±0.015)	0.76 ±0.38 (0.030 ±0.015)
4D	8.0 ±0.38 (0.315 ±0.015)	8.9 ±0.2 (0.350 ±0.008)	6.2 ±0.38 (0.245 ±0.015)	7.4 ±0.2 (0.292 ±0.008)	4.8 ±0.38 (0.192 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
4X	8.0 ±0.38 (0.315 ±0.015)	8.9 ±0.2 (0.350 ±0.008)	8.9 ±0.38 (0.350 ±0.015)	7.4 ±0.2 (0.292 ±0.008)	6.9 ±0.38 (0.272 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
4O	7.9 ±0.38 (0.311 ±0.015)	12.2 ±0.4 (0.48 ±0.016)	8.9 ±0.38 (0.350 ±0.015)	10.5 ±0.4 (0.413 ±0.016)	6.6 ±0.38 (0.260± 0.015)	1.4±0.38 (0.055 ± 0.015)



TSP6

KEMET 6 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
6B	4.1 ±0.38 (0.162 ±0.015)	6.1 ±0.2 (0.242 ±0.008)	6.3 ±0.38 (0.248 ±0.015)	5.3 ±0.2 (0.210 ±0.008)	5.3 ±0.38 (0.210 ±0.015)	0.76 ±0.38 (0.030 ±0.015)
6D	8.0 ±0.38 (0.315 ±0.015)	8.9 ±0.2 (0.350 ±0.008)	9.2 ±0.38 (0.365 ±0.015)	7.4 ±0.2 (0.292 ±0.008)	7.7 ±0.38 (0.304 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
6X	8.0 ±0.38 (0.315 ±0.015)	8.9 ±0.2 (0.350 ±0.008)	13.3 ±0.38 (0.525 ±0.015)	7.4 ±0.2 (0.292 ±0.008)	11.0 ±0.38 (0.436 ±0.015)	1.9 ±0.38 (0.075 ±0.015)
6O	8.0± 0.38 (0.315 ±0.015)	12.2 ±0.4 (0.48 ±0.016)	13.3 ±0.38 (0.525 ±0.015)	10.5 ±0.4 (0.413 ±0.016)	11.0 ±0.38 (0.436 ±0.015)	1.4±0.38 (0.055 ± 0.015)



KEMET a YAGEO company

Table 1A – TSP2 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Ultra Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
4	200	2B	TSP2B207(4)004(6)(3)(1)10(5)540	80	8	40	N/A	N/A	125
6.3	130	2B	TSP2B137(4)006(6)(3)(1)10(5)540	86	8	40	N/A	N/A	125
10	66	2B	TSP2B666(4)010(6)(3)(1)10(5)540	66	8	40	N/A	N/A	125
3	660	2D	TSP2D667(4)003(6)(3)(1)10(5)540	198	10	13	N/A	N/A	125
3	1400	2D	TSP2D148(4)003(6)(3)(1)10(5)540	408	10	13	N/A	N/A	125
4	440	2D	TSP2D447(4)004(6)(3)(1)10(5)540	176	10	13	N/A	N/A	125
4	940	2D	TSP2D947(4)004(6)(3)(1)(2)(5)540	376	10	20	13	N/A	125
6.3	660	2D	TSP2D667(4)006(6)(3)(1)(2)(5)540	416	10	20	13	N/A	125
10	200	2D	TSP2D207(4)010(6)(3)(1)(2)(5)540	200	10	28	13	N/A	125
10	300	2D	TSP2D307(4)010(6)(3)(1)(2)(5)540	300	10	28	13	N/A	125
10	440	2D	TSP2D447(4)010(6)(3)(1)10(5)540	440	10	13	N/A	N/A	125
16	94	2D	TSP2D946(4)016(6)(3)(1)(2)(5)540	152	10	33	18	N/A	125
4	1,300	2X	TSP2X138(4)004(6)(3)(1)(2)(5)541	520	10	5	3	N/A	125
4	2,000	2X	TSP2X208(4)004(6)(3)(1)(2)(5)541	800	10	5	3	N/A	125
6.3	940	2X	TSP2X947(4)006(6)(3)(1)(2)(5)541	564	10	5	3	N/A	125
10	660	2X	TSP2X667(4)010(8)(3)(1)(2)(5)541	660	10	5	3	N/A	125
16	300	2X	TSP2X307(4)016(6)(3)(1)(2)(5)541	480	10	20	12	N/A	125
16	440	2X	TSP2X447(4)016(6)(3)(1)(2)(5)541	704	10	20	12	N/A	125
16	660	2X	TSP2X667(4)016(6)(3)(1)(2)(5)541	1,056	10	25	12	N/A	125
25	130	2X	TSP2X137(4)025(6)(3)(1)10(5)541	325	10	25	N/A	N/A	125
35	66	2X	TSP2X666(4)035(8)(3)(1)10(5)541	231	10	30	N/A	N/A	125
35	94	2X	TSP2X946(4)035(8)(3)(1)10(5)541	329	10	30	N/A	N/A	125
50	44	2X	TSP2X446(4)050(8)(3)(1)10(5)541	220	10	40	N/A	N/A	125
50	66	2X	TSP2X666(4)050(8)(3)(1)10(5)541	330	10	40	N/A	N/A	125
63	20	2X	TSP2X206(4)063(8)(3)(1)(2)(5)541	126	10	75	50	N/A	125
63	30	2X	TSP2X306(4)063(8)(3)(1)10(5)541	189	10	25	N/A	N/A	125

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

Table 1A – TSP2 Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Ultra Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	4,000	20	TSP20408M003(6)(3)(1)10(9)541	1,200	10	7	N/A	N/A	125
4	3,000	20	TSP20308M004(6)(3)(1)10(9)541	1,200	10	7	N/A	N/A	125
6.3	2,000	20	TSP20208M006(6)(3)(1)10(9)541	1,260	10	8	N/A	N/A	125
10	1,300	20	TSP20138M010(6)(3)(1)10(9)541	1,300	10	10	N/A	N/A	125
16	940	20	TSP20947M016(6)(3)(1)(2)(9)541	1,504	10	25	15	N/A	125
25	300	20	TSP20307M025(6)(3)(1)10(9)541	750	10	25	N/A	N/A	125
30	300	20	TSP20307M030(8)(3)(1)(2)(9)541	900	10	30	20	N/A	125
35	**130**	**20**	**TSP20137M035(8)(3)(1)10(9)541**	**455**	**10**	**25**	**N/A**	**N/A**	**125**
50	**94**	**20**	**TSP20946M050(8)(3)(1)10(9)541**	**470**	**10**	**35**	**N/A**	**N/A**	**125**
63	**44**	**20**	**TSP20446M063(8)(3)(1)10(9)541**	**277**	**10**	**25**	**N/A**	**N/A**	**125**
3	4,000	20	TSP20408M003A(3)(7)010(9)543	1,200	10	7	N/A	N/A	105
4	3,000	20	TSP20308M004A(3)(7)010(9)543	1,200	10	7	N/A	N/A	105
6.3	2,000	20	TSP20208M006A(3)(7)015(9)543	1,260	10	10	N/A	N/A	105
6.3	2,000	20	TSP20208M006A(3)(7)010(9)543	1,260	10	N/A	7	N/A	105
10	1,300	20	TSP20138M010A(3)(7)015(9)543	1,300	10	10	N/A	N/A	105
16	940	20	TSP20947M016A(3)(7)040(9)543	1,504	10	25	N/A	N/A	105
16	940	20	TSP20947M016A(3)(7)020(9)543	1,504	10	N/A	15	N/A	105
25	300	20	TSP20307M025A(3)(7)045(9)543	750	10	25	N/A	N/A	105
30	300	20	TSP20307M030A(3)(7)055(9)543	900	10	30	N/A	N/A	105
30	300	20	TSP20307M030A(3)(7)045(9)543	900	10	N/A	25	N/A	105
30	300	20	TSP20307M030A(3)(7)030(9)543	900	10	N/A	N/A	20	105
35	130	20	TSP20137M035A(3)(7)045(9)543	455	10	25	N/A	N/A	105
35	130	20	TSP20137M035A(3)(7)025(9)543	455	10	N/A	15	N/A	105
40	140	20	TSP20147M040A(3)(7)035(9)543	560	10	20	N/A	N/A	105
50	94	20	TSP20946M050A(3)(7)060(9)543	470	10	35	N/A	N/A	105
63	44	20	TSP20446M063A(3)(7)040(9)543	277	10	25	N/A	N/A	105
63	44	20	TSP20446M063A(3)(7)030(9)543	277	10	N/A	20	N/A	105

((1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.
Part numbers marked in blue font are under development.

Table 1B – TSP3 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	450	3B	TSP3B457(4)003(6)(3)(1)10(5)540	135	8	27	N/A	125
4	300	3B	TSP3B307(4)004(6)(3)(1)10(5)540	120	8	27	N/A	125
6.3	200	3B	TSP3B207(4)006(6)(3)(1)10(5)540	129	8	27	N/A	125
10	99	3B	TSP3B996(4)010(6)(3)(1)10(5)540	99	8	27	N/A	125
3	2,000	3D	TSP3D208(4)003(6)(3)(1)10(5)540	612	10	9	N/A	125
4	1,400	3D	TSP3D148(4)004(6)(3)(1)(2)(5)540	564	10	14	9	125
6.3	990	3D	TSP3D997(4)006(6)(3)(1)(2)(5)540	624	10	14	9	125
10	660	3D	TSP3D667(4)010(6)(3)(1)10(5)540	660	10	9	N/A	125
16	140	3D	TSP3D147(4)016(6)(3)(1)(2)(5)540	226	10	22	12	125
4	2,000	3X	TSP3X208(4)004(6)(3)(1)(2)(5)541	800	10	3	2	125
4	3,000	3X	TSP3X308(4)004(6)(3)(1)(2)(5)541	1,200	10	3	2	125
6.3	1,400	3X	TSP3X148(4)006(6)(3)(1)(2)(5)541	840	10	3	2	125
10	990	3X	TSP3X997(4)010(8)(3)(1)(2)(5)541	990	10	3	2	125
16	450	3X	TSP3X457(4)016(6)(3)(1)(2)(5)541	720	10	15	9	125
16	660	3X	TSP3X667(4)016(6)(3)(1)(2)(5)541	1,056	10	15	9	125
16	990	3X	TSP3X997(4)016(6)(3)(1)(2)(5)541	1,584	10	18	9	125
25	200	3X	TSP3X207(4)025(6)(3)(1)10(5)541	500	10	18	N/A	125
35	100	3X	TSP3X107(4)035(8)(3)(1)10(5)541	350	10	20	N/A	125
35	140	3X	TSP3X147(4)035(8)(3)(1)10(5)541	490	10	20	N/A	125
50	66	3X	TSP3X666(4)050(8)(3)(1)10(5)541	330	10	25	N/A	125
50	100	3X	TSP3X107(4)050(8)(3)(1)10(5)541	500	10	25	N/A	125
63	30	3X	TSP3X306(4)063(8)(3)(1)(2)(5)541	189	10	50	35	125
63	45	3X	TSP3X456(4)063(8)(3)(1)10(5)541	283.5	10	18	N/A	125

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

Table 1B – TSP3 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	6,000	30	TSP30608M003(6)(3)(1)10(9)541	1,800	10	5	N/A	125
4	4,500	30	TSP30458M004(6)(3)(1)10(9)541	1,800	10	5	N/A	125
6.3	3,000	30	TSP30308M006(6)(3)(1)10(9)541	1,890	10	6	N/A	125
10	2,000	30	TSP30208M010(6)(3)(1)10(9)541	2,040	10	7	N/A	125
16	1,400	30	TSP30148M016(6)(3)(1)(2)(9)541	2,256	10	15	9	125
25	450	30	TSP30457M025(6)(3)(1)10(9)541	1,125	10	17	N/A	125
30	450	30	TSP30457M030(6)(3)(1)(2)(9)541	1,350	10	20	12	125
35	130	30	TSP30137M035(6)(3)(1)10(9)541	714	10	17	N/A	125
50	94	30	TSP30946M050(6)(3)(1)10(9)541	705	10	22	N/A	125
3	6,000	30	TSP30608M003A(3)(7)010(9)543	1,800	10	5	N/A	105
4	4,500	30	TSP30458M004A(3)(7)010(9)543	1,800	10	5	N/A	105
6.3	3,000	30	TSP30308M006A(3)(7)010(9)543	1,890	10	8	N/A	105
6.3	3,000	30	TSP30308M006A(3)(7)015(9)543	1,890	10	7	N/A	105
10	2,000	30	TSP30208M010A(3)(7)015(9)543	2,040	10	7	N/A	105
16	1,400	30	TSP30148M016A(3)(7)020(9)543	2,256	10	9	N/A	105
16	1,400	30	TSP30148M016A(3)(7)040(9)543	2,256	10	15	N/A	105
25	450	30	TSP30457M025A(3)(7)045(9)543	1,125	10	17	N/A	105
30	450	30	TSP30457M030A(3)(7)030(9)543	1350	10	12	N/A	105
30	450	30	TSP30457M030A(3)(7)045(9)543	1350	10	17	N/A	105
30	450	30	TSP30457M030A(3)(7)055(9)543	1350	10	20	N/A	105
35	200	30	TSP30207M035A(3)(7)025(9)543	714	10	10	N/A	105
35	200	30	TSP30207M035A(3)(7)045(9)543	714	10	17	N/A	105
40	200	30	TSP30207M040A(3)(7)035(9)543	816	10	14	N/A	105
40	240	30	TSP30247M040A(3)(7)055(9)543	984	10	20	N/A	105
50	140	30	TSP30147M050A(3)(7)060(9)543	705	10	22	N/A	105

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

Table 1C – TSP4 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Ultra Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	600	4B	TSP4B607(4)003(6)(3)(1)10(5)540	180	8	20	N/A	N/A	125
4	400	4B	TSP4B407(4)004(6)(3)(1)10(5)540	160	8	20	N/A	N/A	125
6.3	270	4B	TSP4B277(4)006(6)(3)(1)10(5)540	172	8	20	N/A	N/A	125
10	130	4B	TSP4B137(4)010(6)(3)(1)10(5)540	132	8	20	N/A	N/A	125
3	2,700	4D	TSP4D278(4)003(6)(3)(1)10(5)540	816	10	7	N/A	N/A	125
4	880	4D	TSP4D887(4)004(6)(3)(1)10(5)540	352	10	7	N/A	N/A	125
4	1,900	4D	TSP4D198(4)004(6)(3)(1)(2)(5)540	752	10	10	7	N/A	125
6.3	1,300	4D	TSP4D138(4)006(6)(3)(1)(2)(5)540	832	10	10	7	N/A	125
10	400	4D	TSP4D407(4)010(6)(3)(1)(2)(5)540	400	10	14	7	N/A	125
10	880	4D	TSP4D887(4)010(6)(3)(1)10(5)540	880	10	7	N/A	N/A	125
16	190	4D	TSP4D197(4)016(6)(3)(1)(2)(5)540	301	10	17	9	N/A	125
4	2,700	4X	TSP4X278(4)004(6)(3)(1)(2)(5)541	1,080	10	3	2	N/A	125
4	4,000	4X	TSP4X408(4)004(6)(3)(1)(2)(5)541	1,600	10	3	2	N/A	125
6.3	1,900	4X	TSP4X198(4)006(6)(3)(1)(2)(5)541	1,140	10	3	2	N/A	125
10	1,300	4X	TSP4X138(4)010(8)(3)(1)(2)(5)541	1,300	10	3	2	N/A	125
16	600	4X	TSP4X607(4)016(6)(3)(1)(2)(5)541	960	10	10	8	N/A	125
16	880	4X	TSP4X887(4)016(6)(3)(1)(2)(5)541	1,408	10	10	8	N/A	125
16	1,300	4X	TSP4X138(4)016(6)(3)(1)(2)(5)541	2,080	10	12	8	N/A	125
25	260	4X	TSP4X267(4)025(6)(3)(1)10(5)541	650	10	12	N/A	N/A	125
35	130	4X	TSP4X137(4)035(8)(3)(1)10(5)541	455	10	15	N/A	N/A	125
35	190	4X	TSP4X197(4)035(8)(3)(1)10(5)541	665	10	15	N/A	N/A	125
50	88	4X	TSP4X886(4)050(8)(3)(1)10(5)541	440	10	20	N/A	N/A	125
50	130	4X	TSP4X137(4)050(8)(3)(1)10(5)541	650	10	20	N/A	N/A	125
63	40	4X	TSP4X406(4)063(8)(3)(1)(2)(5)541	252	10	40	25	N/A	125
63	60	4X	TSP4X606(4)063(8)(3)(1)10(5)541	378	10	12	N/A	N/A	125

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

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Table 1C – TSP4 Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Ultra Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	8,000	40	TSP4O808M003(6)(3)(1)10(9)541	2,400	10	5	N/A	N/A	125
4	6,000	40	TSP4O608M004(6)(3)(1)10(9)541	2,400	10	5	N/A	N/A	125
6.3	4,000	40	TSP4O408M006(6)(3)(1)10(9)541	2,520	10	5	N/A	N/A	125
10	2,700	40	TSP4O278M010(6)(3)(1)10(9)541	2,700	10	6	N/A	N/A	125
16	1,900	40	TSP4O198M016(6)(3)(1)(2)(9)541	3,040	10	15	7	N/A	125
25	600	40	TSP4O607M025(6)(3)(1)10(9)541	1,500	10	15	N/A	N/A	125
30	600	40	TSP4O607M030(8)(3)(1)(2)(9)541	1,800	10	20	10	N/A	125
35	270	40	TSP4O277M035(8)(3)(1)10(9)541	952	10	15	N/A	N/A	125
50	190	40	TSP4O197M050(8)(3)(1)10(9)541	950	10	20	N/A	N/A	125
63	88	40	TSP4O886M063(8)(3)(1)10(9)541	554	10	15	N/A	N/A	125
3	8,000	40	TSP4O808M003A(3)(7)010(9)543	2,400	10	5	N/A	N/A	105
4	6,000	40	TSP4O608M004A(3)(7)010(9)543	2,400	10	5	N/A	N/A	105
6.3	4,000	40	TSP4O408M006A(3)(7)015(9)543	2,520	10	6	N/A	N/A	105
6.3	4,000	40	TSP4O408M006A(3)(7)010(9)543	2,520	10	N/A	5	N/A	105
10	2,700	40	TSP4O278M010A(3)(7)010(9)543	2,700	10	6	N/A	N/A	105
16	1,900	40	TSP4O198M016A(3)(7)040(9)543	3,040	10	15	N/A	N/A	105
16	1,900	40	TSP4O198M016A(3)(7)020(9)543	3,040	10	N/A	7	N/A	105
25	600	40	TSP4O607M025A(3)(7)045(9)543	1,500	10	15	N/A	N/A	105
30	600	40	TSP4O607M030A(3)(7)055(9)543	1,800	10	20	N/A	N/A	105
30	600	40	TSP4O607M030A(3)(7)045(9)543	1,800	10	N/A	15	N/A	105
30	600	40	TSP4O607M030A(3)(7)030(9)543	1,800	10	N/A	N/A	10	105
35	270	40	TSP4O277M035A(3)(7)045(9)543	952	10	15	N/A	N/A	105
35	270	40	TSP4O277M035A(3)(7)025(9)543	952	10	N/A	8	N/A	105
40	270	40	TSP4O277M040A(3)(7)035(9)543	1,080	10	15	N/A	N/A	105
50	190	40	TSP4O197M050A(3)(7)060(9)543	950	10	20	N/A	N/A	105
63	88	40	TSP4O886M063A(3)(7)040(9)543	554	10	15	N/A	N/A	105
63	88	40	TSP4O886M063A(3)(7)030(9)543	554	10	N/A	10	N/A	105

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.
Part numbers marked in blue font are under development.

Table 1D – TSP6 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	900	6B	TSP6B907(4)003(6)(3)(1)10(5)540	270	8	14	N/A	125
4	600	6B	TSP6B607(4)004(6)(3)(1)10(5)540	240	8	14	N/A	125
6.3	400	6B	TSP6B407(4)006(6)(3)(1)10(5)540	258	8	14	N/A	125
10	200	6B	TSP6B207(4)010(6)(3)(1)10(5)540	198	8	14	N/A	125
3	4,100	6D	TSP6D418(4)003(6)(3)(1)10(5)540	1,224	10	5	N/A	125
4	2,800	6D	TSP6D288(4)004(6)(3)(1)(2)(5)540	1,128	10	7	5	125
6.3	2,000	6D	TSP6D208(4)006(6)(3)(1)(2)(5)540	1,248	10	7	5	125
10	900	6D	TSP6D907(4)010(6)(3)(1)(2)(5)540	900	10	10	5	125
10	1,300	6D	TSP6D138(4)010(6)(3)(1)10(5)540	1,320	10	5	N/A	125
16	280	6D	TSP6D287(4)016(6)(3)(1)(2)(5)540	452	10	11	6	125
4	4,000	6X	TSP6X408(4)004(6)(3)(1)(2)(5)541	1,600	10	2	1	125
4	6,000	6X	TSP6X608(4)004(6)(3)(1)(2)(5)541	2,400	10	2	1	125
6.3	2,800	6X	TSP6X288(4)006(6)(3)(1)(2)(5)541	1,680	10	2	1	125
10	2,000	6X	TSP6X208(4)010(8)(3)(1)(2)(5)541	2,000	10	2	1	125
16	900	6X	TSP6X907(4)016(6)(3)(1)(2)(5)541	1,440	10	8	5	125
16	1,300	6X	TSP6X138(4)016(6)(3)(1)(2)(5)541	2,080	10	8	5	125
16	2,000	6X	TSP6X208(4)016(6)(3)(1)(2)(5)541	3,200	10	9	5	125
25	400	6X	TSP6X407(4)025(6)(3)(1)10(5)541	1,000	10	9	N/A	125
35	200	6X	TSP6X207(4)035(8)(3)(1)10(5)541	700	10	10	N/A	125
35	280	6X	TSP6X287(4)035(8)(3)(1)10(5)541	980	10	10	N/A	125
50	130	6X	TSP6X137(4)050(8)(3)(1)10(5)541	650	10	12	N/A	125
50	200	6X	TSP6X207(4)050(8)(3)(1)10(5)541	1,000	10	12	N/A	125
63	60	6X	TSP6X606(4)063(8)(3)(1)(2)(5)541	378	10	25	20	125
63	90	6X	TSP6X906(4)063(8)(3)(1)10(5)541	567	10	9	N/A	125

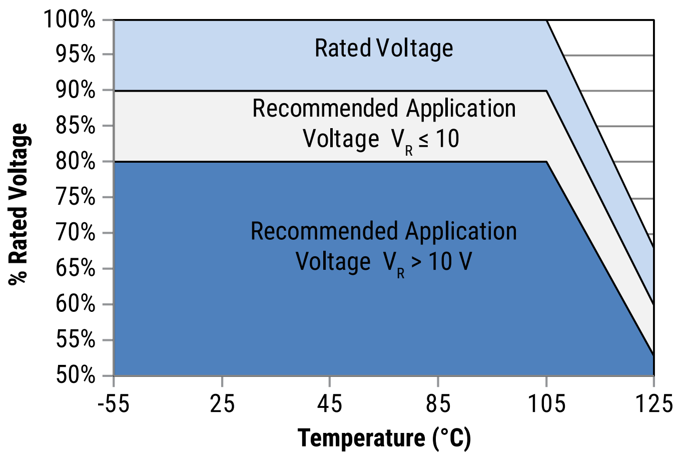
(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

Table 1D – TSP6 Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/5 Min	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	mΩ at +25°C 100 kHz Max	°C
3	12,000	6O	TSP6O129M003(8)(3)(1)10(9)541	3,600	10	4	N/A	125
4	9,000	6O	TSP6O908M004(8)(3)(1)10(9)541	3,600	10	4	N/A	125
6.3	6,000	6O	TSP6O608M006(8)(3)(1)10(9)541	3,780	10	4	N/A	125
10	4,000	6O	TSP6O408M010(8)(3)(1)10(9)541	4,080	10	5	N/A	125
16	2,800	6O	TSP6O288M016(8)(3)(1)(2)(9)541	4,512	10	9	5	125
25	900	6O	TSP6O907M025(8)(3)(1)10(9)541	2,250	10	10	N/A	125
30	900	6O	TSP6O907M030(8)(3)(1)(2)(9)541	2,700	10	11	7	125
35	400	6O	TSP6O407M035(8)(3)(1)10(9)541	1,428	10	10	N/A	125
50	280	6O	TSP6O287M050(8)(3)(1)10(9)541	1,410	10	12	N/A	125
3	12,000	6O	TSP6O129M003A(3)(7)010(9)543	3,600	10	4	N/A	105
4	9,000	6O	TSP6O908M004A(3)(7)010(9)543	3,600	10	4	N/A	105
6.3	6,000	6O	TSP6O608M006A(3)(7)010(9)543	3,780	10	4	N/A	105
6.3	6,000	6O	TSP6O608M006A(3)(7)015(9)543	3,780	10	5	N/A	105
10	4,000	6O	TSP6O408M010A(3)(7)015(9)543	4,080	10	5	N/A	105
16	2,800	6O	TSP6O288M016A(3)(7)020(9)543	4,512	10	5	N/A	105
16	2,800	6O	TSP6O288M016A(3)(7)040(9)543	4,512	10	9	N/A	105
25	900	6O	TSP6O907M025A(3)(7)045(9)543	2,250	10	10	N/A	105
30	900	6O	TSP6O907M030A(3)(7)030(9)543	2,700	10	7	N/A	105
30	900	6O	TSP6O907M030A(3)(7)045(9)543	2,700	10	10	N/A	105
30	900	6O	TSP6O907M030A(3)(7)055(9)543	2,700	10	11	N/A	105
35	400	6O	TSP6O407M035A(3)(7)025(9)543	1,428	10	6	N/A	105
35	400	6O	TSP6O407M035A(3)(7)035(9)543	1,428	10	8	N/A	105
35	400	6O	TSP6O407M035A(3)(7)045(9)543	1,428	10	10	N/A	105
40	480	6O	TSP6O487M040A(3)(7)055(9)543	1,968	10	11	N/A	105
50	280	6O	TSP6O287M050A(3)(7)060(9)543	1,410	10	12	N/A	105

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C, 85 = 4 cycles + 25°C + improved humidity, 86 = 10 cycles +25°C +improved humidity,
87 = 10 cycles +55°C and +85°C + improved humidity. Designates surge current option
(2) To complete KEMET part number, insert 05= High ESR ,10 = Standard ESR, 20 = Low ESR. Designates ESR option.
(3) To complete KEMET part number, insert H = Standard solder coated or T = 100% Tin
(4) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates Capacitance tolerance.
(5) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, or T = 100% Tin (Sn). Designates Termination Finish (stack)
(6) To complete KEMET part number, insert D (0.001%/1,000 hours), C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(7) To complete KEMET part number, insert E = None, S = 10 cycles at +25°C, W = 10 cycles −55°C and +85°C. Designates surge current option for T543 discrete component
(8) To complete KEMET part number, C (0.01%/1,000 hours), B (0.1%/1,000 hours), or A = N/A. Designates Reliability Level.
(9) To complete KEMET part number, insert D = Silver-plated (Ag) , H = Solder-plated, T = 100% Tin (Sn) or X = Leadless stack.
Please contact your sales representative for availability of engineering samples.

Derating Guidelines



Recommended Application Voltage
KO-CAPs are solid state capacitors that demonstrate no wearout mechanism when operated within their recommended guidelines. While the KO-CAP can be operated at full rated voltage, most circuit designers seek a minimum level of assurance in long term reliability, which should be demonstrated with data. A voltage derating can provide the desired level of demonstrated reliability based on industry accepted acceleration models. Since most applications do require long term reliability, KEMET recommends that designers consider a voltage derating, according the graphic above, for the maximum steady state voltage.

Voltage Rating	Maximum Recommended Steady State Voltage	
	−55°C to 105°C	105°C to 125°C
10 V ≤ V_R	90% of V_R	90% of V_R, See Chart
V_R > 10	80% of V_R	54% of V_R, See Chart

V_R = Rated Voltage

Reverse Voltage

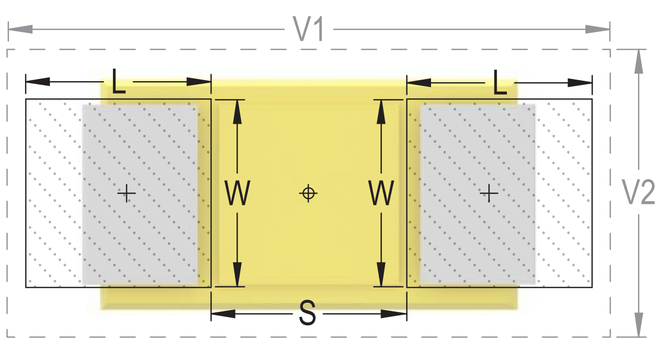
Solid electrolytic capacitors are polar devices and may be permanently damaged or destroyed if connected with the wrong polarity. The positive terminal is identified on the capacitor body by a stripe plus in some cases a beveled edge. A small degree of transient reverse voltage is permissible for short periods per the table. The capacitors should not be operated continuously in reverse mode, even within these limits.

Temperature	Permissible Transient Reverse Voltage
25°C	15% of Rated Voltage
85°C	5% of Rated Voltage
125°C	1% of Rated Voltage

Table 2 – Land Dimensions/Courtyard

KEMET	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	L	W	S	V1	V2	L	W	S	V1	V2	L	W	S	V1	V2
TSP2B	2.34	2.54	1.41	7.10	4.30	1.94	2.42	1.61	6.00	3.80	1.56	2.32	1.77	5.14	3.54
TSP2C	2.98	2.74	2.53	9.50	4.50	2.58	2.62	2.73	8.40	4.00	2.20	2.52	2.89	7.54	3.74
TSP2D	3.48	3.24	3.03	11.00	5.60	3.08	3.12	3.23	9.90	5.10	2.70	3.02	3.39	9.04	4.84
TSP2X	3.48	3.24	3.03	11.00	5.60	3.08	3.12	3.23	9.90	5.10	2.70	3.02	3.39	9.04	4.84
TSP2O	3.48	4.53	3.87	11.00	7.50	3.08	4.41	4.07	9.90	7.00	2.70	4.31	4.23	9.07	6.74
TSP3B	2.34	2.54	1.41	7.10	4.30	1.94	2.42	1.61	6.00	3.80	1.56	2.32	1.77	5.14	3.54
TSP3D	3.48	3.24	3.03	11.00	5.60	3.08	3.12	3.23	9.90	5.10	2.70	3.02	3.39	9.04	4.84
TSP3X	3.48	3.24	3.03	11.00	5.60	3.08	3.12	3.23	9.90	5.10	2.70	3.02	3.39	9.04	4.84
TSP3O	3.48	4.53	3.87	11.00	7.50	3.08	4.41	4.07	9.90	7.00	2.70	4.31	4.23	9.07	6.74
TSP4B	2.34	5.54	1.41	7.10	7.30	1.94	5.42	1.61	6.00	6.80	1.56	5.32	1.77	5.14	6.54
TSP4D	3.48	7.64	3.03	11.00	10.10	3.08	7.52	3.23	9.90	9.60	2.70	7.42	3.39	9.04	9.34
TSP4X	3.48	7.64	3.03	11.00	10.10	3.08	7.52	3.23	9.90	9.60	2.70	7.42	3.39	9.04	9.34
TSP4O	3.48	10.93	3.87	11.00	13.64	3.08	10.81	4.07	9.90	13.14	2.70	10.71	4.23	9.07	12.88
TSP6B	2.34	5.54	1.41	7.10	7.30	1.94	5.42	1.61	6.00	6.80	1.56	5.32	1.77	5.14	6.54
TSP6D	3.48	7.64	3.03	11.00	10.10	3.08	7.52	3.23	9.90	9.60	2.70	7.42	3.39	9.04	9.34
TSP6X	3.48	7.64	3.03	11.00	10.10	3.08	7.52	3.23	9.90	9.60	2.70	7.42	3.39	9.04	9.34
TSP6O	3.48	10.93	3.87	11.00	13.64	3.08	10.81	4.07	9.90	13.14	2.70	10.71	4.23	9.07	12.88

Density Level A: *For low-density Product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC-7351).*



Grid Placement Courtyard

Soldering Process

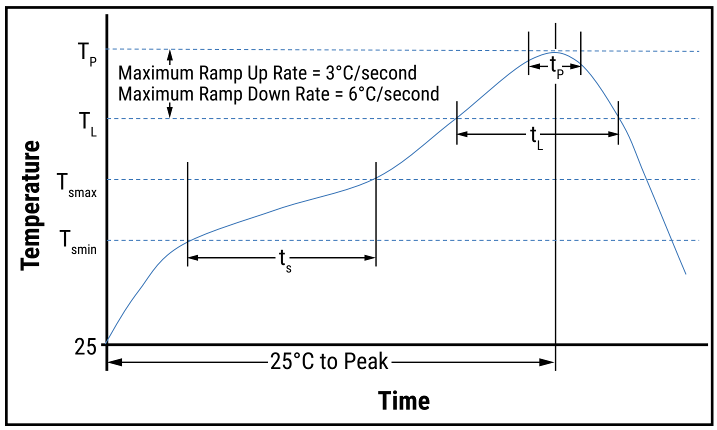
KEMET's families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/seconds maximum	3°C/seconds maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C	250°C
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/seconds maximum	6°C/seconds maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.



Storage

All KO-Cap Series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC).
These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J-STD-020 and packaged per IPC/JEDEC J–STD–033
MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity
Unused capacitors should be sealed in a MBB with fresh desiccant.
Calculated shelf life in sealed bag:
– 12 months from bag seal date in a storage environment of <40°C and humidity <90% RH
– 24 months from bag seal date in a storage environment of <30°C and humidity <70% RH
If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure

Packaging Information

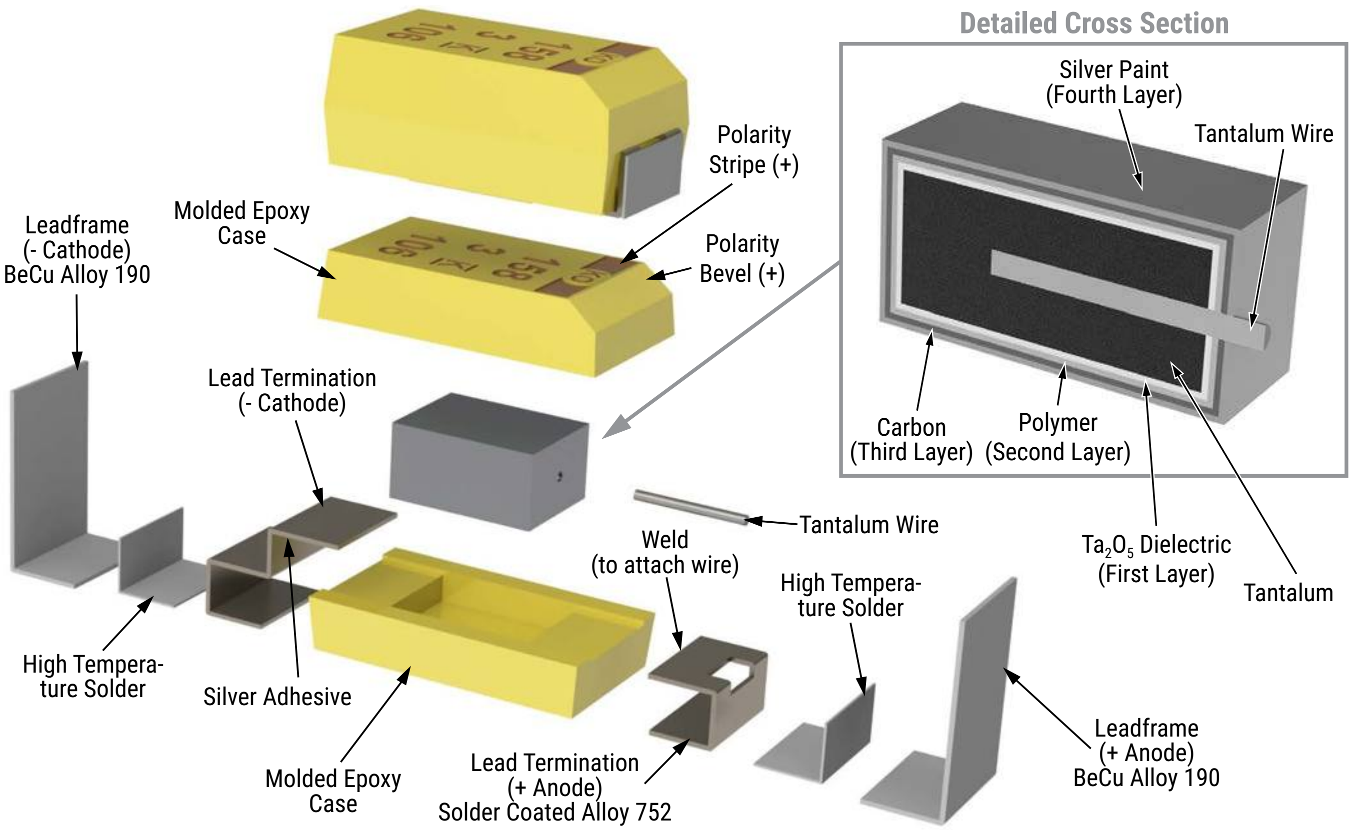
KEMET Tantalum Stack Polymer (TSP) are packed in plastic trays
This packaging method is for manual board placement

Packaging Quantity

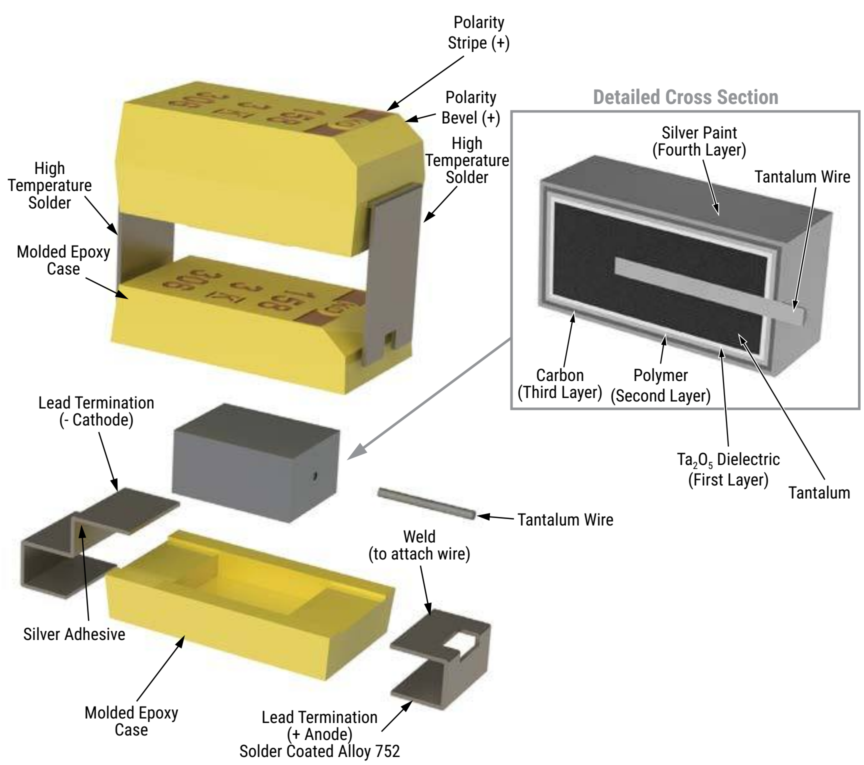
Case Code	Min pcs/tray	Max pcs/tray
2X	1	50
3X	1	50
4X	1	50
6X	1	50

X denotes the different stacks letter (B, C, D, X and O)

Construction- Leaded

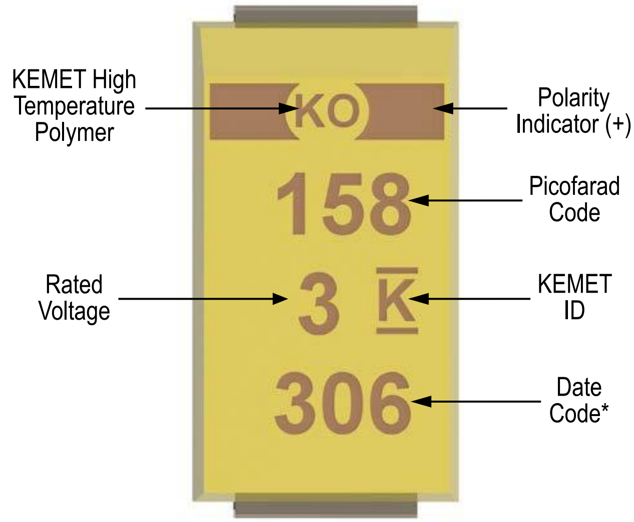


Construction- Leadless



Marking (Discrete Capacitor)

T540/T541/T543



* 306 = 6th week of 2023

Date Code *	
1st digit = Last number of Year	0 = 2020 1 = 2021 2 = 2022 3 = 2023 4 = 2024
2nd and 3rd digit = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

NOTE: The marking observed is for the discrete capacitor used in the construction of the stacked product.

T522 Reduced Leakage Polymer Electrolytic, 6.3 VDC

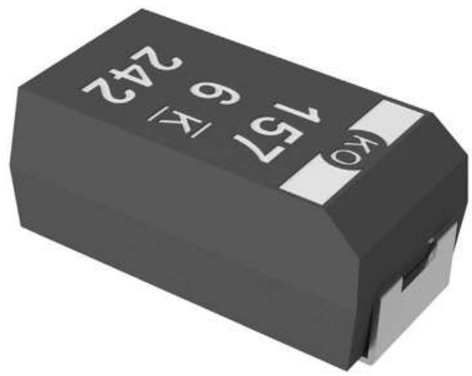
Overview

The KEMET Organic Capacitor (KO-CAP) is a solid electrolytic capacitor with a conductive polymer cathode capable of delivering very low ESR and improved capacitance retention at high frequencies. KO-CAP combines the low ESR of multilayer ceramic, the high capacitance of aluminum electrolytic, and the volumetric efficiency of tantalum into a single surface mount package. Unlike liquid electrolyte-based capacitors, KO-CAP has a very long operational life, and high ripple current capabilities.

The T522 Reduced Leakage Polymer Electrolytic design is based on the T520 KO-CAP series. Developed specifically to meet the needs of leakage current sensitive applications, the T522 is well-suited for battery-based circuits. The T522 provides the lowest leakage values available in polymer electrolytic capacitors, with upper leakage limits that are up to 70% lower than comparable KO-CAP capacitors.

Benefits

- ESR: 25 to 40 mΩ
- Volumetrically efficient
- High frequency capacitance retention
- 100% accelerated steady state aging
- 100% surge current tested
- EIA standard case sizes
- Low profile designs
- Halogen-free epoxy and RoHS Compliant



Applications

Typical applications include battery dependent applications such as handheld consumer electronics, global tracking systems, energy harvesting, wireless sensors, and other applications that seek high capacitance, low profile, safety, and low power consumption.

Environmental Compliance

- RoHS compliant when ordered with 100% Sn, Ni-Pd-Au or non-magnetic 100% Sn solder
- Halogen-free
- Epoxy compliant with UL94 V-0

Ordering Information

T	522	V	157	M	006	A	T	E025	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR Code	Packaging (C-Spec)
T = Tantalum	522 = Reduced Leakage Polymer	V Y	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	006 = 6.3	A = N/A	T = 100% Matte Tin (Sn)-plated H = Tin/Lead (SnPb) solder coated (5% Pb minimum)	E = ESR Last three digits specify ESR in mΩ. (025 = 25 mΩ)	Blank = 7" Reel 7280 = 13" Reel

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	–55°C to 105°C
Rated Capacitance Range	150 – 470 µF at 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	6.3 V
DF (120 Hz)	≤ 10%
ESR (100 kHz)	Refer to Part Number Electrical Specification Table 1
Leakage Current	≤ 0.03 CV (µA) at rated voltage after 10 minutes

Qualification

<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">105°C at rated voltage, 2,000 hours</td><td>Δ C/C</td><td colspan="3">Within −20/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.5 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">105°C at 0 volts, 2,000 hours</td><td>Δ C/C</td><td colspan="3">Within −20/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.5 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Humidity</td><td colspan="2" rowspan="4">60°C, 90% RH, 500 hours, rated voltage</td><td>Δ C/C</td><td colspan="3">Within −5%/+35% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 5.0 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at +25°C, −55°C, +25°C, +85°C, +105°/125°C, +25°C</td><td></td><td>+25°C</td><td>−55°C</td><td>+85°C</td><td>+105ºC</td></tr>
<tr><td>Δ C/C</td><td>IL*</td><td>±20%</td><td>±20%</td><td>±30%</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>1.2 x IL</td><td>1.5 x IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>10 x IL</td><td>10 x IL</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">105°C, 1.32 x rated voltage, 33 Ω Resistance, 1,000 cycles</td><td>Δ C/C</td><td colspan="3">Within −20%/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within initial limits</td></tr>
<tr><td rowspan="3">Mechanical Shock/ Vibration</td><td colspan="2" rowspan="3">MIL–STD–202, Method 213, Condition I, 100 G peak. MIL–STD–202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
</table>

**IL = Initial limit*

Reliability

KO-CAP capacitors have an average failure rate of 0.5 %/1,000 hours at category voltage, U_C, and category temperature, T_C. These capacitors are qualified using industry test standards at U_C and T_C. The minimum test time (1,000 or 2,000 hours) is dependent on the product.

The actual life expectancy of KO-CAP capacitors increases when application voltage, U_A, and application temperature, T_A, are lower than U_C and T_C. As a general guideline, when $U_A < 0.9 * U_C$ and $T_A < 85°C$, the life expectancy will typically exceed the useful lifetime of most hardware (> 10 years).

The lifetime of a KO-CAP capacitor at a specific application voltage and temperature can be modeled using the equations below. A failure is defined as passing enough current to blow a 1-Amp fuse. The calculation is an estimation based on empirical results and is not a guarantee.

$$VAF = \left(\frac{U_C}{U_A}\right)^n$$

where:
VAF = acceleration factor due to voltage, unitless
U_C = category voltage, volt
U_A = application voltage, volt
n = exponent, 16

$$TAF = e^{\left[\frac{E_a}{k}\left(\frac{1}{273+T_A} - \frac{1}{273+T_C}\right)\right]}$$

where:
TAF = acceleration factor due to temperature, unitless
E_a = activation energy, 1.4 eV
k = Boltzmann's constant, 8.617E-5 eV/K
T_A = application temperature, °C
T_C = category temperature, °C

$$AF = VAF * TAF$$

where:
AF = acceleration factor, unitless
TAF = accerlation factor due to temperature, unitless
VAF = acceleration factor due to voltage, unitless

$$Life_{U_A,T_A} = Life_{U_C,T_C} * AF$$

where:
$Life_{UA,\,TA}$ = estimated life application voltage and temperature, years
$Life_{UC,\,TC}$ = guaranteed life category voltage and temperature, years
AF = acceleration factor, unitless

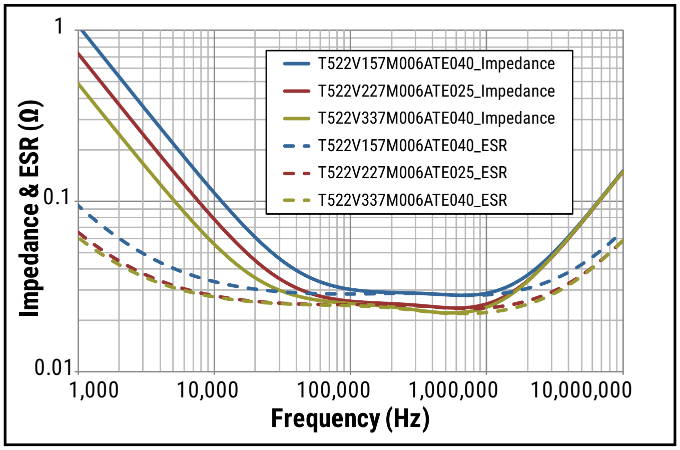
Reliability Table 1 – Common temperature range classifications

85°C (T_R) / 85°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 105°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 125°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	1.7	2.7	4.2	5.4	6.7	8.4	10.7	13.4	16.8	23.5	33.5	42.2	50.3

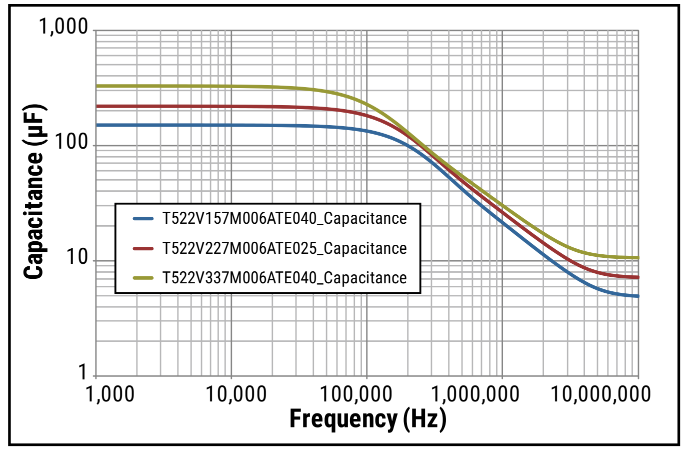
Terms:
Category Voltage, U_C: Maximum recommended peak DC operating voltage for continuous operation at the category temperature, T_C
Rated Voltage, U_R: Maximum recommended peak DC operating voltage for continuous operation up to the rated temperature, T_R
Category Temperature, T_C: Maximum recommended operating temperature; voltage derating may be required at T_C
Rated Temperature, T_R: Maximum recommended operating temperature without voltage derating; T_R is equal to or lower than T_C

Electrical Characteristics

Impedance & ESR vs. Frequency

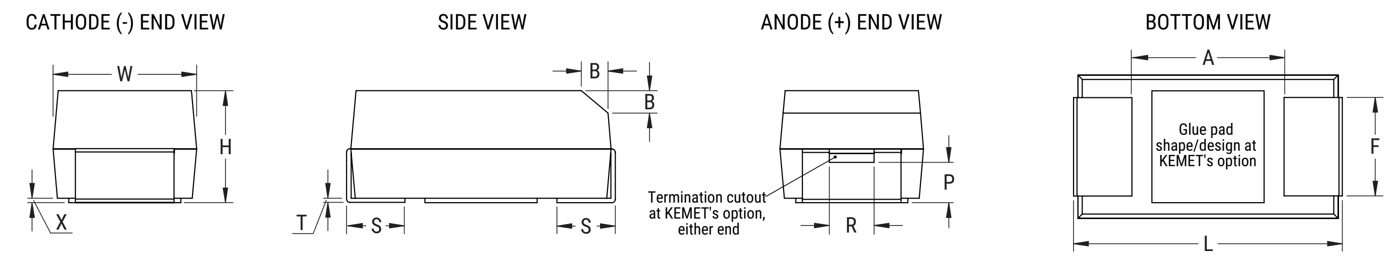


Capacitance vs. Frequency



Dimensions – Millimeters (Inches)

Metric will govern



Case Size		Component Dimensions											Typical Weight
KEMET	EIA	L	W	H	F ±0.1 ±(0.004)	S ±0.3 ±(0.012)	B ±0.15 (Ref) ±0.006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Minimum)	(mg)
V	7343-19	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.9 (0.075) ±0.1 (0.004)	2.4 (0.094)	1.3 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	274.30
Y	7343-40	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	3.8 ±0.2 (0.150 ±0.008)	2.4 (0.094)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	493.99

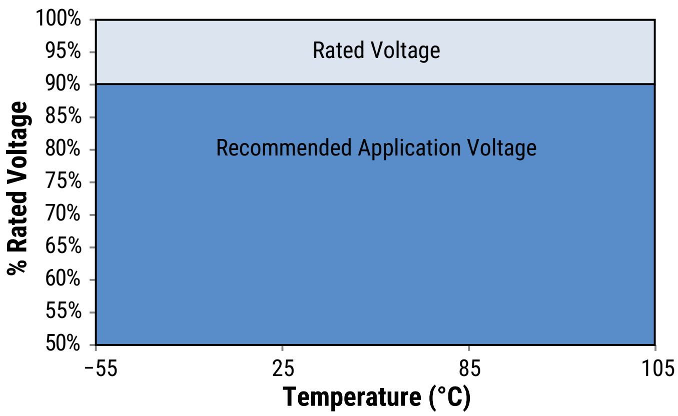
Notes: (Ref) – Dimensions provided for reference only. For low profile cases, no dimensions are provided for B, P, or R because these cases do not have a bevel or a notch.
These weights are provided as reference. If exact weights are needed, please contact your KEMET Sales Representative.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Max/10 Min.	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(mA) 45°C 100 kHz* Maximum Allowable	Reflow Temp ≤ 260°C	°C
6.3	150	V/7343-19	T522V157M006A(1)E025	28	10	25	2,700	3	105
6.3	150	V/7343-19	T522V157M006A(1)E040	28	10	40	2,200	3	105
6.3	220	V/7343-19	T522V227M006A(1)E025	42	10	25	2,700	3	105
6.3	220	V/7343-19	T522V227M006A(1)E040	42	10	40	2,200	3	105
6.3	330	V/7343-19	T522V337M006A(1)E040	62	10	40	2,200	3	105
6.3	470	Y/7343-40	T522Y477M006A(1)E035	89	10	35	2,600	3	105

(1) Standard with tin terminations (14th character = T). Tin/lead terminations is also available (14th character = H).
Also available on large (13 inch) reels. Add 7280 to the end of the part number.
Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Derating Guidelines



Recommended Application Voltage
KO-CAPs are solid state capacitors that demonstrate no wearout mechanism when operated within their recommended guidelines. While the KO-CAP can be operated at full rated voltage, most circuit designers seek a minimum level of assurance in long term reliability, which should be demonstrated with data. A voltage derating can provide the desired level of demonstrated reliability based on industry accepted acceleration models. Since most applications do require long term reliability, KEMET recommends that designers consider a voltage derating, according the graphic above, for the maximum steady state voltage

Voltage Rating	Maximum Recommended Steady State Voltage
	−55°C to 105°C
6.3 V	90% of V_R

V_R = Rated Voltage

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage which may be applied is limited by two criteria:

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage. See the Reverse Voltage section for allowable limits.

The maximum power dissipation by case size can be determined using the table at right. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Refer to the table below for temperature compensation requirements.

Temperature Compensation Multipliers for Maximum Ripple Current		
T ≤ 45°C	45° C < T ≤ 85°C	85°C < T ≤ 125°C
1.00	0.70	0.25

T= Environmental Temperature

The maximum power dissipation rating must be reduced with increasing environmental operating temperatures. Refer to the Temperature Compensation Multiplier table for details.

KEMET Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts at 45°C with +30°C Rise
V	7343-19	187
Y	7343-40	241

Using the P max of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{P\ max/R}$
$E(max) = Z\ \sqrt{P\ max/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
P max = maximum power dissipation (watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (ohms)

Surge Voltage

Surge voltage is the maximum voltage (peak value) which may be applied to the capacitor.
The surge voltage must not be applied for periodic charging and discharging in the course of normal operation and cannot be part of the application voltage.
Surge voltage capability is demonstrated by application of 1,000cycles at relevant voltage at 105ºC and 125ºC.
The parts are charged through a 33 Ohm resistor for 30 seconds and then discharged though a 33 Ohm resistor for each cycle.

Rated Voltage (V)	Surge Voltage (V)	Category Voltage (V)	Category Surge Voltage (V)
–55ºC to 105ºC		up to 125ºC	
2.5	3.3	1.7	2.2
6.3	8.2	4.2	5.5
10	13	6.7	8.7
16	20.8	10.7	13.9
20	26	13.4	17.4
25	32.5	16.8	21.8
35	45.5	23.5	30.5
50	65	33.5	43.6

Reverse Voltage

Polymer electrolytic capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a small degree of transient voltage reversal for short periods as shown in the below table.

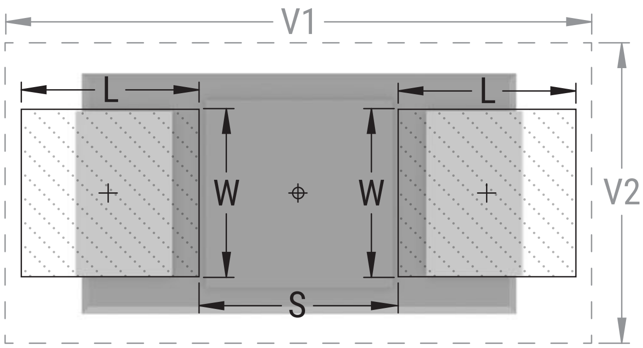
Temperature	Permissible Transient Reverse Voltage
25°C	15% of rated voltage
55°C	10% of rated voltage
85°C	5% of rated voltage
105°C	3% of rated voltage
125°C*	1% of rated voltage

**For series rated to 125°C*

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
V	7343–20	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
Y[1]	7343–40	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component desity product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] *Height of these chips may create problems in wave soldering.*
[2] *Land pattern geometry is too small for silkscreen outline.*



Grid Placement Courtyard

Soldering Process

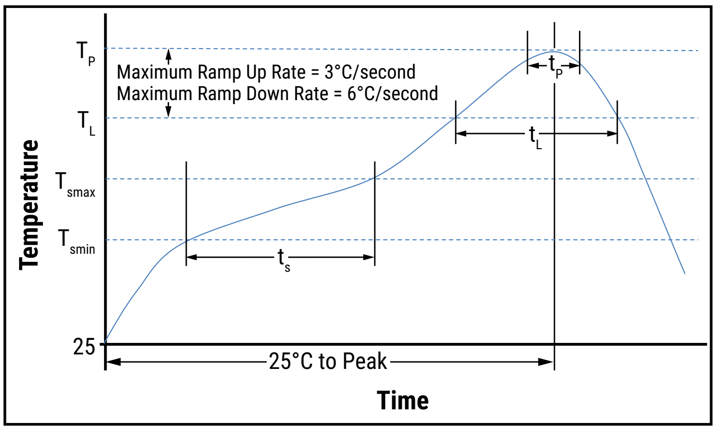
KEMET's families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/seconds maximum	3°C/seconds maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/seconds maximum	6°C/seconds maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



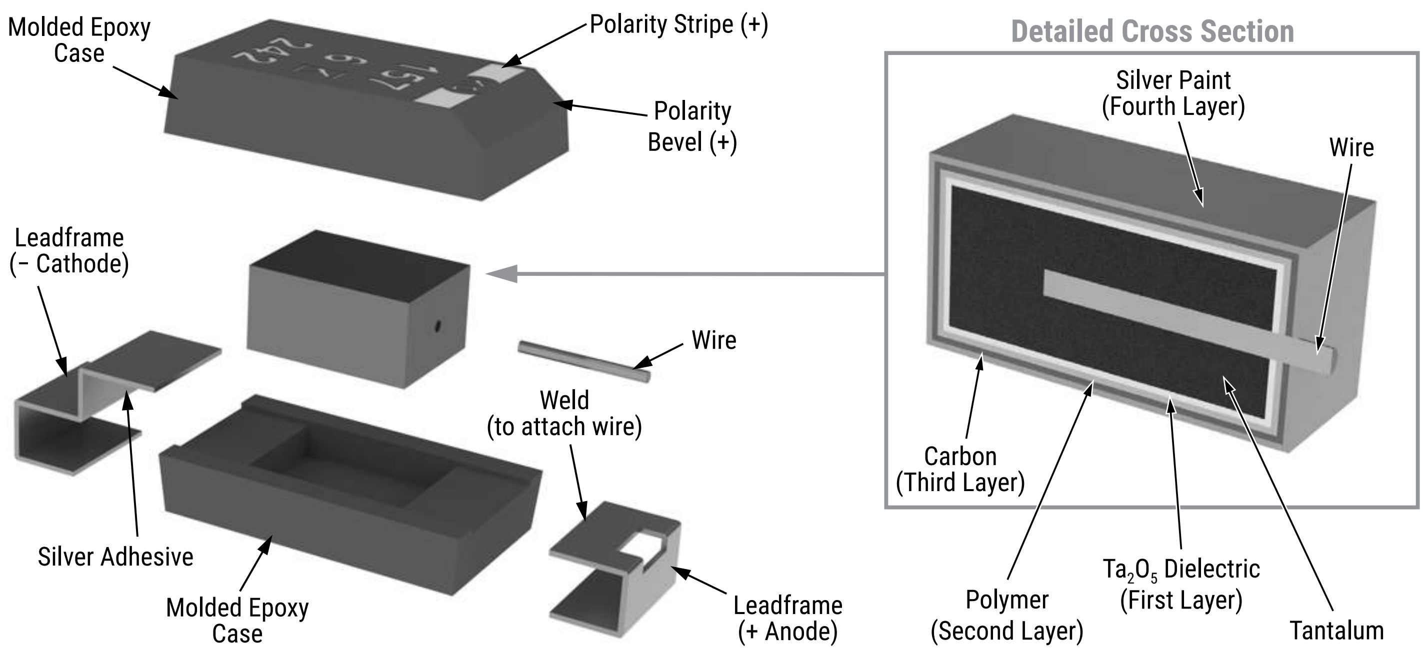
Storage

All KO-CAP Series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J–STD–020 and packaged per IPC/JEDEC J–STD–033. MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

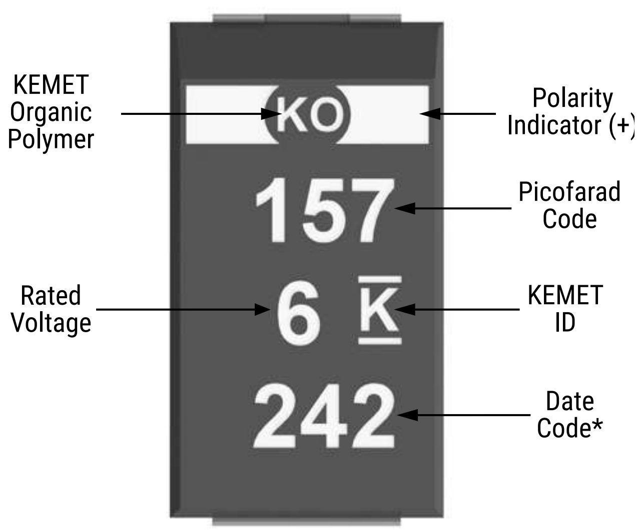
The calculated shelf life in a sealed bag would be 12 months from a bag seal date in a storage environment of < 40°C and humidity < 90% RH. It should be 24 months from a bag seal date in a storage environment of < 30°C and humidity < 70% RH.

If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure.

Construction



Capacitor Marking



* 242 = 42nd week of 2012

Date Code *	
1st digit = Last number of Year	2 = 2012 3 = 2013 4 = 2014 5 = 2015 6 = 2016 7 = 2017
2nd and 3rd digit = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

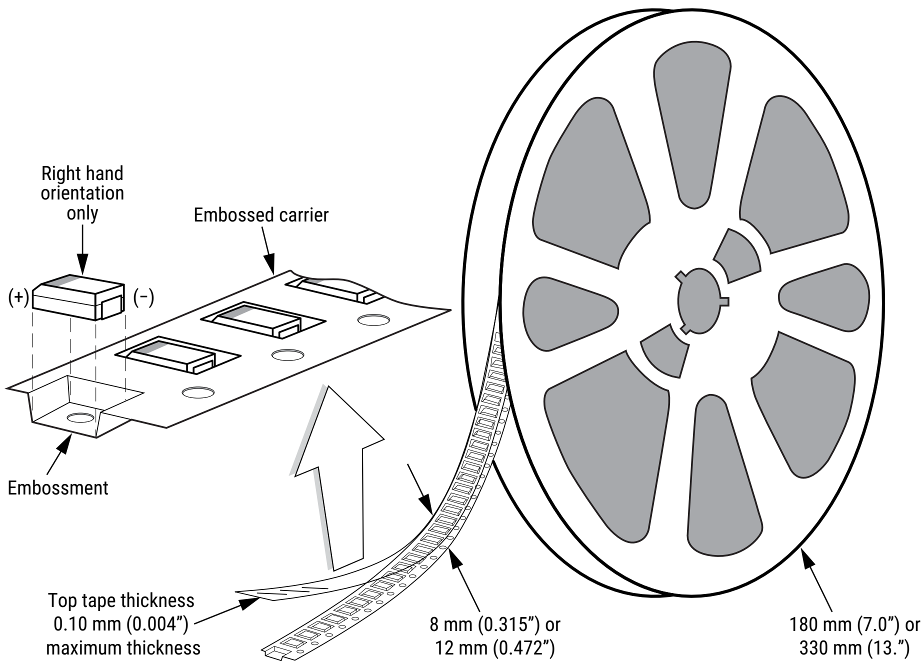


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
R	2012−12	8	2,500	10,000
I	3216−10	8	3,000	12,000
S	3216−12	8	2,500	10,000
T	3528−12	8	2,500	10,000
M	3528−15	8	2,000	8,000
U	6032−15	12	1,000	5,000
L	6032−19	12	1,000	3,000
W	7343−15	12	1,000	3,000
Z	7343−17	12	1,000	3,000
V	7343−19	12	1,000	3,000
A	3216−18	8	2,000	9,000
B	3528−21	8	2,000	8,000
C	6032−28	12	500	3,000
D	7343−31	12	500	2,500
Y	7343−40	12	500	2,000
X	7343−43	12	500	2,000
E/T428P	7360−38	12	500	2,000
H	7360−20	12	1,000	2,500

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

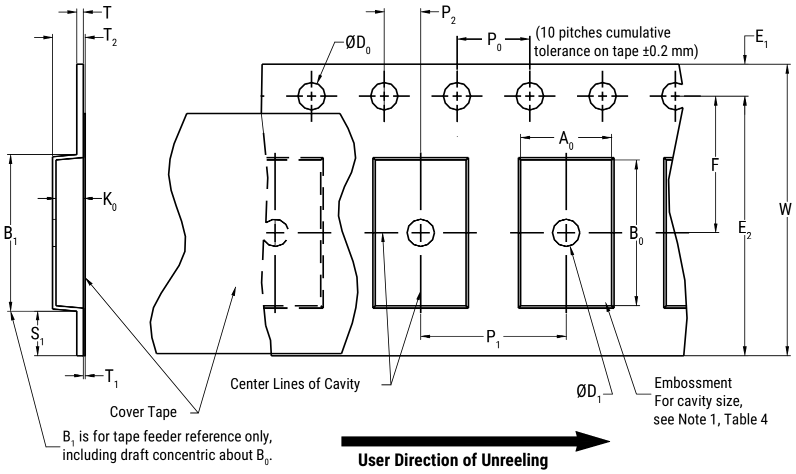


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/−0.0 (0.059+0.004/−0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0, B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) and Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape, with or without components, shall pass around R without damage (see Figure 4).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
   (e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

Packaging Information Performance Notes

1. Cover Tape Break Force: 1.0 kg minimum.
2. Cover Tape Peel Strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 Newton (10 to 100 gf)
12 and 16 mm	0.1 to 1.3 Newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624*.

Figure 2 – Maximum Component Rotation

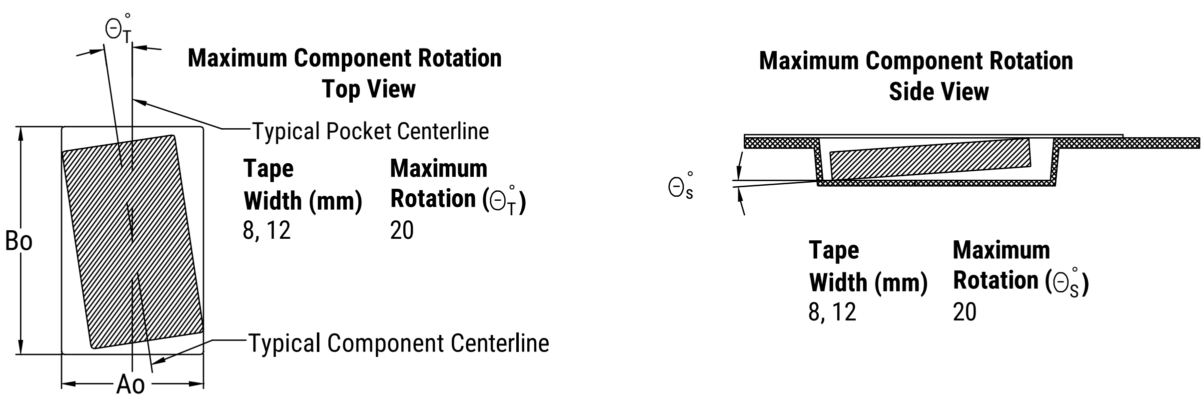


Figure 3 – Maximum Lateral Movement

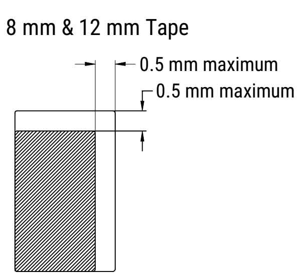


Figure 4 – Bending Radius

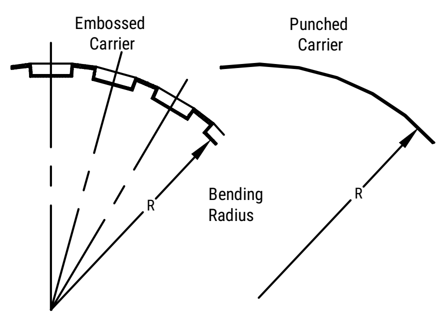
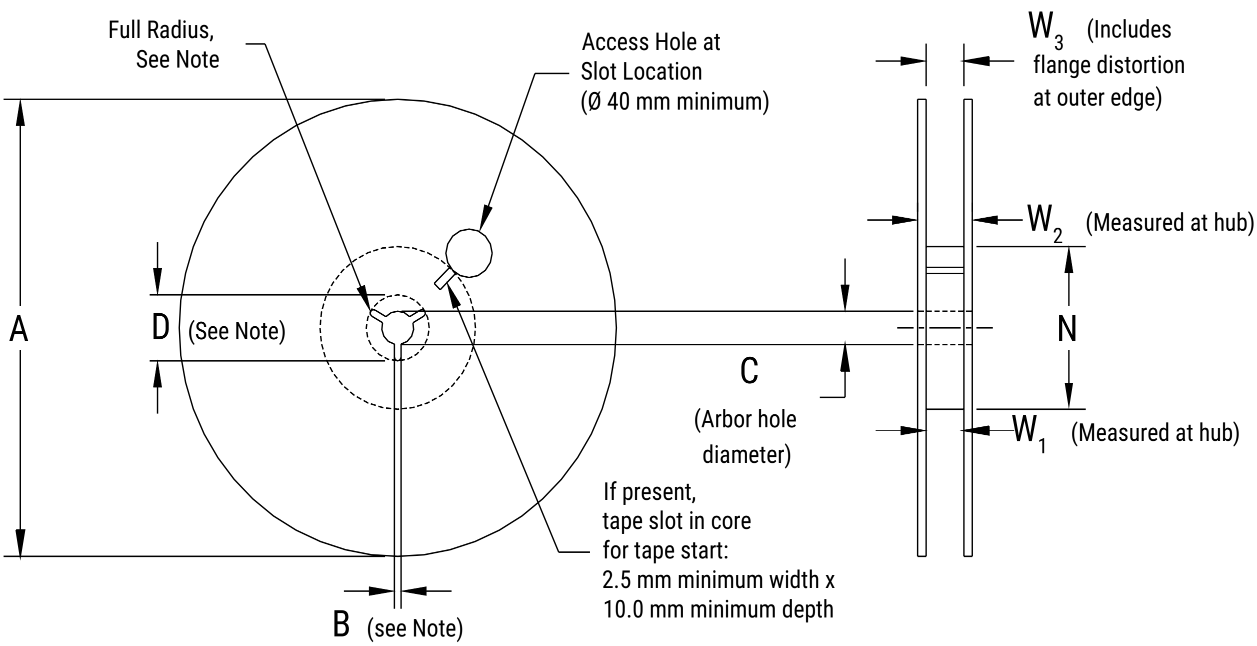


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm 12 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

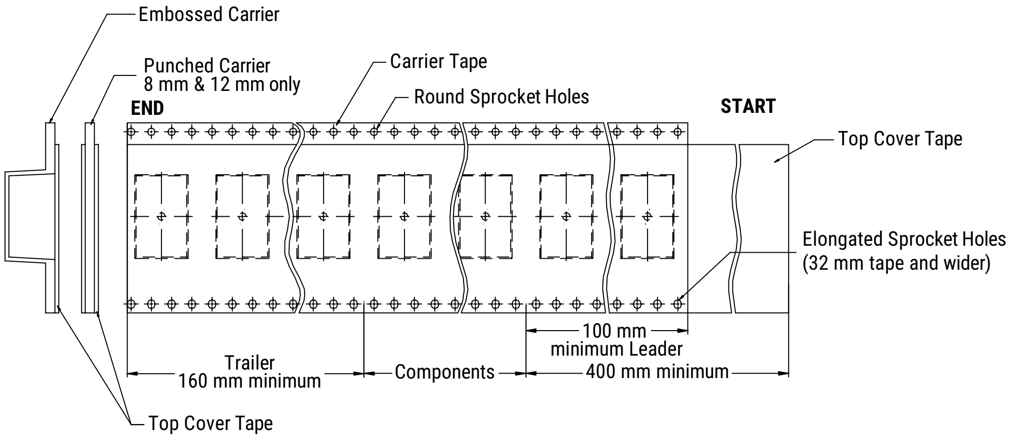
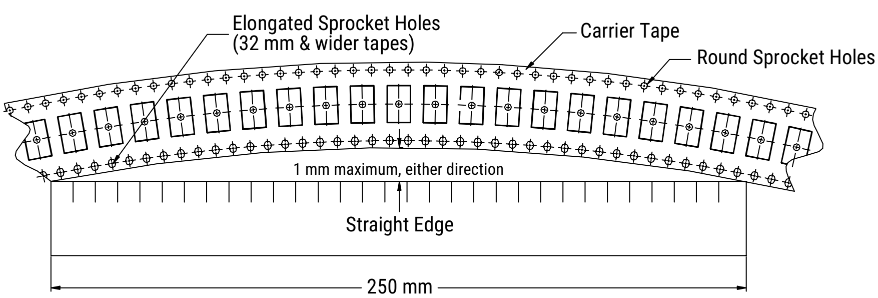


Figure 7 – Maximum Camber



Tantalum Polymer Capacitors – Hermetically Sealed

T550 Axial & T555 Surface Mount 105°C

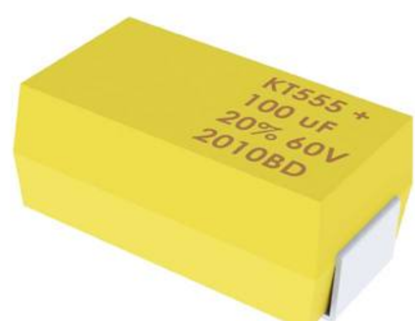
Overview

The T550 axial leaded and T555 surface mount polymer hermetically sealed (PHS) devices are tantalum capacitors with a Ta anode and Ta_2O_5 dielectric. A conductive organic polymer replaces the traditionally used MnO_2 or wet electrolyte as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency and low temperature. The PHS device also exhibits a benign failure mode, which eliminates the case breach that can occur in wet tantalum capacitors. Additionally, this part may be operated at voltages up to 80% of rated voltage, with equivalent or better reliability than traditional MnO_2 or wet tantalum capacitors operated at 50% of rated voltage.

PHS capacitors also offer higher ripple current handling capability and a lower ESR range than wet tantalums. With reduced ESR and enhanced capacitance retention at higher frequencies and low temperatures, these parts provide the highest total capacitance and the most economical solution for high power applications, all within an approximately 25% lighter package than the equivalent wet tantalum capacitor.

Benefits

- Includes F-Tech anode which eliminates hidden defects in the dielectric
- 100% simulated breakdown screening
- Maximum operating temperature of +105°C
- DLA drawing 13030 qualified parts available
- Polymer cathode technology
- Extremely low ESR
- High frequency and low temperature capacitance retention
- 100% constant voltage conditioning (240 hours)
- 100% surge current tested
- Volumetrically efficient
- Non-ignition failure mode
- Approximately 25% lighter than equivalent wet tantalum
- T555 surface mount design (see dimensions diagram)



Applications

Typical applications include high voltage power management, such as buck/boost converters, filtering, hold-up capacitors, and other high ripple current applications.

Ordering Information

T	550	B	107	M	025	A	T	4251	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Product Level	Termination Finish	Surge Option**	Packaging**
T = Tantalum	550 = Axial Leaded PHS 555 = Surface Mount PHS	B C	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	006 = 6.3 008 = 8 010 = 10 015 = 15 025 = 25 030 = 30 035 = 35 040 = 40 050 = 50 060 = 60 075= 75 100 = 100	A = N/A B* = DLA 13030 standard reliability T* = DLA 13030 high reliability E* = DLA 13030 "B" level equivalent for T termination F* = DLA 13030 "T" level equivalent for T termination	T = 100% tin (Sn)-plated H = Tin/lead (SnPb) solder coated (5% Pb minimum)	Blank = 25°C ±5°C, 10 cycles, after constant voltage conditioning (KEMET standard) 4251 = 10 cycles, −55°C and +85°C after constant voltage conditioning 4252 = 10 cycles, −55°C and +85°C before constant voltage conditioning	Blank = Bulk/Sleeved 0100 = Bulk/Unsleeved 7200 = Tape & Reel/Sleeved 7293 = Ammo/Sleeved 7443 = Ammo/Sleeved

** Only available on select parts. Refer to part number table for details.*
*** Only for T550 (Surge options/Packaging)*

Ordering Information – DLA

13030	-01	K	A	S	L	B
Drawing Number	Dash Number	Capacitance Tolerance	Surge Current Testing	Insulation	Lead Length	Product Level
	See Part Number Table	K = ±10% M = ±20%	A = +25°C ±5°C, 10 cycles, after constant voltage conditioning (KEMET standard) B = −55°C, −5°C, +0°C and +85°C ±5°C after constant voltage conditioning. C = −55°C, −5°C, +0°C and +85°C ±5°C before constant voltage conditioning.	S = Sleeved U = Unsleeved	L = 1.50 inches (standard)	B = Standard reliability T = High reliability

** Standard terminations for DLA part numbers is "H" (SnPb).*

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 105°C
Rated Capacitance Range	20 – 680 µF at 120 Hz/25°C *
Capacitance Tolerance	K tolerance (±10%), M tolerance (±20%)
Rated Voltage Range	6.3 – 100 V
DF (120 Hz at 25°C)	Refer to Part Number Electrical Specification Table
ESR (100 kHz at 25°C)	Refer to Part Number Electrical Specification Table
Leakage Current	Refer to Part Number Electrical Specification Table (rated voltage up to +85°C and 78% of rated voltage applied at 105°C)
Packaging	T550 according to MIL-PRF-39006, T555 bulk

KEMET does not recommend storage above 85°C.
** Additional case sizes and capacitance/voltage are under development.*

Qualification - T550

Test Performed	Method Reference	Test Conditions
Reliability and Environmental Tests		
AC Ripple Life at 85˚C	MIL–PRF–39006	85˚C, 40 kHz ripple current, 2,000 hours
85˚C Life	KEMET Standard	85˚C, rated voltage, 2,000 hours
105˚C Life	KEMET Standard	105˚C, 0.78 x rated voltage, 2,000 hours
Surge Voltage	MIL–PRF–39006	85˚C, 1.15 x rated voltage, 1,000 cycles, except delta cap shall be +10%/-20%
Surge Current	MIL–PRF–39003	+25 °C, 10 cycles (Option A), Option B available
Low Temperature Storage	MIL–PRF–39006	-62˚C for 72 hours followed by 1 hour at 125˚C
Reverse Voltage	KEMET Catalog	1 V for 8 hours maximum at 25°C, 1 V for 2 hours maximum at 70°C
Physical, Mechanical and Process Tests		
Visual and Mechanical Examination (Internal and External)	MIL–PRF–39006	Case dimensions, marking
Terminal Strength	MIL–PRF–39006	Pull test and wire lead bend test
Resistance to Solvents	MIL–PRF–39006	Immersion in (3) solvents
Resistance to Soldering Heat	MIL–PRF–39006	Immersed to within 0.05 inch of capacitor body
Solderability	MIL–PRF–39003	Depth of insertion in flux and solder to within 0.125 inch ±0.025 inch (3.18 mm ± 0.64 mm) from end of case and from the point of “clean lead” emerging from the seal eyelet.
Shock and Vibration	MIL–STD–202, Methods 213, 204	Shock Method 213, Condition I, 100 G peak, Vibration Method 204, Condition D, 20 G peak
Barometric Pressure (Reduced)	MIL–PRF–39006	150,000 feet for 5 minutes, voltage applied for 1 minute
Salt Atmosphere (Corrosion)	MIL–PRF–39006	Subjected to fine mist of salt solution
Moisture Resistance	MIL–PRF–39006	65°C at 6 V
Dielectric Withstanding Voltage	MIL–PRF–39006	2,000 VDC, 60 seconds, sleeving examined for evidence of breakdown
Insulation Resistance	MIL–PRF–39003	500 VDC, 1 minute, insulation resistance not less than 1,000 MΩ
Electrical Characterization		
Temperature Stability	Reference MIL–PRF–39006	-55˚C to 105˚C
Frequency Scan	KEMET Standard	Impedance, ESR and capacitance versus frequency

Qualification – DLA Approval Inspection – Only for T550

Inspection	Test Name	DLA Requirement Paragraph	SS/Lot
Group I	Shock (specified pulse)[1]	3.3.4	6 per case size
	Vibration, high frequency[1]	3.3.5	
	Thermal shock	3.3.6	
	Salt atmosphere	3.3.7	
Group II	Solderability	3.3.8	12
	Terminal strength	3.3.9	
	Surge voltage[2]	3.3.10	
	Moisture resistance	3.3.11	
	Dielectric withstanding voltage	3.3.12	
	Insulation resistance	3.3.13	
	Low temperature (storage)	3.3.14	
Group III	Stability at low and high temperatures	3.3.15	13
	Reverse voltage	3.3.23	12 per condition
Group IV	Life at 85°C	3.3.16	102
Group V	AC ripple life at 85°C	3.3.18	8 per case size
Group VI	Life at 105°C	3.3.17	40
	Barometric pressure	3.3.20	
Group VII	Resistance to solvents	3.3.21	6
	Resistance to soldering heat	3.3.22	

[1] No failures for mechanical shock or vibration tests shall be permitted.
[2] Surge voltage change in capacitance limits are wider than those in some subsequent tests.
It may be necessary to perform initial measurements again, prior to the individual tests of Group II.

Product Level:
Inspection of product for delivery shall consist of:

B level	Group A inspection specified in Drawing 13030
T level	Group A and group B inspections specified in Drawing 13030

Qualification - T555

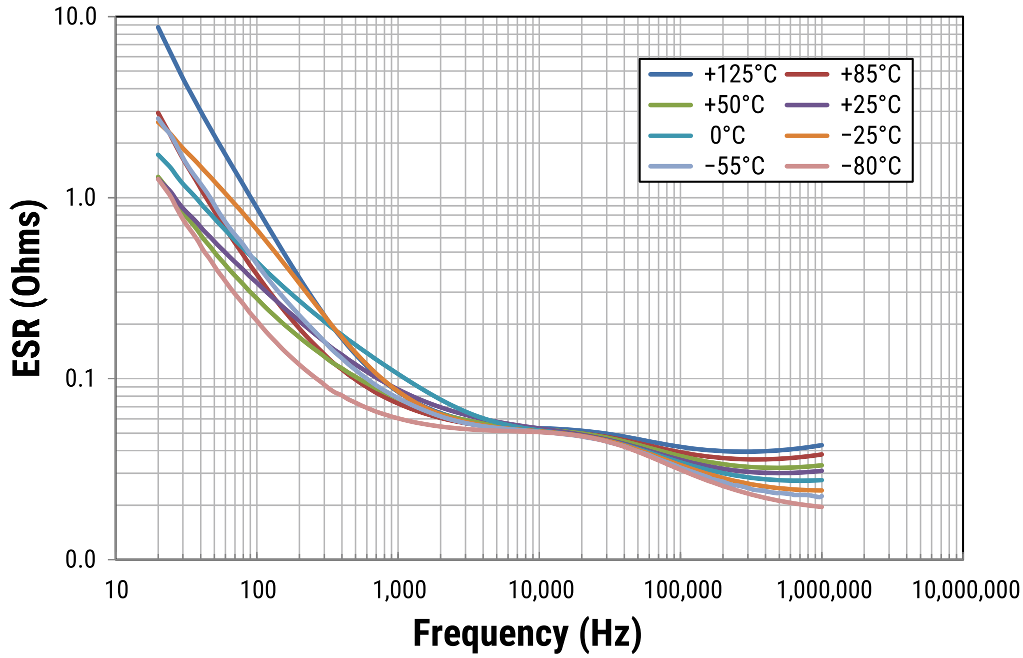
Test Performed	Method Reference	Test Conditions
Reliability and Environmental Tests		
105˚C Life	KEMET Standard	105°C, 0.78 x rated voltage, 2,000 hours
Surge Voltage	MIL-PRF-39006	85˚C, 1.15 x rated voltage, 1,000 cycles, except delta cap shall be +10%/–20%
Physical, Mechanical and Process Tests		
Visual and Mechanical Examination (Internal and External)	MIL-PRF-39003	Case dimensions, marking
Terminal Strength	MIL-PRF-39006	Pull test and wire lead bend test
Resistance to Solvents	MIL-PRF-39006	Immersion in (3) solvents
Resistance to Soldering Heat	MIL-PRF-39006	Immersed to within 0.05 inch of capacitor body
Solderability	MIL-PRF-39006	Depth of insertion in flux and solder to within 0.062 inch of welded joint
Shock and Vibration	MIL-STD-202, Methods 213, 204	Shock Method 213, Condition I, 100 g peak, Vibration Method 204, Condition D, 20 g peak
Electrical Characterization		
Temperature Stability	Reference MIL-PRF-39006	−55˚C to 105˚C

Environmental Compliance

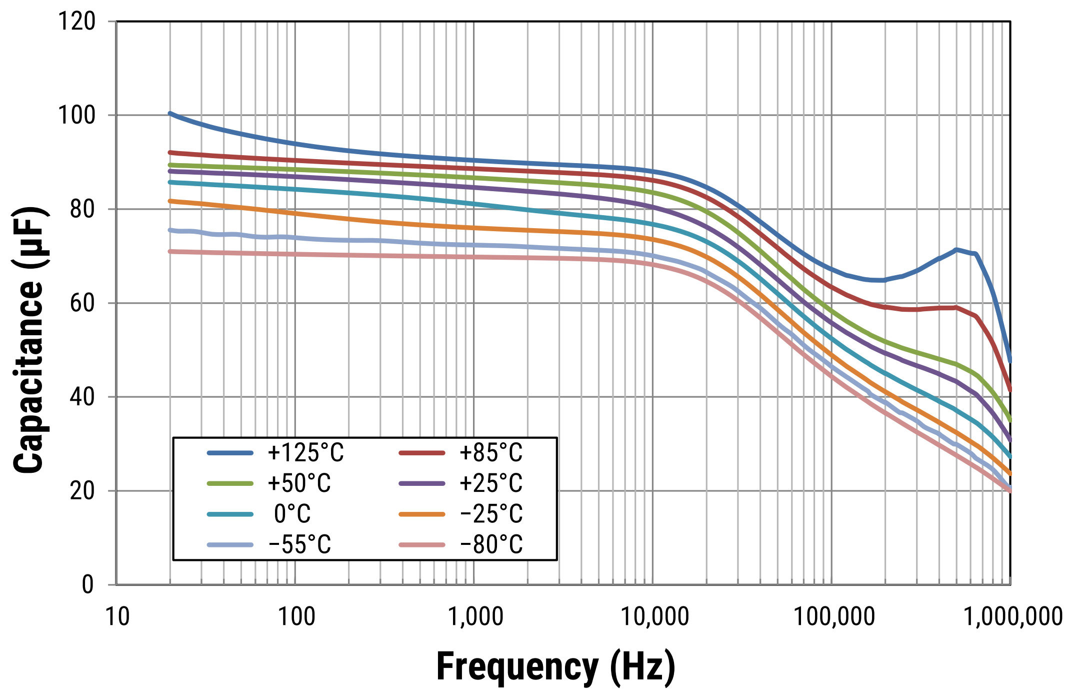
Epoxy compliant with UL 94 V–0.

Electrical Characteristics

ESR vs. Frequency

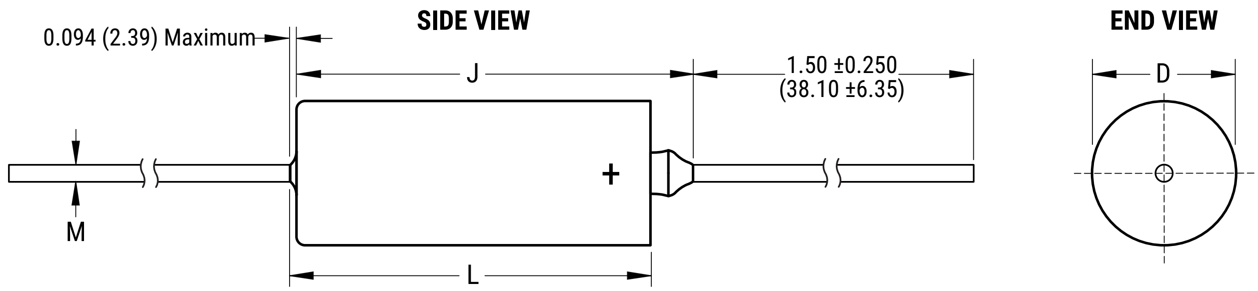


Capacitance vs. Frequency



Dimensions – Inches (Millimeters)

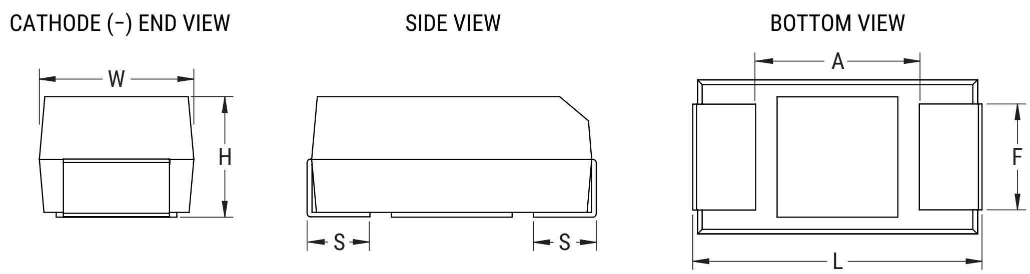
T550



Case Code	Uninsulated Case				Insulated Case	
	L ±0.031 (0.79)	D +0.016 (0.41) −0.015 (0.38)	M ±0.002 (0.05)	J maximum	D +0.016 (0.41) −0.015 (0.38)	L ± 0.031 (0.79)
B	0.650 (16.51)	0.279 (7.09)	0.025 (0.64)	0.822 (20.88)	0.289 (7.34)	0.686 (17.42)
C	0.750 (19.05)	0.341 (8.66)	0.025 (0.64)	0.922 (23.42)	0.351 (8.92)	0.786 (19.96)

Dimensions – Millimeters

T555



Case Code						Weight (g)
	L ±0.5	W ±0.5	H ±0.5	F ±0.5	S ±0.3	Average
B Surface mount	24.5	8.5	9.1	4.2	3.0	5.54

Table 1A – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Size	KEMET Part Number	DLA Drawing Number	DC Leakage	DF	Maximum ESR	Ripple Current
(V) 85°C	µF	KEMET/EIA	(See below for part options)	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Max	mΩ at 25°C 100 kHz	mArms at 85°C/40 kHz
6.3	140	B	T550B147(1)006A(3)	N/A	6.3	5.0	120	1,510
8	220	B	T550B227(1)008A(3)	N/A	13.2	5.0	120	1,510
8	680	B	T550B687(1)008A(3)	N/A	40.8	5.0	90	1750
10	100	B	T550B107(1)010A(3)	N/A	7.5	5.0	140	1400
10	180	B	T550B187(1)010A(3)	N/A	13.5	5.0	110	1580
10	560	B	T550B567(1)010A(3)	N/A	42.0	5.0	90	1750
15	70	B	T550B706(1)015A(3)	N/A	7.9	5.0	140	1400
15	120	B	T550B127(1)015A(3)	N/A	13.5	5.0	110	1580
15	390	B	T550B397(1)015A(3)	N/A	43.9	5.0	90	1750
25	50	B	T550B506(1)025A(3)	N/A	9.4	5.0	170	1275
25	100	B	T550B107(1)025(2)H	13030-01(1)(4)(5)L(6)	18.8	5.0	190	1,200
25	100	B	T550B107(1)025A(3)	N/A	18.8	5.0	190	1,200
30	40	B	T550B406(1)030A(3)	N/A	9.0	5.0	170	1,275
30	68	B	T550B686(1)030A(3)	N/A	15.3	5.0	140	1,400
35	330	B	T550B337(1)035A(3)	N/A	86.6	10.0	180	1,240
35	500	B	T550B507(1)035A(3)	N/A	86.6	10.0	110	1,240
40	100	B	T550B107(1)040(2)(3)	13030-02(1)(4)(5)L(6)	30.0	5.0	150	1,350
40	100	B	T550B107(1)040(7)T	N/A	30.0	5.0	150	1,350
40	120	B	T550B127(1)040(2)(3)	13030-03(1)(4)(5)L(6)	36.0	5.0	120	1,510
40	120	B	T550B127(1)040(7)T	N/A	36.0	5.0	120	1,510
50	25	B	T550B256(1)050A(3)	N/A	9.4	5.0	170	1,275
50	47	B	T550B476(1)050A(3)	N/A	17.6	5.0	150	1,350
50	**100**	**B**	**T550B107(1)050(2)(3)**	**13030-04(1)(4)(5)L(6)**	**37.5**	**5.0**	**130**	**1,450**
50	100	B	T550B107(1)050(7)T	N/A	37.5	5.0	130	1,450
50	**120**	**B**	**T550B127(1)050(2)(3)**	**13030-05(1)(4)(5)L(6)**	**45.0**	**5.0**	**90**	**1,750**
50	120	B	T550B127(1)050(7)T	N/A	45.0	5.0	90	1,750
50	300	C	T550C307(1)050A(3)	N/A	112.5	7.0	100	1,460
60	20	B	T550B206(1)060A(3)	N/A	9.0	5.0	200	1,175
60	39	B	T550B396(1)060A(3)	N/A	17.6	5.0	160	1,310
60	**100**	**B**	**T550B107(1)060(2)(3)**	**13030-06(1)(4)(5)L(6)**	**45.0**	**5.0**	**100**	**1,660**
60	100	B	T550B107(1)060(7)T	N/A	45.0	5.0	100	1,660
75	**75**	**B**	**T550B756(1)075(2)(3)**	**13030-07(1)(4)(5)L(6)**	**42.2**	**5.0**	**110**	**1,580**
75	75	B	T550B756(1)075(7)T	N/A	42.2	5.0	110	1,580
75	82	B	T550B826(1)075A(3)	N/A	57.6	5.0	220	1,800
100	**25**	**B**	**T550B256(1)100(2)(3)**	**13030-08(1)(4)(5)L(6)**	**18.8**	**5.0**	**190**	**1,200**
100	25	B	T550B256(1)100(7)T	N/A	18.8	5.0	190	1,200

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert A = N/A, B = standard reliability, or T = high reliability.
(3) To complete KEMET part number, insert T = 100% matte tin (Sn)-plated, H = standard solder coated (SnPb 5% Pb minimum). Designates termination finish.
(4) To complete the DLA PIN number, insert the surge current testing option, A = 25°C after voltage aging, B = −55°C +0°C and +85°C after voltage aging or C = −55°C +0°C and +85°C before voltage aging.
(5) To complete the DLA PIN number, insert the insulation option. S = Sleeved, U = Unseleeved.
(6) To complete the DLA PIN number, insert the product level option. B = standard reliability or T = high reliability.
(7) To complete KEMET part number, insert E = DLA "B" level equivalent, or F = DLA "T" level equivalent. Designates product level
To confirm availability on DLA part numbers marked in blue font, please contact your KEMET sales representative
Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. The 85°C 40 kHz ripple limit is based on the maximum allowed power at 85°C and the maximum expected ESR at 40 kHz. For this calculation, the 100 kHz ESR limit is multiplied by a factor of 1.3 to account for the frequency dependence of ESR.

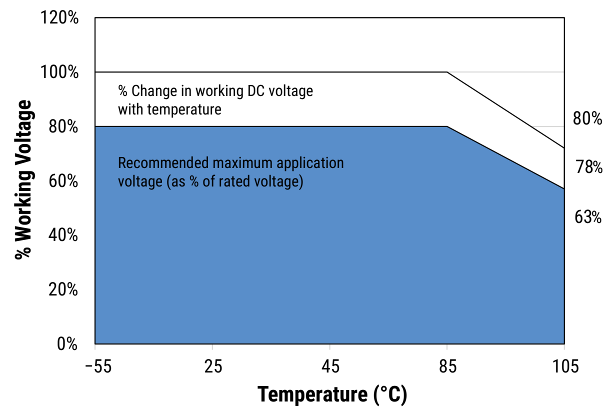
Table 1B – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Size	KEMET Part Number	DC Leakage	DF	Maximum ESR	Ripple Current
(V) 85°C	µF	KEMET/EIA	(See below for part options)	µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Max	mΩ at 25°C 100 kHz	mArms at 85°C/40 kHz
6.3	140	B	T555B147(1)006A(3)	6.3	5.0	120	1,510
8	220	B	T555B227(1)008A(3)	13.2	5.0	120	1,510
8	680	B	T555B687(1)008A(3)	40.8	5.0	90	1,750
10	100	B	T555B107(1)010A(3)	7.5	5.0	140	1,400
10	180	B	T555B187(1)010A(3)	13.5	5.0	110	1,580
10	560	B	T555B567(1)010A(3)	42.0	5.0	90	1,750
15	70	B	T555B706(1)015A(3)	7.9	5.0	140	1,400
15	120	B	T555B127(1)015A(3)	13.5	5.0	110	1,580
15	390	B	T555B397(1)015A(3)	43.9	5.0	90	1,750
25	50	B	T555B506(1)025A(3)	9.4	5.0	170	1,275
25	100	B	T555B107(1)025A(3)	18.8	5.0	190	1,200
30	40	B	T555B406(1)030A(3)	9.0	5.0	170	1,275
30	68	B	T555B686(1)030A(3)	15.3	5.0	140	1,400
35	330	B	T555B337(1)035A(3)	86.6	10.0	180	1,240
40	100	B	T555B107(1)040A(3)	30.0	5.0	150	1,350
40	120	B	T555B127(1)040A(3)	36.0	5.0	120	1,510
50	25	B	T555B256(1)050A(3)	9.4	5.0	170	1,275
50	47	B	T555B476(1)050A(3)	17.6	5.0	150	1,350
50	100	B	T555B107(1)050A(3)	37.5	5.0	130	1,450
50	120	B	T555B127(1)050A(3)	45.0	5.0	90	1,750
60	20	B	T555B206(1)060A(3)	9.0	5.0	200	1,175
60	39	B	T555B396(1)060A(3)	17.6	5.0	160	1,310
60	100	B	T555B107(1)060A(3)	45.0	5.0	100	1,660
75	75	B	T555B756(1)075A(3)	42.2	5.0	110	1,580
75	82	B	T555B826(1)075A(3)	57.6	5.0	220	1,800
100	25	B	T555B256(1)100A(3)	18.8	5.0	190	1,200

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(3) To complete KEMET part number, insert T = 100% Matte Tin (Sn)-plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates termination finish.
Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. The 85°C 40 kHz ripple limit is based on the maximum allowed power at 85°C and the maximum expected ESR at 40 kHz. For this calculation, the 100 kHz ESR limit is multiplied by a factor of 1.3 to account for the frequency dependence of ESR.

Recommended Voltage Derating Guidelines

	-55°C to 85°C	85°C to 105°C
% Change in working DC voltage with temperature	V_R	78% of V_R
Recommended maximum application voltage (as % of rated voltage)	80% of V_R	63% of V_R



Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage that may be applied is limited by two criteria:

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage.

The maximum power dissipation by case size can be determined using the below left table. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Refer to the below right table for temperature compensation requirements.

Case Code	Maximum Power Dissipation (P_{max}) mWatts at 25°C with +60°C Rise
KEMET	
B*	715
C	894

** Applies to TH and SMD*

Temperature Compensation Multipliers for Maximum Power Dissipation (P_{max})		
T ≤ 45°C	45°C < T ≤ 85°C	85°C < T ≤ 105°C
1.00	0.70	0.10

T = Environmental temperature

Using the P_{max} of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{P_{max}/R}$
$E(max) = Z\sqrt{P_{max}/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
P_{max} = maximum power dissipation (watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (ohms)

The maximum power dissipation rating must be reduced with increasing environmental operating temperatures. Refer to the Temperature Compensation Multiplier table for details.

Reverse Voltage

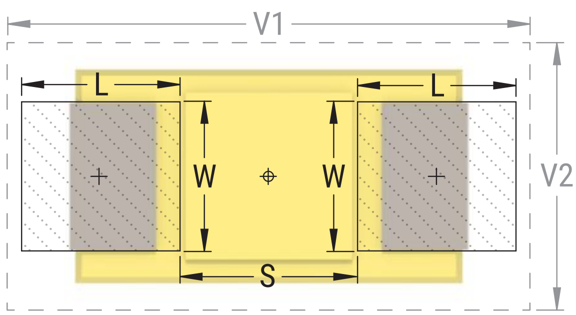
Solid tantalum polymer capacitors are polar devices and may be permanently damaged or destroyed if connected with the wrong polarity. A small reverse voltage is permissible for time periods per the below table. KEMET can offer lower capacitance in this voltage with higher reverse voltage capability. In addition, we continue to improve our capability for this characteristic.

Temperature	Permissible Reverse Voltage
25°C	1 V for 8 hours maximum
70°C	1 V for 2 hours maximum

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
B	3528–21	4.73	4.86	17.015	27.62	10	4.61	4.46	17.215	26.52	9.5	4.51	4.08	17.375	25.81	9.24

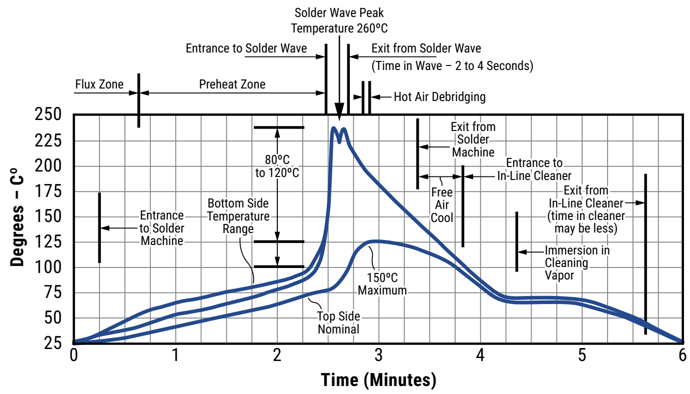
Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*



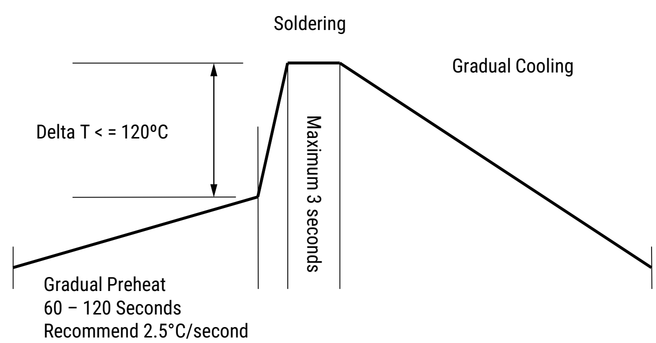
Grid Placement Courtyard

Soldering Process

Optimum Solder Wave Profile



Hand Soldering (Manual)*



T555 MUST be hand soldered only.

Mounting

WARNING: T555/T556 MUST BE HAND SOLDERED. THE USE OF STANDARD SMD PROCESSES FOR BOARD MOUNT WILL CAUSE IRREVERSIBLE DAMAGE TO THIS PRODUCT.

T555 SMD

In hand-soldering tantalum polymer SMT capacitors, a manufacturer can utilize two (2) soldering methodologies that include pre-heating or not pre-heating the capacitors. KEMET recommends utilizing a pre-heating technique. However, due to the large temperature gradient between the capacitors and the tip of the soldering iron, take extreme caution in this process. The thermal stresses from the large thermal gradients and the propensity of the operator touching the tip of the soldering iron to the device can lead to mechanical and/or electrical damage.

When manually soldering, it is important the soldering process be carefully monitored and carried out so that the temperature gradient falls within the recommended conditions above (profile).

Mounting cont.

Process 1 (with preheating)

1) Utilize 1.0 mm thread eutectic solder with soldering flux in the core. Either a rosin-based or non-activated flux is recommended.
2) The capacitors shall be pre-heated so that the temperature gradient between the devices and the tip of the soldering iron is Delta T < = 120°C or below.
3) The temperature of the solder iron tip should not exceed 270°C.
4) The required amount of solder shall be melted in advance on the soldering tip.
5) After soldering, the capacitors shall be cooled gradually at room ambient temperature. Forced air cooling is not recommended.

Process 2 (without preheating)

1) Soldering iron tip shall never directly touch the termination egress or the case body of the capacitors.
2) Lands are sufficiently pre-heated with a soldering iron tip before sliding the soldering iron tip to the terminal electrode of the capacitor for soldering.

Reference	Condition
Case Size	All
Temperature of soldering iron	270°C
Wattage	20 W maximum
Shape of soldering iron	3 mm maximum
Soldering time with soldering iron	3 seconds maximum

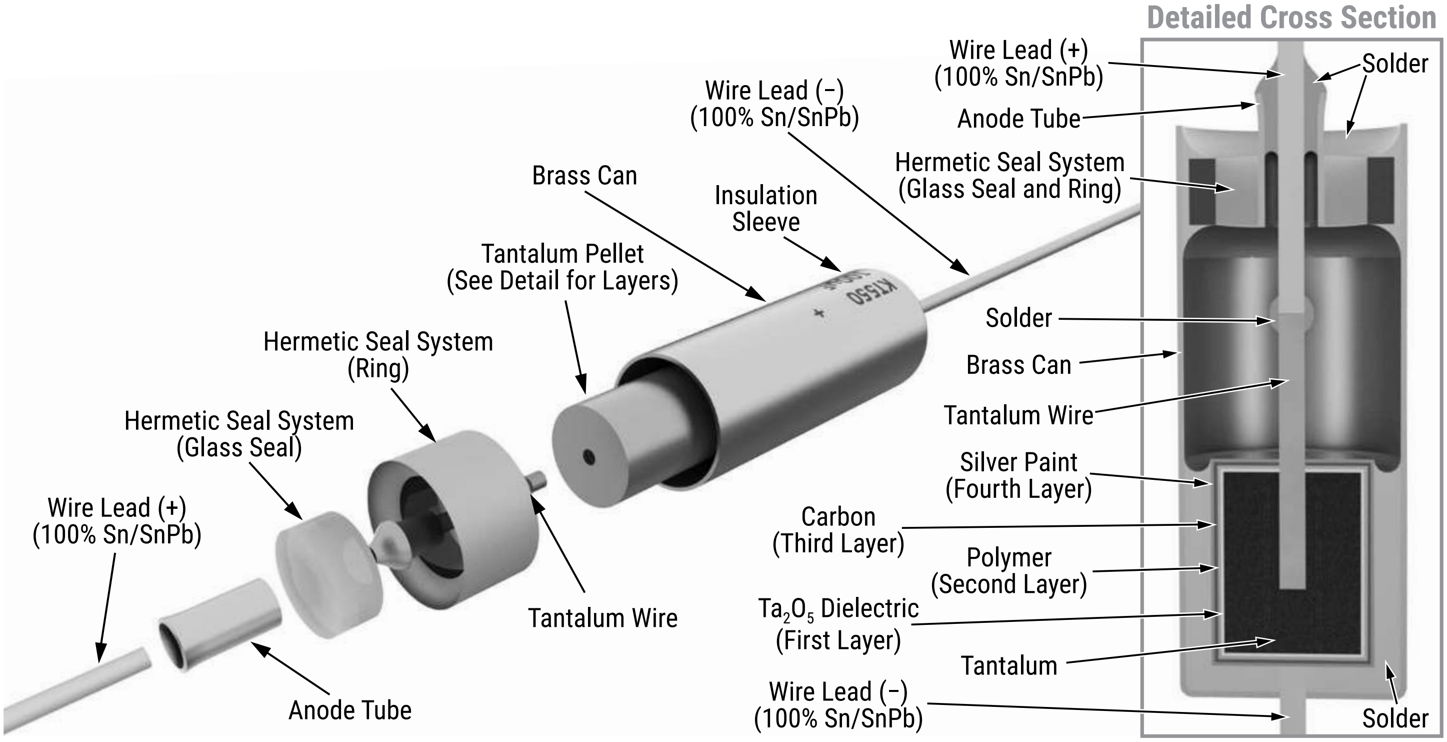
T550 Through-Hole
All encased capacitors will pass the resistance to soldering heat test of MIL-STD-202, Method 210, Condition C. This test simulates wave solder of topside board mount product. This demonstration of resistance to solder heat is in accordance with what is believed to be the industry standard. More severe treatment must be considered reflective of an improper soldering process. The above figure is a recommended solder wave profile for both axial and radial leaded solid tantalum capacitors.

Additional mounting recommendations (SMD and Through-Hole):

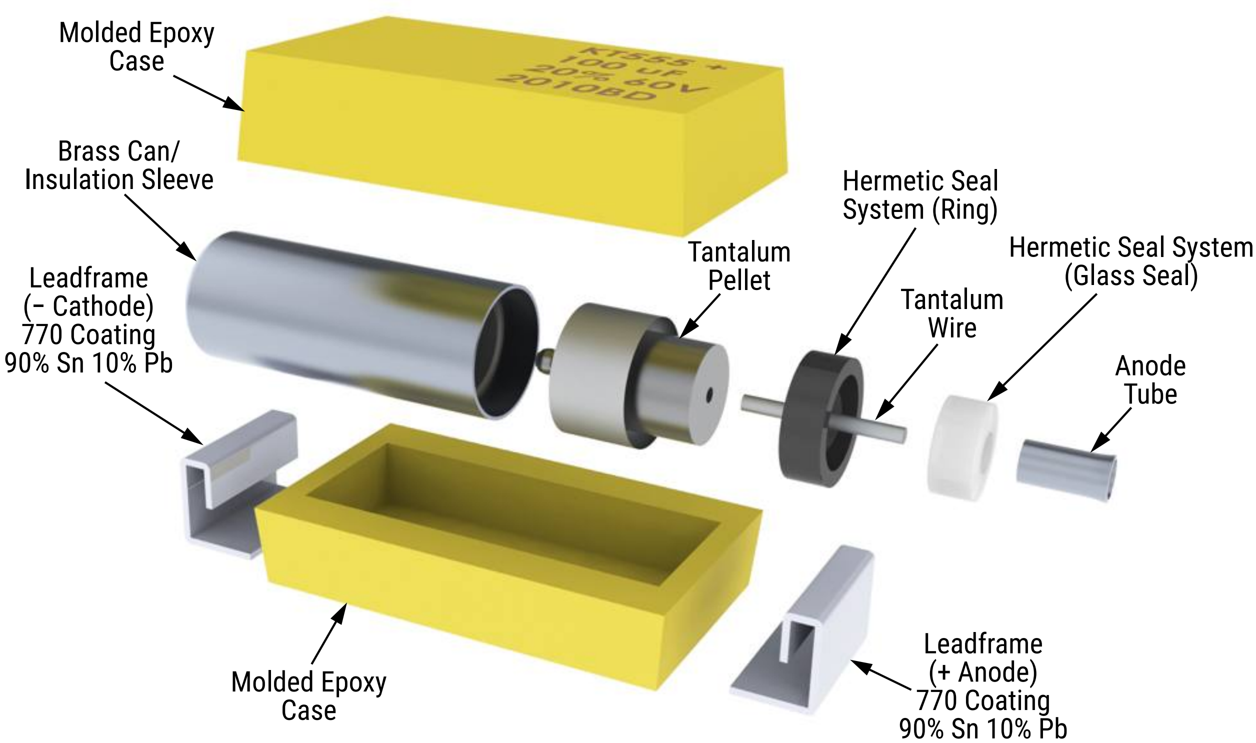
In order to increase the board mount integrity of KEMET's Polymer Hermetic Sealed (SMD or TH version) relative to mechanical shock and vibration, KEMET recommends the use of an adhesive between the component and the PCB. This is defined in the Space Application Electronic Hardware Addendum to J-STD-001 (Requirements for Solder Electrical and Electronic Assemblies.)

Construction

T550



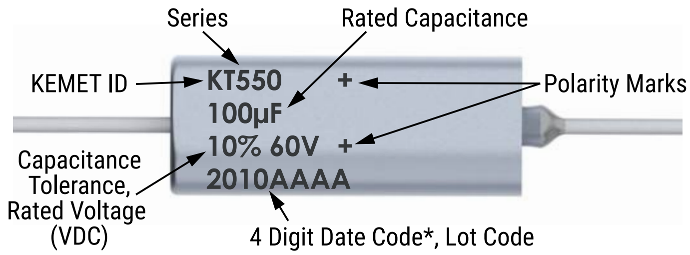
T555



Capacitor Marking

T550

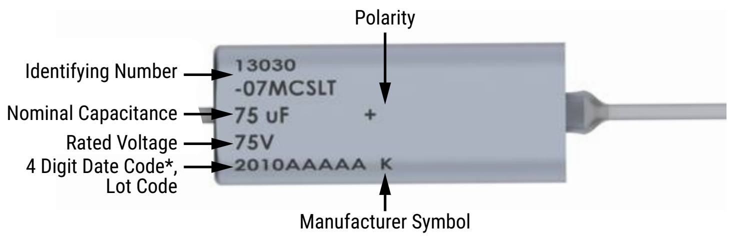
B Case



** 1st & 2nd Digit = Year*
3rd & 4th Digit = Week

T550 - Military Format

B Case



** 1st & 2nd Digit = Year*
3rd & 4th Digit = Week

T555

** 1st & 2nd Digit = Year*
3rd & 4th Digit = Week

Date Code	
1st & 2nd Digit = Year	18 = 2018 19 = 2019 20 = 2020 21 = 2021 22 = 2022
3rd & 4th Digit = Week of the Year	01 = 1st week 52 = 52nd week

Storage

Tantalum hermetically sealed and SMD capacitors should be stored in normal working environments. While the capacitors themselves are quite robust in other environments, solderability will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. In addition, packaging materials will be degraded by high temperature – reels may soften or warp and tape peel force may increase. KEMET recommends that maximum storage temperature not exceed 40°C and maximum storage humidity not exceed 60% relative humidity. Temperature fluctuations should be minimized to avoid condensation on the parts and atmospheres should be free of chlorine and sulphur bearing compounds. For optimized solderability capacitors stock should be used promptly, preferably within three years of receipt.

Packaging Quantities

Case Size		Bulk	8.5" Reel*	Ammo Pack
	C-Spec	**Blank**	**7200**	**7443**
B Through Hole	–	20 per tray	500	250
B Surface Mount	–	100 per box	N/A	
C Through Hole	–	20 per tray	500	250

** For orders greater than 150 pieces, a 12" reel (500 pieces/reel) will be sent.*

Weight

Case Size		Average Weight (grams)
KEMET	**EIA**	
B Through Hole	T2	3.63
B Surface Mount	–	5.54
C Through Hole	T2	5.80

KEMET Organic Capacitor (KO-CAP®) – High Reliability

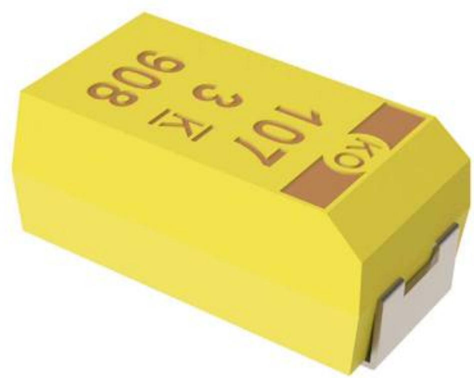
T543 Up-Screen Commercial Polymer Electrolytic, 2.5 – 63 VDC

Overview

The T543 Series is a KEMET solution for designers seeking for cost effective solutions up-screened to HRA equivalents. T543's up screened options includes surge current testing of 10 cycles at +25°C and 10 cycles at -55°C/+85°C. In addition to 100% Tin (Sn) termination, a tin-lead (SnPb) option is also available. The recommended application derating for these capacitors is 10 – 20%, rendering them suitable for application voltages from 2.25 to 50 VDC. In order to support customers' requirements KEMET develop and implement new up-screen test protocols.

Benefits

- Extremely low ESR
- High frequency capacitance retention
- 100% accelerated steady state aging
- 100% surge current tested
- Tape & Reel standard packaging per EIA 481
- Volumetrically efficienct
- Surge options at 25°C and −55°C/+85°C
- EIA standard case sizes
- Halogen-free epoxy and RoHS compliant



Applications

Typical applications include DC/DC converters, switch mode and point of load power supply, radar pulse capacitor, and telecommunications (mobile phone and base station). Other general applications include decoupling and filtering in applications requiring low ESR or a benign failure mode.

Environmental Compliance

RoHS compliant when ordered with 100% Sn solder.

- Halogen-free
- Epoxy compliant with UL94 V–0
- Molded Epoxy complies for outgassing testing under ASTM E 595.

Ordering Information

T	543	D	156	K	035	A	H	E	100	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	Surge	ESR	Packaging (C-Spec)
T = Tantalum	Polymer Tantalum COTS	A,B, C, D, H, L, M, O, T, U, V, W, X, Y	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	2R5 = 2.5 003 = 3 004 = 4 006 = 6.3 010 = 10 12R = 12.5 016 = 16 020 = 20 025 = 25 035 = 35 040 = 40 050 = 50 063 =63	A = N/A	H = Standard solder coated (SnPb 5% Pb minimum) T = 100% tin (Sn)	E = None S = 10 cycles 25°C W = 10 cycles -55°C and 85°C	ESR in mΩ	Blank = 7" reel 7280 = 13" reel 7610 = Bulk Bag 7640 = Bulk plastic box WAFL = Waffle pack

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 105°C/125°C (refer to part number for maximum temperature rating)
Rated Capacitance Range	4.7 – 2,000 µF at 120 Hz/25°C
Capacitance Tolerance	K tolerance (10%), M tolerance (20%)
Rated Voltage Range	2.5 – 63 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.1 CV (µA) at rated voltage after 5 minutes

Qualification

<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">105°C at rated voltage, 2,000 hours
125°C at 2/3 rated voltage, 2,000 hours**</td><td>Δ C/C</td><td colspan="3">Within −20/+10 of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">105°C at 0 volts, 2,000 hours
125°C at 0 volts, 2,000 hours**</td><td>Δ C/C</td><td colspan="3">Within −20/+10 of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Humidity</td><td colspan="2" rowspan="4">60°C, 90% RH, 500 hours</td><td>Δ C/C</td><td colspan="3">Within −5%/+35% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 5.0 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at +25°C, −55°C, +25°C, +85°C, +105°C/+125°C**, +25° C</td><td></td><td>+25°C</td><td>−55°C</td><td>+85°C</td><td>+105°C</td></tr>
<tr><td>Δ C/C</td><td>IL*</td><td>±20%</td><td>±20%</td><td>±30%</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>1.2 x IL</td><td>1.5 x IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>10 x IL</td><td>10 x IL</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">105°C, 1.32 x rated voltage, 1,000 cycles</td><td>Δ C/C</td><td colspan="3">Within −20/+10 of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within initial limits</td></tr>
<tr><td rowspan="3">Mechanical Shock/ Vibration</td><td colspan="2" rowspan="3">MIL–STD–202, Method 213, Condition I, 100 G peak
MIL–STD–202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak</td><td>Δ C/C</td><td colspan="3">Within ±10 of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
</table>

**IL = Initial limit*
***Refer to part number specifications for individual temperature classification*

Reliability

KO-CAP capacitors have an average failure rate of 0.5 %/1,000 hours at category voltage, U_C, and category temperature, T_C. These capacitors are qualified using industry test standards at U_C and T_C. The minimum test time (1,000 hours or 2,000 hours) is dependent on the product.

The actual life expectancy of KO-CAP capacitors increases when application voltage, U_A, and application temperature, T_A, are lower than U_C and T_C. As a general guideline, when $U_A < 0.9 * U_C$ and $T_A < 85°C$, the life expectancy will typically exceed the useful lifetime of most hardware (> 10 years).

The lifetime of a KO-CAP capacitor at a specific application voltage and temperature can be modeled using the equations below. A failure is defined as passing enough current to blow a 1-amp fuse. The calculation is an estimation based on empirical results and is not a guarantee.

$$VAF = \left(\frac{U_C}{U_A}\right)^n$$

where:
VAF = acceleration factor due to voltage, unitless
U_C = category voltage, volt
U_A = application voltage, volt
n = exponent, 16

$$TAF = e^{\left[\frac{E_a}{k}\left(\frac{1}{273+T_A} - \frac{1}{273+T_C}\right)\right]}$$

where:
TAF = acceleration factor due to temperature, unitless
E_a = activation energy, 1.4 eV
k = Boltzmann's constant, 8.617E-5 eV/K
T_A = application temperature, °C
T_C = category temperature, °C

$$AF = VAF * TAF$$

where:
AF = acceleration factor, unitless
TAF = accerlation factor due to temperature, unitless
VAF = acceleration factor due to voltage, unitless

$$Life_{U_A,T_A} = Life_{U_C,T_C} * AF$$

where:
$Life_{UA, TA}$ = estimated life application voltage and temperature, years
$Life_{UC, TC}$ = guaranteed life category voltage and temperature, years
AF = acceleration factor, unitless

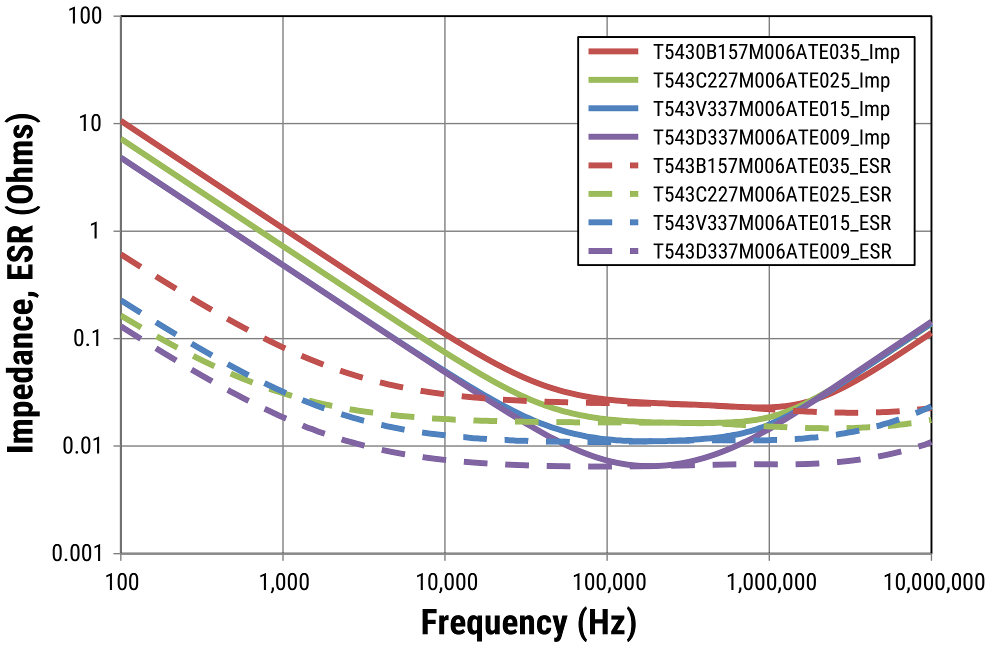
Terms:
Category voltage, U_C : maximum recommended peak DC operating voltage for continuous operation at the category temperature, T_C
Rated voltage, U_R : maximum recommended peak DC operating voltage for continuous operation up to the rated temperature, T_R
Category temperature, T_C : maximum recommended operating temperature. Voltage derating may be required at T_C
Rated temperature, T_R : maximum recommended operating temperature without voltage derating. T_R is equal to or lower than T_C

Reliability Table 1 – Common temperature range classifications

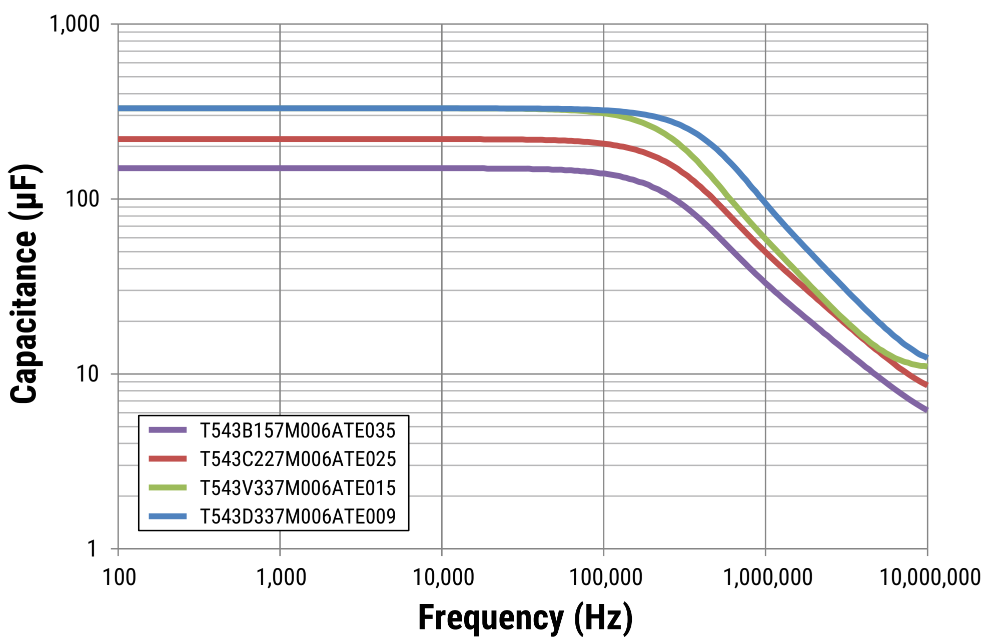
85°C (T_R) / 85°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 105°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 125°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	1.7	2.7	4.2	5.4	6.7	8.4	10.7	13.4	16.8	23.5	33.5	42.2	50.3

Electrical Characteristics

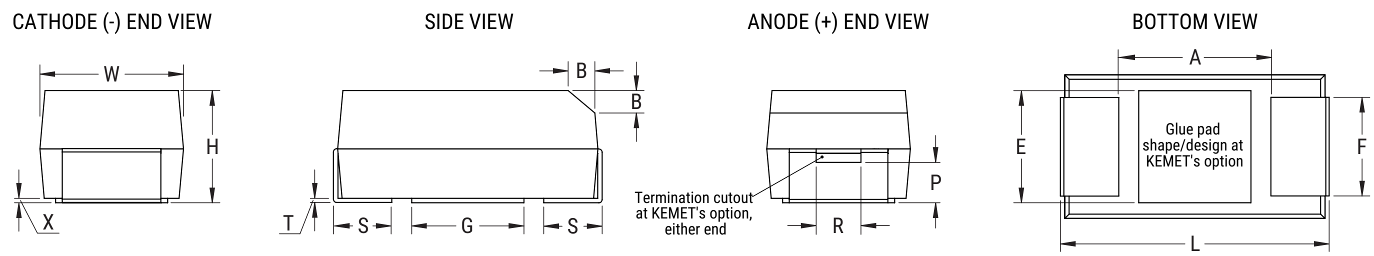
ESR vs. Frequency



Capacitance vs. Frequency



Dimensions – Millimeters



Case Size		Component Dimensions													Typical Weight
KEMET	EIA	L	W	H	F ±0.1 ±(0.004)	S ±0.3 ±(0.012)	B ±0.15 (Ref) ±0.006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Min)	G (Ref)	E (Ref)	(mg)
A	3216–18	3.2±0.2 (0.126±0.008)	1.6±0.2 (0.063 ±0.008)	1.6±0.2 (0.063±0.008)	1.2 (0.047)	0.8 (0.031)	0.4 (0.016)	0.10±0.10 (0.004±0.004)	0.4 (0.016)	0.4 (0.016)	0.13 (0.005)	1.2 (0.047)	1.1 (0.043)	1.3 (0.051)	53.17
B	3528–21	3.5±0.2 (0.138±0.008)	2.8±0.2 (0.110±0.008)	1.9±0.2 (0.075±0.008)	2.2 (0.087)	0.8 (0.031)	0.4 (0.016)	0.10±0.10 (0.004±0.004)	0.5 (0.020)	1.0 (0.039)	0.13 (0.005)	1.9 (0.075)	1.8 (0.071)	2.2 (0.087)	98.30
C	6032–28	6.0±0.3 (0.236±0.012)	3.2±0.2 (0.126±0.008)	2.5±0.3 (0.098±0.012)	2.2 (0.087)	1.3 (0.051)	0.5 (0.020)	0.10±0.10 (0.004±0.004)	0.9 (0.035)	1.0 (0.039)	0.13 (0.005)	3.1 (0.122)	2.8 (0.110)	2.4 (0.094)	193.46
D	7343–31	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	2.8±0.3 (0.110±0.012)	2.4 (0.094)	1.3 (0.051)	0.5 (0.020)	0.10±0.10 (0.004±0.004)	0.9 (0.035)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	352.36
H	7360–20	7.3±0.3 (0.287±0.012)	6.0±0.3 (0.236±0.012)	1.9±0.1 (0.075±0.004)	4.1 (0.161)	1.3 (0.051)	N/A	0.10±0.10 (0.004±0.004)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	366.62
L	6032–19	6.0±0.3 (0.236±0.012)	3.2±0.2 (0.110±0.008)	1.8±0.1 (0.071±0.004)	2.2 (0.087)	1.3 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.1 (0.122)	2.8 (0.110)	2.4 (0.094)	No data
M	3528–15	3.5±0.2 (0.138±0.008)	2.8±0.2 (0.110±0.008)	1.4±0.1 (0.055±0.004)	2.2 (0.087)	0.8 (0.031)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	1.9 (0.075)	1.8 (0.071)	2.2 (0.087)	97.99
O	7360-43	7.3±0.3 (0.287±0.012)	6.0±0.3 (0.236±0.012)	4.0±0.3 (0.157±0.012)	4.1 (0.161)	1.3 (0.051)	N/A	0.10 ±0.10 (0.004±0.004)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	696.00
T	3528–12	3.5±0.2 (0.138±0.008)	2.8±0.2 (0.110±0.008)	1.1±0.1 (0.043±0.004)	2.2 (0.087)	0.8 (0.031)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	1.9 (0.075)	1.8 (0.071)	2.2 (0.087)	59.38
U	6032–15	6.0±0.3 (0.236±0.012)	3.2±0.2 (0.110±0.008)	1.4±0.1 (0.055±0.004)	2.2 (0.087)	1.3 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.1 (0.122)	2.8 (0.110)	2.4 (0.094)	No data
V	7343–20	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	1.9±0.1 (0.075±0.004)	2.4 (0.094)	1.3 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	262.90
W	7343–15	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	1.4±0.1 (0.055 ±0.004)	2.4 (0.094)	1.3 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	222.94
X	7343–43	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	4.0±0.3 (0.157±0.012)	2.4 (0.094)	1.3 (0.051)	0.5 (0.020)	0.10±0.10 (0.004±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	588.16
Y	7343–40	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	3.8±0.2 (0.150±0.008)	2.4 (0.094)	1.3 (0.051)	0.5 (0.020)	0.10±0.10 (0.004±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	481.55

Notes: (Ref) – Dimensions provided for reference only. For low profile cases, no dimensions are provided for B, P, or R because these cases do not have a bevel or a notch.
These weights are provided as reference. If exact weights are needed, please contact your KEMET Sales Representative.

Table 1 – Ratings & Part Number Reference

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
2.5	47	A/3216-18	T543A476(1)2R5A(2)(3)090	12	8	90	1,116	105	3
2.5	56	T/3528-12	T543T566(1)2R5A(2)(3)040	14	8	40	1,620	105	3
2.5	56	T/3528-12	T543T566(1)2R5A(2)(3)070	14	8	70	1,225	105	3
2.5	68	A/3216-18	T543A686(1)2R5A(2)(3)070	17	8	70	1,265	105	3
2.5	68	A/3216-18	T543A686(1)2R5A(2)(3)080	17	8	80	1,183	105	3
2.5	100	T/3528-12	T543T107(1)2R5A(2)(3)040	25	8	40	1,620	105	3
2.5	100	T/3528-12	T543T107(1)2R5A(2)(3)070	25	8	70	1,225	105	3
2.5	100	T/3528-12	T543T107(1)2R5A(2)(3)080	25	8	80	1,146	105	3
2.5	100	B/3528-21	T543B107(1)2R5A(2)(3)025	25	8	25	2,254	105	3
2.5	100	B/3528-21	T543B107(1)2R5A(2)(3)035	25	8	35	1,905	105	3
2.5	100	B/3528-21	T543B107(1)2R5A(2)(3)040	25	8	40	1,782	105	3
2.5	100	B/3528-21	T543B107(1)2R5A(2)(3)070	25	8	70	1,347	105	3
2.5	150	U/6032-15	T543U157(1)2R5A(2)(3)055	38	8	55	1,567	105	3
2.5	220	B/3528-21	T543B227(1)2R5A(2)(3)025	55	8	25	2,254	105	3
2.5	220	B/3528-21	T543B227(1)2R5A(2)(3)030	55	8	30	2,058	105	3
2.5	220	B/3528-21	T543B227(1)2R5A(2)(3)035	55	8	35	1,905	105	3
2.5	220	B/3528-21	T543B227(1)2R5A(2)(3)055	55	8	55	1,520	105	3
2.5	220	B/3528-21	T543B227(1)2R5A(2)(3)070	55	8	70	1,347	105	3
2.5	220	U/6032-15	T543U227(1)2R5A(2)(3)055	55	8	55	1,567	105	3
2.5	220	C/6032-28	T543C227(1)2R5A(2)(3)025	55	8	25	2,569	105	3
2.5	220	C/6032-28	T543C227(1)2R5A(2)(3)045	55	8	45	1,915	105	3
2.5	220	W/7343-15	T543W227(1)2R5A(2)(3)025	55	10	25	2,683	105	3
2.5	220	V/7343-20	T543V227(1)2R5A(2)(3)015	55	10	15	3,531	105	3
2.5	220	V/7343-20	T543V227(1)2R5A(2)(3)025	55	10	25	2,735	105	3
2.5	220	V/7343-20	T543V227(1)2R5A(2)(3)045	55	10	45	2,039	105	3
2.5	220	D-7343-31	T543D227(1)2R5A(2)(3)040	55	10	40	2,372	105	3
2.5	330	B/3528-21	T543B337(1)2R5A(2)(3)035	83	8	35	1,905	105	3
2.5	330	B/3528-21	T543B337(1)2R5A(2)(3)045	83	8	45	1,680	105	3
2.5	330	B/3528-21	T543B337(1)2R5A(2)(3)070	83	8	70	1,347	105	3
2.5	330	L/6032-19	T543L337(1)2R5A(2)(3)012	83	8	12	3,536	105	3
2.5	330	L/6032-19	T543L337(1)2R5A(2)(3)025	83	8	25	2,449	105	3
2.5	330	C/6032-28	T543C337(1)2R5A(2)(3)015	83	8	15	3,317	105	3
2.5	330	C/6032-28	T543C337(1)2R5A(2)(3)018	83	8	18	3,028	105	3
2.5	330	C/6032-28	T543C337(1)2R5A(2)(3)025	83	8	25	2,569	105	3
2.5	330	C/6032-28	T543C337(1)2R5A(2)(3)045	83	8	45	1,915	105	3
2.5	330	W/7343-15	T543W337(1)2R5A(2)(3)015	83	10	15	3,464	105	3
2.5	330	W/7343-15	T543W337(1)2R5A(2)(3)025	83	10	25	2,683	105	3
2.5	330	W/7343-15	T543W337(1)2R5A(2)(3)040	83	10	40	2,121	105	3
2.5	330	V/7343-20	T543V337(1)2R5A(2)(3)015	83	10	15	3,531	105	3
2.5	330	V/7343-20	T543V337(1)2R5A(2)(3)018	83	10	18	3,223	105	3
2.5	330	V/7343-20	T543V337(1)2R5A(2)(3)025	83	10	25	2,735	105	3
2.5	330	V/7343-20	T543V337(1)2R5A(2)(3)040	83	10	40	2,162	105	3
2.5	330	D-7343-31	T543D337(1)2R5A(2)(3)006	83	10	6	6,124	105	3
2.5	330	D-7343-31	T543D337(1)2R5A(2)(3)007	83	10	7	5,669	105	3
2.5	330	D-7343-31	T543D337(1)2R5A(2)(3)025	83	10	25	3,000	105	3
2.5	470	C/6032-28	T543C477(1)2R5A(2)(3)025	118	8	25	2,569	105	3
2.5	470	C/6032-28	T543C477(1)2R5A(2)(3)045	118	8	45	1,915	105	3
2.5	470	V/7343-20	T543V477(1)2R5A(2)(3)018	118	10	18	3,223	105	3
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)005	118	10	5	6,708	105	3
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)006	118	10	6	6,124	105	3
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)007	118	10	7	5,669	105	3
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)009	118	10	9	5,000	105	3
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)010	118	10	10	4,743	105	3
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)025	118	10	25	3,000	105	3
2.5	560	D-7343-31	T543D567(1)2R5A(2)(3)005	140	10	5	6,708	105	3
2.5	680	D-7343-31	T543D687(1)2R5A(2)(3)006	170	10	6	6,124	125	3
2.5	680	D-7343-31	T543D687(1)2R5A(2)(3)010	170	10	10	4,743	125	3
2.5	680	D-7343-31	T543D687(1)2R5A(2)(3)015	170	10	15	3,873	125	3
2.5	680	D-7343-31	T543D687(1)2R5A(2)(3)040	170	10	40	2,372	125	3
2.5	680	Y/7343-40	T543Y687(1)2R5A(2)(3)005	170	10	5	6,943	105	3
2.5	680	Y/7343-40	T543Y687(1)2R5A(2)(3)006	170	10	6	6,338	105	3
2.5	680	Y/7343-40	T543Y687(1)2R5A(2)(3)010	170	10	10	4,909	105	3
2.5	680	Y/7343-40	T543Y687(1)2R5A(2)(3)015	170	10	15	4,008	105	3
2.5	680	Y/7343-40	T543Y687(1)2R5A(2)(3)025	170	10	25	3,105	105	3
2.5	680	X/7343-43	T543X687(1)2R5A(2)(3)006	170	10	6	6,416	105	3
2.5	1,000	Y/7343-40	T543Y108(1)2R5A(2)(3)005	250	10	5	6,943	105	3
2.5	1,000	Y/7343-40	T543Y108(1)2R5A(2)(3)006	250	10	6	6,338	105	3
2.5	1,000	Y/7343-40	T543Y108(1)2R5A(2)(3)010	250	10	10	4,909	105	3
2.5	1,000	Y/7343-40	T543Y108(1)2R5A(2)(3)015	250	10	15	4,008	105	3
2.5	1,000	Y/7343-40	T543Y108(1)2R5A(2)(3)025	250	10	25	3,105	105	3
2.5	1,000	X/7343-43	T543X108(1)2R5A(2)(3)005	250	10	5	7,029	105	3
2.5	1,000	X/7343-43	T543X108(1)2R5A(2)(3)006	250	10	6	6,416	105	3
2.5	1,000	X/7343-43	T543X108(1)2R5A(2)(3)010	250	10	10	4,970	105	3
2.5	1,500	X/7343-43	T543X158(1)2R5A(2)(3)005	375	10	5	7,029	105	3
2.5	1,500	X/7343-43	T543X158(1)2R5A(2)(3)010	375	10	10	4,970	105	3
3	100	B/3528-21	T543B107(1)003A(2)(3)035	30	8	35	1,905	105	3
3	100	B/3528-21	T543B107(1)003A(2)(3)040	30	8	40	1,782	105	3
3	100	B/3528-21	T543B107(1)003A(2)(3)070	30	8	70	1,347	105	3
3	100	B/3528-21	T543B107(1)003A(2)(3)080	30	8	80	1,260	105	3
3	150	B/3528-21	T543B157(1)003A(2)(3)035	45	8	35	1,905	105	3
3	150	B/3528-21	T543B157(1)003A(2)(3)040	45	8	40	1,782	105	3
3	150	B/3528-21	T543B157(1)003A(2)(3)070	45	8	70	1,347	105	3
3	150	B/3528-21	T543B157(1)003A(2)(3)080	45	8	80	1,260	105	3
3	330	V/7343-20	T543V337(1)003A(2)(3)015	99	10	15	3,531	105	3
3	330	V/7343-20	T543V337(1)003A(2)(3)025	99	10	25	2,735	105	3
3	330	D-7343-31	T543D337(1)003A(2)(3)025	99	10	25	3,000	105	3
3	470	D-7343-31	T543D477(1)003A(2)(3)010	141	10	10	4,743	105	3
3	470	D-7343-31	T543D477(1)003A(2)(3)025	141	10	25	3,000	105	3
3	680	D-7343-31	T543D687(1)003A(2)(3)010	204	10	10	4,743	125	3
3	680	D-7343-31	T543D687(1)003A(2)(3)015	204	10	15	3,873	125	3
3	680	D-7343-31	T543D687(1)003A(2)(3)025	204	10	25	3,000	125	3
3	680	D-7343-31	T543D687(1)003A(2)(3)040	204	10	40	2,372	125	3
3	1,000	X/7343-43	T543X108(1)003A(2)(3)010	300	10	10	4,970	105	3
3	1,000	X/7343-43	T543X108(1)003A(2)(3)015	300	10	15	4,058	105	3
3	1,000	X/7343-43	T543X108(1)003A(2)(3)030	300	10	30	2,869	105	3
3	1,500	X/7343-43	T543X158(1)003A(2)(3)008	450	10	8	5,557	125	3
3	2,000	O/7360-43	T543O208M003A(2)(3)010	600	10	10	5,480	105	3
4	15	T/3528-12	T543T156(1)004A(2)(3)100	6	8	100	1,025	105	3
4	33	A/3216-18	T543A336(1)004A(2)(3)070	13	8	70	1,265	105	3
4	33	A/3216-18	T543A336(1)004A(2)(3)080	13	8	80	1,183	105	3
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
4	47	A/3216-18	T543A476(1)004A(2)(3)070	19	8	70	1,265	105	3
4	47	A/3216-18	T543A476(1)004A(2)(3)080	19	8	80	1,183	105	3
4	47	T/3528-12	T543T476(1)004A(2)(3)070	19	8	70	1,225	105	3
4	68	T/3528-12	T543T686(1)004A(2)(3)070	27	8	70	1,225	105	3
4	68	T/3528-12	T543T686(1)004A(2)(3)080	27	8	80	1,146	105	3
4	68	B/3528-21	T543B686(1)004A(2)(3)035	27	8	35	1,905	105	3
4	68	B/3528-21	T543B686(1)004A(2)(3)040	27	8	40	1,782	105	3
4	68	B/3528-21	T543B686(1)004A(2)(3)070	27	8	70	1,347	105	3
4	68	B/3528-21	T543B686(1)004A(2)(3)080	27	8	80	1,260	105	3
4	68	U/6032-15	T543U686(1)004A(2)(3)055	27	8	55	1,567	105	3
4	100	A/3216-18	T543A107(1)004A(2)(3)150	40	8	150	864	105	3
4	100	A/3216-18	T543A107(1)004A(2)(3)200	40	8	200	748	105	3
4	100	T/3528-12	T543T107(1)004A(2)(3)070	40	8	70	1,225	105	3
4	100	T/3528-12	T543T107(1)004A(2)(3)150	40	8	150	837	105	3
4	100	B/3528-21	T543B107(1)004A(2)(3)035	40	8	35	1,905	105	3
4	100	B/3528-21	T543B107(1)004A(2)(3)040	40	8	40	1,782	105	3
4	100	B/3528-21	T543B107(1)004A(2)(3)070	40	8	70	1,347	105	3
4	100	B/3528-21	T543B107(1)004A(2)(3)080	40	8	80	1,260	105	3
4	100	U/6032-15	T543U107(1)004A(2)(3)055	40	8	55	1,567	105	3
4	150	B/3528-21	T543B157(1)004A(2)(3)035	60	8	35	1,905	105	3
4	150	B/3528-21	T543B157(1)004A(2)(3)040	60	8	40	1,782	105	3
4	150	B/3528-21	T543B157(1)004A(2)(3)070	60	8	70	1,347	105	3
4	150	U/6032-15	T543U157(1)004A(2)(3)055	60	8	55	1,567	105	3
4	150	C/6032-28	T543C157(1)004A(2)(3)015	60	8	15	3,317	105	3
4	150	C/6032-28	T543C157(1)004A(2)(3)025	60	8	25	2,569	105	3
4	150	C/6032-28	T543C157(1)004A(2)(3)045	60	8	45	1,915	105	3
4	150	C/6032-28	T543C157(1)004A(2)(3)100	60	8	100	1,285	105	3
4	150	V/7343-20	T543V157(1)004A(2)(3)015	60	10	15	3,531	105	3
4	150	V/7343-20	T543V157(1)004A(2)(3)025	60	10	25	2,735	105	3
4	220	B/3528-21	T543B227(1)004A(2)(3)035	88	8	35	1,905	105	3
4	220	B/3528-21	T543B227(1)004A(2)(3)045	88	8	45	1,680	105	3
4	220	B/3528-21	T543B227(1)004A(2)(3)070	88	8	70	1,347	105	3
4	220	L/6032-19	T543L227(1)004A(2)(3)012	88	8	12	3,536	105	3
4	220	L/6032-19	T543L227(1)004A(2)(3)025	88	8	25	2,449	105	3
4	220	C/6032-28	T543C227(1)004A(2)(3)015	88	8	15	3,317	105	3
4	220	C/6032-28	T543C227(1)004A(2)(3)018	88	8	18	3,028	105	3
4	220	C/6032-28	T543C227(1)004A(2)(3)025	88	8	25	2,569	105	3
4	220	C/6032-28	T543C227(1)004A(2)(3)045	88	8	45	1,915	105	3
4	220	C/6032-28	T543C227(1)004A(2)(3)055	88	8	55	1,732	105	3
4	220	W/7343-15	T543W227(1)004A(2)(3)025	88	10	25	2,683	105	3
4	220	W/7343-15	T543W227(1)004A(2)(3)040	88	10	40	2,121	105	3
4	220	V/7343-20	T543V227(1)004A(2)(3)015	88	10	15	3,531	105	3
4	220	V/7343-20	T543V227(1)004A(2)(3)018	88	10	18	3,223	105	3
4	220	V/7343-20	T543V227(1)004A(2)(3)025	88	10	25	2,735	105	3
4	220	V/7343-20	T543V227(1)004A(2)(3)040	88	10	40	2,162	105	3
4	220	V/7343-20	T543V227(1)004A(2)(3)045	88	10	45	2,039	105	3
4	220	D-7343-31	T543D227(1)004A(2)(3)025	88	10	25	3,000	105	3
4	220	D-7343-31	T543D227(1)004A(2)(3)065	88	10	65	1,861	105	3
4	330	C/6032-28	T543C337(1)004A(2)(3)025	132	8	25	2,569	105	3
4	330	C/6032-28	T543C337(1)004A(2)(3)045	132	8	45	1,915	105	3
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

KEMET a YAGEO company

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
4	330	V/7343-20	T543V337(1)004A(2)(3)018	132	10	18	3,223	105	3
4	330	V/7343-20	T543V337(1)004A(2)(3)025	132	10	25	2,735	105	3
4	330	V/7343-20	T543V337(1)004A(2)(3)040	132	10	40	2,162	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)005	132	10	5	6,708	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)006	132	10	6	6,124	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)007	132	10	7	5,669	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)009	132	10	9	5,000	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)010	132	10	10	4,743	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)012	132	10	12	4,330	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)015	132	10	15	3,873	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)025	132	10	25	3,000	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)040	132	10	40	2,372	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)045	132	10	45	2,236	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)006	188	10	6	6,124	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)010	188	10	10	4,743	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)012	188	10	12	4,330	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)015	188	10	15	3,873	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)018	188	10	18	3,536	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)025	188	10	25	3,000	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)040	188	10	40	2,372	105	3
4	470	Y/7343-40	T543Y477(1)004A(2)(3)005	188	10	5	6,943	125	3
4	470	Y/7343-40	T543Y477(1)004A(2)(3)006	188	10	6	6,338	125	3
4	470	Y/7343-40	T543Y477(1)004A(2)(3)010	188	10	10	4,909	125	3
4	470	Y/7343-40	T543Y477(1)004A(2)(3)025	188	10	25	3,105	125	3
4	470	Y/7343-40	T543Y477(1)004A(2)(3)040	188	10	40	2,455	125	3
4	680	D-7343-31	T543D687(1)004A(2)(3)025	272	10	25	3,000	125	3
4	680	Y/7343-40	T543Y687(1)004A(2)(3)005	272	10	5	6,943	105	3
4	680	Y/7343-40	T543Y687(1)004A(2)(3)010	272	10	10	4,909	105	3
4	680	Y/7343-40	T543Y687(1)004A(2)(3)015	272	10	15	4,008	105	3
4	680	Y/7343-40	T543Y687(1)004A(2)(3)025	272	10	25	3,105	105	3
4	680	X/7343-43	T543X687(1)004A(2)(3)005	272	10	5	7,029	125	3
4	680	X/7343-43	T543X687(1)004A(2)(3)006	272	10	6	6,416	125	3
4	680	X/7343-43	T543X687(1)004A(2)(3)010	272	10	10	4,970	125	3
4	680	X/7343-43	T543X687(1)004A(2)(3)015	272	10	15	4,058	125	3
4	680	X/7343-43	T543X687(1)004A(2)(3)035	272	10	35	2,657	125	3
4	1,000	X/7343-43	T543X108(1)004A(2)(3)006	400	10	6	6,416	105	3
4	1,000	X/7343-43	T543X108(1)004A(2)(3)010	400	10	10	4,970	105	3
4	1,500	O/7360-43	T543O158M004A(2)(3)010	600	10	10	5,480	105	3
6.3	15	T/3528-12	T543T156(1)006A(2)(3)100	9	8	100	1,025	105	3
6.3	22	A/3216-18	T543A226(1)006A(2)(3)090	14	8	90	1,116	105	3
6.3	22	A/3216-18	T543A226(1)006A(2)(3)100	14	8	100	1,058	105	3
6.3	33	A/3216-18	T543A336(1)006A(2)(3)070	21	8	70	1,265	105	3
6.3	33	A/3216-18	T543A336(1)006A(2)(3)080	21	8	80	1,183	105	3
6.3	33	A/3216-18	T543A336(1)006A(2)(3)120	21	8	120	966	105	3
6.3	33	T/3528-12	T543T336(1)006A(2)(3)070	21	8	70	1,225	105	3
6.3	33	B/3528-21	T543B336(1)006A(2)(3)025	21	8	25	2,254	105	3
6.3	33	B/3528-21	T543B336(1)006A(2)(3)035	21	8	35	1,905	105	3
6.3	33	B/3528-21	T543B336(1)006A(2)(3)040	21	8	40	1,782	105	3
6.3	33	B/3528-21	T543B336(1)006A(2)(3)070	21	8	70	1,347	105	3
6.3	33	B/3528-21	T543B336(1)006A(2)(3)080	21	8	80	1,260	105	3
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
6.3	33	C/6032-28	T543C336(1)006A(2)(3)100	21	8	100	1,285	105	3
6.3	47	A/3216-18	T543A476(1)006A(2)(3)150	30	8	150	864	105	3
6.3	47	T/3528-12	T543T476(1)006A(2)(3)070	30	8	70	1,225	105	3
6.3	47	T/3528-12	T543T476(1)006A(2)(3)080	30	8	80	1,146	105	3
6.3	47	B/3528-21	T543B476(1)006A(2)(3)025	30	8	25	2,254	125	3
6.3	47	B/3528-21	T543B476(1)006A(2)(3)035	30	8	35	1,905	105	3
6.3	47	B/3528-21	T543B476(1)006A(2)(3)040	30	8	40	1,782	105	3
6.3	47	B/3528-21	T543B476(1)006A(2)(3)070	30	8	70	1,347	105	3
6.3	47	B/3528-21	T543B476(1)006A(2)(3)080	30	8	80	1,260	105	3
6.3	68	A/3216-18	T543A686(1)006A(2)(3)150	43	8	150	864	105	3
6.3	68	T/3528-12	T543T686(1)006A(2)(3)070	43	8	70	1,225	105	3
6.3	68	T/3528-12	T543T686(1)006A(2)(3)150	43	8	150	837	105	3
6.3	68	B/3528-21	T543B686(1)006A(2)(3)025	43	8	25	2,254	105	3
6.3	68	B/3528-21	T543B686(1)006A(2)(3)035	43	8	35	1,905	105	3
6.3	68	B/3528-21	T543B686(1)006A(2)(3)040	43	8	40	1,782	105	3
6.3	68	B/3528-21	T543B686(1)006A(2)(3)070	43	8	70	1,347	105	3
6.3	68	B/3528-21	T543B686(1)006A(2)(3)080	43	8	80	1,260	105	3
6.3	68	U/6032-15	T543U686(1)006A(2)(3)055	43	8	55	1,567	105	3
6.3	68	U/6032-15	T543U686(1)006A(2)(3)070	43	8	70	1,389	105	3
6.3	68	C/6032-28	T543C686(1)006A(2)(3)100	43	8	100	1,285	105	3
6.3	100	T/3528-12	T543T107(1)006A(2)(3)070	63	8	70	1,225	105	3
6.3	100	B/3528-21	T543B107(1)006A(2)(3)025	63	8	25	2,254	105	3
6.3	100	B/3528-21	T543B107(1)006A(2)(3)035	63	8	35	1,905	105	3
6.3	100	B/3528-21	T543B107(1)006A(2)(3)040	63	8	40	1,782	105	3
6.3	100	B/3528-21	T543B107(1)006A(2)(3)045	63	8	45	1,680	105	3
6.3	100	B/3528-21	T543B107(1)006A(2)(3)070	63	8	70	1,347	105	3
6.3	100	U/6032-15	T543U107(1)006A(2)(3)055	63	8	55	1,567	105	3
6.3	100	C/6032-28	T543C107(1)006A(2)(3)025	63	8	25	2,569	105	3
6.3	100	C/6032-28	T543C107(1)006A(2)(3)045	63	8	45	1,915	105	3
6.3	100	W/7343-15	T543W107(1)006A(2)(3)040	63	10	40	2,121	105	3
6.3	100	V/7343-20	T543V107(1)006A(2)(3)015	63	10	15	3,531	105	3
6.3	100	V/7343-20	T543V107(1)006A(2)(3)045	63	10	45	2,039	105	3
6.3	120	B/3528-21	T543B127(1)006A(2)(3)035	76	8	35	1,905	105	3
6.3	150	M/3528-15	T543M157(1)006A(2)(3)070	95	8	70	1,309	105	3
6.3	150	M/3528-15	T543M157(1)006A(2)(3)150	95	8	150	894	105	3
6.3	150	B/3528-21	T543B157(1)006A(2)(3)025	95	8	25	2,254	105	3
6.3	150	B/3528-21	T543B157(1)006A(2)(3)035	95	8	35	1,905	105	3
6.3	150	B/3528-21	T543B157(1)006A(2)(3)045	95	8	45	1,680	105	3
6.3	150	B/3528-21	T543B157(1)006A(2)(3)070	95	8	70	1,347	105	3
6.3	150	U/6032-15	T543U157(1)006A(2)(3)045	95	8	45	1,732	105	3
6.3	150	U/6032-15	T543U157(1)006A(2)(3)055	95	8	55	1,567	105	3
6.3	150	L/6032-19	T543L157(1)006A(2)(3)012	95	8	12	3,536	105	3
6.3	150	L/6032-19	T543L157(1)006A(2)(3)025	95	8	25	2,449	105	3
6.3	150	C/6032-28	T543C157(1)006A(2)(3)015	95	8	15	3,317	105	3
6.3	150	C/6032-28	T543C157(1)006A(2)(3)025	95	8	25	2,569	105	3
6.3	150	C/6032-28	T543C157(1)006A(2)(3)045	95	8	45	1,915	105	3
6.3	150	C/6032-28	T543C157(1)006A(2)(3)055	95	8	55	1,732	105	3
6.3	150	W/7343-15	T543W157(1)006A(2)(3)025	95	10	25	2,683	105	3
6.3	150	W/7343-15	T543W157(1)006A(2)(3)040	95	10	40	2,121	105	3
6.3	150	V/7343-20	T543V157(1)006A(2)(3)015	95	10	15	3,531	105	3
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
6.3	150	V/7343-20	T543V157(1)006A(2)(3)018	95	10	18	3,223	105	3
6.3	150	V/7343-20	T543V157(1)006A(2)(3)025	95	10	25	2,735	105	3
6.3	150	V/7343-20	T543V157(1)006A(2)(3)040	95	10	40	2,162	105	3
6.3	150	V/7343-20	T543V157(1)006A(2)(3)045	95	10	45	2,039	105	3
6.3	150	D-7343-31	T543D157(1)006A(2)(3)015	95	10	15	3,873	105	3
6.3	150	D-7343-31	T543D157(1)006A(2)(3)025	95	10	25	3,000	105	3
6.3	150	D-7343-31	T543D157(1)006A(2)(3)055	95	10	55	2,023	105	3
6.3	220	B/3528-21	T543B227(1)006A(2)(3)035	139	8	35	1,905	105	3
6.3	220	B/3528-21	T543B227(1)006A(2)(3)045	139	8	45	1,680	105	3
6.3	220	B/3528-21	T543B227(1)006A(2)(3)070	139	8	70	1,347	105	3
6.3	220	C/6032-28	T543C227(1)006A(2)(3)015	139	8	15	3,317	105	3
6.3	220	C/6032-28	T543C227(1)006A(2)(3)018	139	8	18	3,028	105	3
6.3	220	C/6032-28	T543C227(1)006A(2)(3)025	139	8	25	2,569	105	3
6.3	220	C/6032-28	T543C227(1)006A(2)(3)045	139	8	45	1,915	105	3
6.3	220	V/7343-20	T543V227(1)006A(2)(3)018	139	10	18	3,223	105	3
6.3	220	V/7343-20	T543V227(1)006A(2)(3)025	139	10	25	2,735	105	3
6.3	220	V/7343-20	T543V227(1)006A(2)(3)040	139	10	40	2,162	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)005	139	10	5	6,708	125	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)006	139	10	6	6,124	125	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)007	139	10	7	5,669	125	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)009	139	10	9	5,000	125	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)010	139	10	10	4,743	125	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)015	139	10	15	3,873	125	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)018	139	10	18	3,536	125	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)025	139	10	25	3,000	125	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)040	139	10	40	2,372	125	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)050	139	10	50	2,121	125	3
6.3	330	V/7343-20	T543V337(1)006A(2)(3)015	208	10	15	3,531	105	3
6.3	330	V/7343-20	T543V337(1)006A(2)(3)018	208	10	18	3,223	105	3
6.3	330	V/7343-20	T543V337(1)006A(2)(3)025	208	10	25	2,735	105	3
6.3	330	V/7343-20	T543V337(1)006A(2)(3)040	208	10	40	2,162	105	3
6.3	330	V/7343-20	T543V337(1)006A(2)(3)045	208	10	45	2,039	105	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)006	208	10	6	6,124	125	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)009	208	10	9	5,000	125	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)010	208	10	10	4,743	125	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)015	208	10	15	3,873	125	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)018	208	10	18	3,536	125	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)025	208	10	25	3,000	125	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)040	208	10	40	2,372	125	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)045	208	10	45	2,236	125	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)005	208	10	5	6,943	125	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)006	208	10	6	6,338	125	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)010	208	10	10	4,909	125	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)015	208	10	15	4,008	125	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)025	208	10	25	3,105	125	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)040	208	10	40	2,455	125	3
6.3	470	W/7343-15	T543W477(1)006A(2)(3)055	296	10	55	1,809	85	3
6.3	470	W/7343-15	T543W477(1)006A(2)(3)035	296	10	35	2,268	85	3
6.3	470	V/7343-20	T543V477(1)006A(2)(3)055	296	10	55	1,844	85	3
6.3	470	D-7343-31	T543D477(1)006A(2)(3)015	296	10	15	3,873	105	3
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
6.3	470	D-7343-31	T543D477(1)006A(2)(3)025	296	10	25	3,000	105	3
6.3	470	D-7343-31	T543D477(1)006A(2)(3)030	296	10	30	2,739	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)005	296	10	5	6,943	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)010	296	10	10	4,909	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)015	296	10	15	4,008	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)018	296	10	18	3,659	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)025	296	10	25	3,105	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)035	296	10	35	2,624	105	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)005	296	10	5	7,029	125	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)006	296	10	6	6,416	125	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)010	296	10	10	4,970	125	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)018	296	10	18	3,704	125	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)035	296	10	35	2,657	125	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)040	296	10	40	2,485	125	3
6.3	680	X/7343-43	T543X687(1)006A(2)(3)010	428	10	10	4,970	125	3
6.3	680	X/7343-43	T543X687(1)006A(2)(3)018	428	10	18	3,704	125	3
6.3	1,000	H/7360-20	T543H108(1)006A(2)(3)055	630	20	55	1,844	85	4
6.3	1,000	O/7360-43	T543O108M006A(2)(3)010	630	10	10	5,480	105	3
6.3	1,000	O/7360-43	T543O108M006A(2)(3)015	630	10	15	4,470	105	3
6.3	1,500	H/7360-20	T543H158(1)006A(2)(3)055	945	20	55	1,844	85	4
8	33	T/3528-12	T543T336(1)008A(2)(3)070	26	8	70	1,225	105	3
8	33	T/3528-12	T543T336(1)008A(2)(3)080	26	8	80	1,146	105	3
8	33	B/3528-21	T543B336(1)008A(2)(3)025	26	8	25	2,254	105	3
8	33	B/3528-21	T543B336(1)008A(2)(3)035	26	8	35	1,905	105	3
8	33	B/3528-21	T543B336(1)008A(2)(3)040	26	8	40	1,782	105	3
8	33	B/3528-21	T543B336(1)008A(2)(3)070	26	8	70	1,347	105	3
8	33	U/6032-15	T543U336(1)008A(2)(3)070	26	8	70	1,389	105	3
8	47	B/3528-21	T543B476(1)008A(2)(3)035	38	8	35	1,905	105	3
8	47	B/3528-21	T543B476(1)008A(2)(3)070	38	8	70	1,347	105	3
8	150	V/7343-20	T543V157(1)008A(2)(3)040	120	10	40	2,162	105	3
8	150	D-7343-31	T543D157(1)008A(2)(3)025	120	10	25	3,000	105	3
8	150	D-7343-31	T543D157(1)008A(2)(3)040	120	10	40	2,372	105	3
8	150	D-7343-31	T543D157(1)008A(2)(3)055	120	10	55	2,023	105	3
10	10	A/3216-18	T543A106(1)010A(2)(3)080	10	8	80	1,183	105	3
10	15	A/3216-18	T543A156(1)010A(2)(3)080	15	8	80	1,183	105	3
10	22	A/3216-18	T543A226(1)010A(2)(3)080	22	8	80	1,183	105	3
10	22	B/3528-21	T543B226(1)010A(2)(3)080	22	8	80	1,260	105	3
10	33	T/3528-12	T543T336(1)010A(2)(3)070	33	8	70	1,225	105	3
10	33	T/3528-12	T543T336(1)010A(2)(3)080	33	8	80	1,146	105	3
10	33	B/3528-21	T543B336(1)010A(2)(3)025	33	8	25	2,254	105	3
10	33	B/3528-21	T543B336(1)010A(2)(3)035	33	8	35	1,905	105	3
10	33	B/3528-21	T543B336(1)010A(2)(3)040	33	8	40	1,782	105	3
10	33	B/3528-21	T543B336(1)010A(2)(3)070	33	8	70	1,347	105	3
10	33	B/3528-21	T543B336(1)010A(2)(3)080	33	8	80	1,260	105	3
10	33	U/6032-15	T543U336(1)010A(2)(3)070	33	8	70	1,389	105	3
10	47	B/3528-21	T543B476(1)010A(2)(3)035	47	8	35	1,905	105	3
10	47	B/3528-21	T543B476(1)010A(2)(3)070	47	8	70	1,347	105	3
10	47	U/6032-15	T543U476(1)010A(2)(3)055	47	8	55	1,567	105	3
10	47	C/6032-28	T543C476(1)010A(2)(3)100	47	8	100	1,285	105	3
10	68	U/6032-15	T543U686(1)010A(2)(3)055	68	8	55	1,567	105	3
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
10	68	C/6032-28	T543C686(1)010A(2)(3)045	68	8	45	1,915	105	3
10	68	W/7343-15	T543W686(1)010A(2)(3)025	68	10	25	2,683	105	3
10	68	W/7343-15	T543W686(1)010A(2)(3)040	68	10	40	2,121	105	3
10	68	V/7343-20	T543V686(1)010A(2)(3)025	68	10	25	2,735	105	3
10	68	V/7343-20	T543V686(1)010A(2)(3)040	68	10	40	2,162	105	3
10	68	V/7343-20	T543V686(1)010A(2)(3)045	68	10	45	2,039	105	3
10	68	V/7343-20	T543V686(1)010A(2)(3)060	68	10	60	1,765	105	3
10	68	V/7343-20	T543V686(1)010A(2)(3)100	68	10	100	1,367	105	3
10	68	D-7343-31	T543D686(1)010A(2)(3)100	68	10	100	1,500	105	3
10	100	B/3528-21	T543B107(1)010A(2)(3)150	100	10	150	920	105	3
10	100	L/6032-19	T543L107(1)010A(2)(3)025	100	8	25	2,449	105	3
10	100	C/6032-28	T543C107(1)010A(2)(3)025	100	8	25	2,569	105	3
10	100	C/6032-28	T543C107(1)010A(2)(3)045	100	8	45	1,915	105	3
10	100	W/7343-15	T543W107(1)010A(2)(3)040	100	10	40	2,121	105	3
10	100	V/7343-20	T543V107(1)010A(2)(3)018	100	10	18	3,223	105	3
10	100	V/7343-20	T543V107(1)010A(2)(3)025	100	10	25	2,735	105	3
10	100	V/7343-20	T543V107(1)010A(2)(3)045	100	10	45	2,039	105	3
10	100	V/7343-20	T543V107(1)010A(2)(3)050	100	10	50	1,934	105	3
10	100	D-7343-31	T543D107(1)010A(2)(3)018	100	10	18	3,536	125	3
10	100	D-7343-31	T543D107(1)010A(2)(3)025	100	10	25	3,000	125	3
10	100	D-7343-31	T543D107(1)010A(2)(3)055	100	10	55	2,023	125	3
10	100	D-7343-31	T543D107(1)010A(2)(3)080	100	10	80	1,677	125	3
10	150	C/6032-28	T543C157(1)010A(2)(3)055	150	8	55	1,732	105	3
10	150	V/7343-20	T543V157(1)010A(2)(3)025	150	10	25	2,735	105	3
10	150	V/7343-20	T543V157(1)010A(2)(3)040	150	10	40	2,162	105	3
10	150	D-7343-31	T543D157(1)010A(2)(3)005	150	10	5	6,708	125	3
10	150	D-7343-31	T543D157(1)010A(2)(3)006	150	10	6	6,124	125	3
10	150	D-7343-31	T543D157(1)010A(2)(3)010	150	10	10	4,743	125	3
10	150	D-7343-31	T543D157(1)010A(2)(3)015	150	10	15	3,873	125	3
10	150	D-7343-31	T543D157(1)010A(2)(3)018	150	10	18	3,536	125	3
10	150	D-7343-31	T543D157(1)010A(2)(3)025	150	10	25	3,000	125	3
10	150	D-7343-31	T543D157(1)010A(2)(3)040	150	10	40	2,372	125	3
10	150	D-7343-31	T543D157(1)010A(2)(3)055	150	10	55	2,023	125	3
10	150	Y/7343-40	T543Y157(1)010A(2)(3)018	150	10	18	3,659	105	3
10	150	Y/7343-40	T543Y157(1)010A(2)(3)025	150	10	25	3,105	105	3
10	220	V/7343-20	T543V227(1)010A(2)(3)025	220	10	25	2,735	105	3
10	220	V/7343-20	T543V227(1)010A(2)(3)045	220	10	45	2,039	105	3
10	220	D-7343-31	T543D227(1)010A(2)(3)006	220	10	6	6,124	125	3
10	220	D-7343-31	T543D227(1)010A(2)(3)010	220	10	10	4,743	125	3
10	220	D-7343-31	T543D227(1)010A(2)(3)018	220	10	18	3,536	125	3
10	220	D-7343-31	T543D227(1)010A(2)(3)025	220	10	25	3,000	125	3
10	220	D-7343-31	T543D227(1)010A(2)(3)040	220	10	40	2,372	125	3
10	220	Y/7343-40	T543Y227(1)010A(2)(3)006	220	10	6	6,338	125	3
10	220	Y/7343-40	T543Y227(1)010A(2)(3)010	220	10	10	4,909	125	3
10	220	Y/7343-40	T543Y227(1)010A(2)(3)040	220	10	40	2,455	125	3
10	330	Y/7343-40	T543Y337(1)010A(2)(3)015	330	10	15	4,008	105	3
10	330	Y/7343-40	T543Y337(1)010A(2)(3)035	330	10	35	2,624	105	3
10	330	X/7343-43	T543X337(1)010A(2)(3)005	330	10	5	7,029	125	3
10	330	X/7343-43	T543X337(1)010A(2)(3)006	330	10	6	6,416	125	3
10	330	X/7343-43	T543X337(1)010A(2)(3)010	330	10	10	4,970	125	3
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
10	330	X/7343-43	T543X337(1)010A(2)(3)025	330	10	25	3,143	125	3
10	330	X/7343-43	T543X337(1)010A(2)(3)040	330	10	40	2,485	125	3
10	470	X/7343-43	T543X477(1)010A(2)(3)020	470	10	20	3,674	105	3
10	680	O/7360-43	T543O687M010A(2)(3)015	680	10	15	4,470	105	3
12.5	10	T/3528-12	T543T106(1)12RA(2)(3)150	13	8	150	837	105	3
12.5	15	T/3528-12	T543T156(1)12RA(2)(3)080	19	8	80	1,146	105	3
12.5	330	X/7343-43	T543X337(1)12RA(2)(3)015	413	10	15	4,058	105	3
16	10	B/3528-21	T543B106(1)016A(2)(3)100	16	8	100	1,127	105	3
16	22	C/6032-28	T543C226(1)016A(2)(3)080	35	8	80	1,436	105	3
16	33	W/7343-15	T543W336(1)016A(2)(3)045	53	10	45	2,000	105	3
16	33	V/7343-20	T543V336(1)016A(2)(3)045	53	10	45	2,039	105	3
16	33	V/7343-20	T543V336(1)016A(2)(3)060	53	10	60	1,765	105	3
16	33	V/7343-20	T543V336(1)016A(2)(3)070	53	10	70	1,634	105	3
16	47	W/7343-15	T543W476(1)016A(2)(3)045	75	10	45	2,000	105	3
16	47	V/7343-20	T543V476(1)016A(2)(3)045	75	10	45	2,039	105	3
16	47	V/7343-20	T543V476(1)016A(2)(3)070	75	10	70	1,634	105	3
16	47	V/7343-20	T543V476(1)016A(2)(3)080	75	10	80	1,529	105	3
16	47	D-7343-31	T543D476(1)016A(2)(3)035	75	10	35	2,535	125	3
16	47	D-7343-31	T543D476(1)016A(2)(3)065	75	10	65	1,861	125	3
16	47	D-7343-31	T543D476(1)016A(2)(3)070	75	10	70	1,793	125	3
16	68	V/7343-20	T543V686(1)016A(2)(3)050	109	10	50	1,934	105	3
16	68	V/7343-20	T543V686(1)016A(2)(3)090	109	10	90	1,441	105	3
16	100	V/7343-20	T543V107(1)016A(2)(3)050	160	10	50	1,934	105	3
16	100	D-7343-31	T543D107(1)016A(2)(3)035	160	10	35	2,535	125	3
16	100	D-7343-31	T543D107(1)016A(2)(3)050	160	10	50	2,121	125	3
16	150	X/7343-43	T543X157(1)016A(2)(3)015	240	10	15	4,058	125	3
16	150	X/7343-43	T543X157(1)016A(2)(3)025	240	10	25	3,143	125	3
16	150	X/7343-43	T543X157(1)016A(2)(3)040	240	10	40	2,485	125	3
16	150	X/7343-43	T543X157(1)016A(2)(3)080	240	10	80	1,757	125	3
16	220	X/7343-43	T543X227(1)016A(2)(3)035	352	10	35	2,657	125	3
16	220	X/7343-43	T543X227(1)016A(2)(3)080	352	10	80	1,757	125	3
16	330	X/7343-43	T543X337(1)016A(2)(3)025	528	10	25	3,143	125	3
16	330	X/7343-43	T543X337(1)016A(2)(3)050	528	10	50	2,223	125	3
16	470	O/7360-43	T543O477M016A(2)(3)020	752	10	20	3,870	105	3
16	470	O/7360-43	T543O477M016A(2)(3)040	752	10	40	2,740	105	3
20	22	V/7343-20	T543V226(1)020A(2)(3)040	44	10	40	2,162	105	3
20	22	V/7343-20	T543V226(1)020A(2)(3)045	44	10	45	2,039	105	3
20	22	V/7343-20	T543V226(1)020A(2)(3)090	44	10	90	1,441	105	3
20	22	D-7343-31	T543D226(1)020A(2)(3)040	44	10	40	2,372	105	3
20	22	D-7343-31	T543D226(1)020A(2)(3)045	44	10	45	2,236	105	3
20	22	D-7343-31	T543D226(1)020A(2)(3)090	44	10	90	1,581	105	3
20	33	D-7343-31	T543D336(1)020A(2)(3)060	66	10	60	1,936	125	3
20	47	V/7343-20	T543V476(1)020A(2)(3)055	94	10	55	1,844	105	3
20	47	V/7343-20	T543V476(1)020A(2)(3)090	94	10	90	1,441	105	3
20	47	D-7343-31	T543D476(1)020A(2)(3)055	94	10	55	2,023	105	3
20	100	X/7343-43	T543X107(1)020A(2)(3)035	200	10	35	2,657	125	3
20	100	X/7343-43	T543X107(1)020A(2)(3)050	200	10	50	2,223	125	3
25	10	B/3528-21	T543B106(1)025A(2)(3)100	25	10	100	1,127	105	3
25	15	V/7343-20	T543V156(1)025A(2)(3)090	38	10	90	1,441	105	3
25	15	D-7343-31	T543D156(1)025A(2)(3)060	38	10	60	1,936	125	3
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
25	15	D-7343-31	T543D156(1)025A(2)(3)080	38	10	80	1,677	125	3
25	22	C/6032-28	T543C226(1)025A(2)(3)080	55	8	80	1,436	105	3
25	22	D-7343-31	T543D226(1)025A(2)(3)075	55	10	75	1,732	125	3
25	22	V/7343-20	T543V226(1)025A(2)(3)060	55	10	60	1,765	105	3
25	22	V/7343-20	T543V226(1)025A(2)(3)090	55	10	90	1,441	105	3
25	33	V/7343-20	T543V336(1)025A(2)(3)060	83	10	60	1,765	105	3
25	33	D-7343-31	T543D336(1)025A(2)(3)060	83	10	60	1,936	105	3
25	68	X/7343-43	T543X686(1)025A(2)(3)035	170	10	35	2,657	125	3
25	68	X/7343-43	T543X686(1)025A(2)(3)050	170	10	50	2,223	125	3
25	100	X/7343-43	T543X107(1)025A(2)(3)060	250	10	60	2,029	125	3
25	150	O/7360-43	T543O157M025A(2)(3)045	375	10	45	2,580	105	3
30	22	D-7343-31	T543D226(1)030A(2)(3)075	66	10	75	1,732	105	3
30	33	D-7343-31	T543D336(1)030A(2)(3)100	99	10	100	1,500	105	3
30	47	X/7343-43	T543X476(1)030A(2)(3)050	141	10	50	2,223	105	3
30	68	X/7343-43	T543X686(1)030A(2)(3)035	204	10	35	2,657	125	3
30	68	X/7343-43	T543X686(1)030A(2)(3)050	204	10	50	2,223	125	3
30	100	X/7343-43	T543X107(1)030A(2)(3)035	300	10	35	2,657	105	3
30	100	X/7343-43	T543X107(1)030A(2)(3)060	300	10	60	2,029	105	3
30	100	X/7343-43	T543X107(1)030A(2)(3)070	300	10	70	1,878	105	3
30	150	O/7360-43	T543O157M030A(2)(3)030	450	10	30	3,160	105	3
30	150	O/7360-43	T543O157M030A(2)(3)045	450	10	45	2,580	105	3
30	150	O/7360-43	T543O157M030A(2)(3)055	450	10	55	2,340	105	3
35	15	V/7343-20	T543V156(1)035A(2)(3)100	53	10	100	1,367	105	3
35	15	V/7343-20	T543V156(1)035A(2)(3)125	53	10	125	1,223	105	3
35	15	D-7343-31	T543D156(1)035A(2)(3)100	53	10	100	1,500	125	3
35	15	D-7343-31	T543D156(1)035A(2)(3)125	53	10	125	1,342	125	3
35	33	X/7343-43	T543X336(1)035A(2)(3)065	116	10	65	1,949	105	3
35	47	X/7343-43	T543X476(1)035A(2)(3)030	165	10	30	2,869	125	3
35	47	X/7343-43	T543X476(1)035A(2)(3)060	165	10	60	2,029	125	3
35	68	O/7360-43	T543O686M035A(2)(3)025	238	10	25	3,460	105	3
35	68	O/7360-43	T543O686M035A(2)(3)045	238	10	45	2,580	105	3
40	68	O/7360-43	T543O686M040A(2)(3)035	272	10	35	2,930	105	3
40	82	O/7360-43	T543O826M040A(2)(3)055	328	10	55	2,336	105	3
50	5.6	D-7343-31	T543D565(1)050A(2)(3)070	28	10	70	1,793	105	3
50	5.6	D-7343-31	T543D565(1)050A(2)(3)090	28	10	90	1,581	105	3
50	6.8	V/7343-20	T543V685(1)050A(2)(3)065	34	10	65	1,934	125	3
50	10	D-7343-31	T543D106(1)050A(2)(3)090	50	10	90	1,581	125	3
50	10	D-7343-31	T543D106(1)050A(2)(3)100	50	10	100	1,500	125	3
50	10	D-7343-31	T543D106(1)050A(2)(3)120	50	10	120	1,369	125	3
50	15	X/7343-43	T543X156(1)050A(2)(3)035	75	10	35	2,657	105	3
50	15	X/7343-43	T543X156(1)050A(2)(3)070	75	10	70	1,878	105	3
50	18	X/7343-43	T543X186(1)050A(2)(3)035	90	10	35	2,657	125	3
50	18	X/7343-43	T543X186(1)050A(2)(3)070	90	10	70	1,878	125	3
50	22	X/7343-43	T543X226(1)050A(2)(3)040	110	10	40	2,485	125	3
50	22	X/7343-43	T543X226(1)050A(2)(3)075	110	10	75	1,815	125	3
50	33	X/7343-43	T543X336(1)050A(2)(3)040	165	10	40	2,485	125	3
50	33	X/7343-43	T543X336(1)050A(2)(3)075	165	10	75	1,815	125	3
50	47	O/7360-43	T543O476M050A(2)(3)060	235	10	60	2,240	105	3
63	4.7	D-7343-31	T543D475(1)063A(2)(3)075	30	10	75	1,732	125	3
63	4.7	D-7343-31	T543D475(1)063A(2)(3)100	30	10	100	1,500	125	3
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

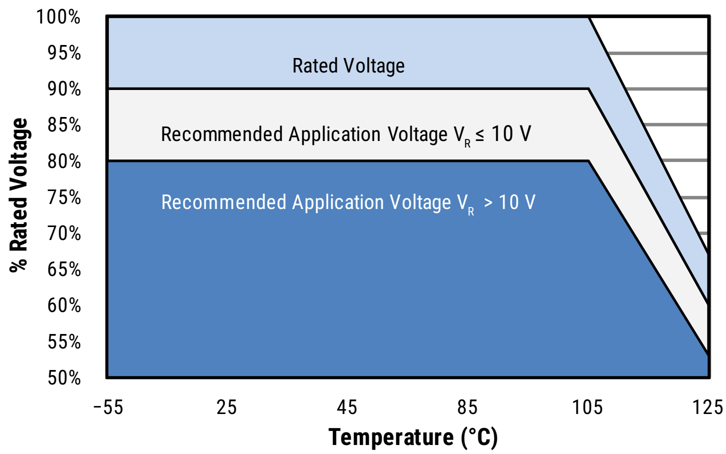
(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage VDC at 105°C	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL
Not all parts are 105°C rated	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
63	4.7	D-7343-31	T543D475(1)063A(2)(3)120	30	10	120	1,369	125	3
63	6.8	D-7343-31	T543D685(1)063A(2)(3)075	43	10	75	1,700	125	3
63	10	X/7343-43	T543X106(1)063A(2)(3)050	63	10	50	2,223	125	3
63	10	X/7343-43	T543X106(1)063A(2)(3)075	63	10	75	1,815	125	3
63	10	X/7343-43	T543X106(1)063A(2)(3)100	63	10	100	1,572	125	3
63	10	X/7343-43	T543X106(1)063A(2)(3)150	63	10	150	1,283	125	3
63	15	X/7343-43	T543X156(1)063A(2)(3)035	95	10	35	2,657	125	3
63	15	X/7343-43	T543X156(1)063A(2)(3)050	95	10	50	2,223	125	3
63	22	X/7343-43	T543X226(1)063A(2)(3)075	138.6	10	75	1,815	125	3
63	**22**	**O/7360-43**	**T543O226M063A(2)(3)030**	**139**	**10**	**30**	**3,160**	**105**	**3**
63	**22**	**O/7360-43**	**T543O226M063A(2)(3)040**	**139**	**10**	**40**	**2,740**	**105**	**3**
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at V_R, 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp.	MSL

(1) To complete KEMET part number, insert M for ±20%, K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, H = Solder-plated, T = 100% Tin (Sn). Designates termination finish.
(3) To complete KEMET part number, insert E = None, S = 10 cycles +25°C, W = 10 cycles −55°C +85°C. Designates surge current option.
Refer to Ordering Information for additional detail.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Derating Guidelines



Recommended Application Voltage

KO-CAPs are solid state capacitors that demonstrate no wearout mechanism when operated within their recommended guidelines. While the KO-CAP can be operated at full rated voltage, most circuit designers seek a minimum level of assurance in long term reliability, which should be demonstrated with data. A voltage derating can provide the desired level of demonstrated reliability based on industry accepted acceleration models. Since most applications do require long term reliability, KEMET recommends that designers consider a voltage derating, according the graphic above, for the maximum steady state voltage.

Voltage Rating	Maximum Recommended Steady State Voltage
−55°C to 105°C	
2.5 V ≤ V_R ≤ 10 V	90% of V_R
12.5 V ≤ V_R ≤ 63 V	80% of V_R

V_R= Rated Voltage

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage which may be applied is limited by two criteria:

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage. See the Reverse Voltage section for allowable limits.

The maximum power dissipation by case size can be determined using the table at right. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Refer to the table below for temperature compensation requirements.

Temperature Compensation Multipliers for Maximum Ripple Current		
T ≤ 45°C	45° C < T ≤ 85°C	85°C < T ≤ 125°C
1.00	0.70	0.25

T = Environmental temperature

The maximum power dissipation rating must be reduced with increasing environmental operating temperatures. Refer to the Temperature Compensation Multiplier table for details.

Case Code	EIA Case Code	Maximum Power Dissipation (Pmax) mWatts at 45°C with +30°C Rise
A	3216-18	112
B	3528-21	127
C	6032-28	165
D	7343-31	225
H	7360-20	187
L	6032-19	150
M	3528-15	120
O	7360-43	300
T	3528-12	105
U	6032-15	135
V	7343-20	187
W	7343-15	180
X	7343-43	247
Y	7343-40	241

Using the Pmax of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{Pmax/R}$
$E(max) = Z \sqrt{Pmax/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
Pmax = maximum power dissipation (watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (ohms)

Surge Voltage

Surge voltage is the maximum voltage (peak value) which may be applied to the capacitor.
The surge voltage must not be applied for periodic charging and discharging in the course of normal operation and cannot be part of the application voltage.
Surge voltage capability is demonstrated by application of 1,000cycles at relevant voltage at 105°C and 125°C.
The parts are charged through a 33 Ohm resistor for 30 seconds and then discharged though a 33 Ohm resistor for each cycle.

Rated Voltage (V)	Surge Voltage (V)	Category Voltage (V)	Category Surge Voltage (V)
–55°C to 105°C		up to 125°C	
2.5	3.3	1.7	2.2
6.3	8.2	4.2	5.5
10	13	6.7	8.7
16	20.8	10.7	13.9
20	26	13.4	17.4
25	32.5	16.8	21.8
35	45.5	23.5	30.5
40	52	26.8	34.6
50	65	33.5	43.6

Reverse Voltage

Polymer electrolytic capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a small degree of transient voltage reversal for short periods as shown in the below table.

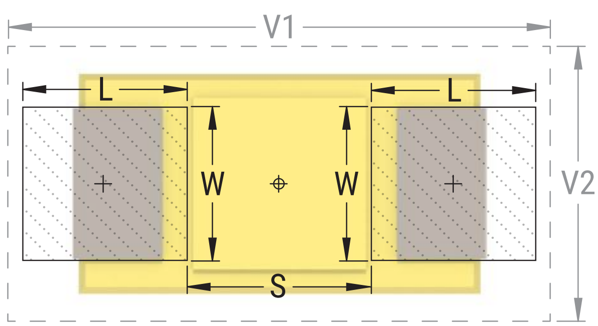
Temperature	Permissible Transient Reverse Voltage
25°C	15% of rated voltage
55°C	10% of rated voltage
85°C	5% of rated voltage
105°C	3% of rated voltage
125°C*	1% of rated voltage

**For series rated to 125°C*

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
A	3216–18	1.35	2.20	0.62	6.02	2.80	1.23	1.80	0.82	4.92	2.30	1.13	1.42	0.98	4.06	2.04
B	3528–21	2.35	2.21	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
C	6032–28	2.35	2.77	2.37	8.92	4.50	2.23	2.37	2.57	7.82	4.00	2.13	1.99	2.73	6.96	3.74
D	7343–31	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
L	6032-19	2.35	2.77	2.37	8.92	4.50	2.23	2.37	2.57	7.82	4.00	2.13	1.99	2.73	6.96	3.74
M	3528-15	2.35	2.20	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
O	7360-43	4.25	2.77	3.67	10.22	7.30	4.13	2.37	3.87	9.12	6.80	4.03	1.99	4.03	8.26	6.54
H	7360-20	4.25	2.77	3.67	10.22	7.30	4.13	2.37	3.87	9.12	6.80	4.03	1.99	4.03	8.26	6.54
T	3528–12	2.35	2.20	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
U	6032–15	2.35	2.77	2.37	8.92	4.50	2.23	2.37	2.57	7.82	4.00	2.13	1.99	2.73	6.96	3.74
V	7343–21	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
W	7343–15	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
X[1]	7343–43	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
Y[1]	7343–40	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] Height of these chips may create problems in wave soldering.
[2] Land pattern geometry is too small for silkscreen outline.



Grid Placement Courtyard

Soldering Process

The KEMET families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

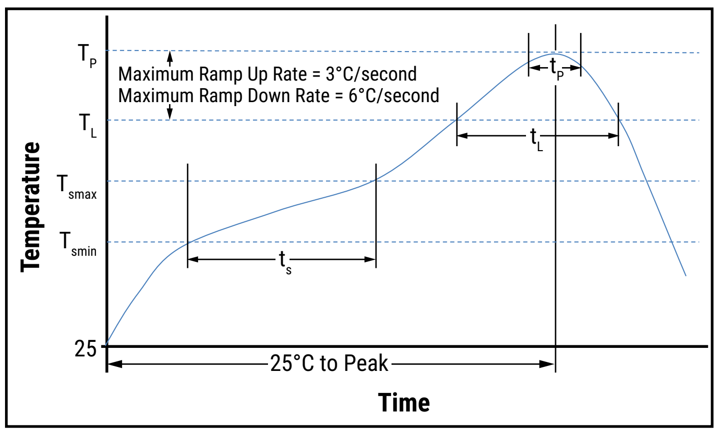
Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. “Wiping” the edges of a chip and heating the top surface is not recommended.

During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/second maximum	3°C/second maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/second maximum	6°C/second maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



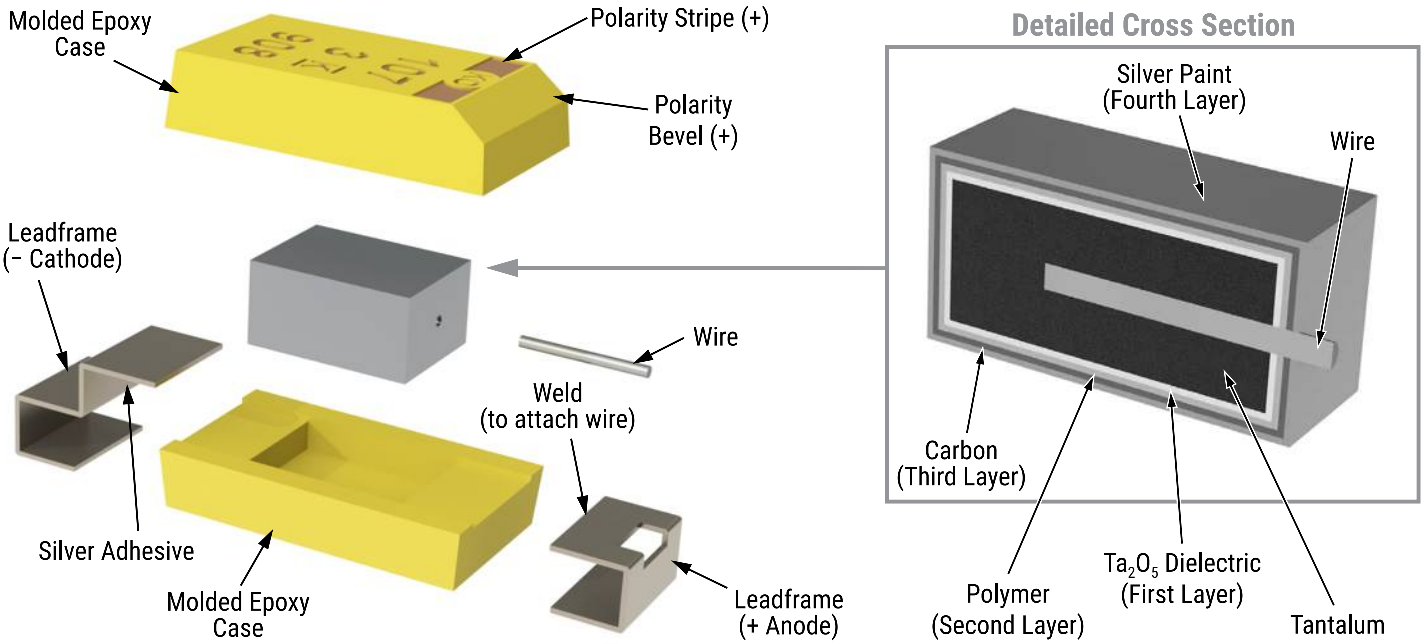
Storage

All KO-Cap are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as moisture sensitivity level 3 (MSL3) or moisture sensitivity level 4 (MSL4) per IPC/JEDEC J-STD-020 and packaged per IPC/JEDEC J-STD-033. Refer to Table 1 for part type specification. MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity. MSL4 specifies a floor time of 72H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

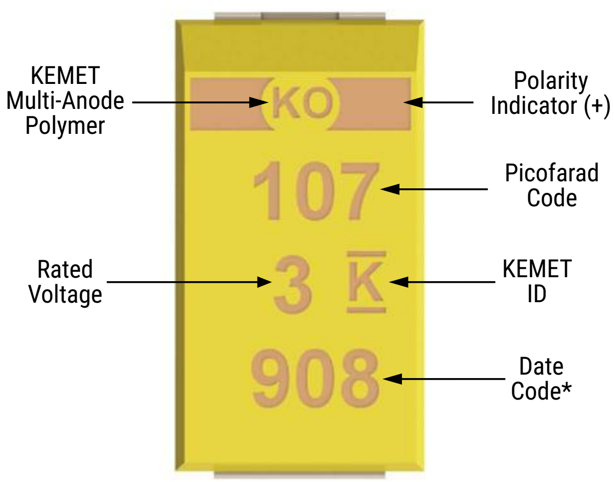
Calculated shelf life in sealed bag:
– 12 months from bag seal date in a storage environment of < 40°C and humidity < 90% RH
– 24 months from bag seal date in a storage environment of < 30°C and humidity < 70% RH

If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure

Construction



Capacitor Marking



* 908 = 8th week of 2019

Date Code *	
1st digit = last number of year	8 = 2018 9 = 2019 0 = 2020 1 = 2021 2 = 2022
2nd and 3rd digit = week of the year	01 = 1st week of the year to 52 = 52nd week of the year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

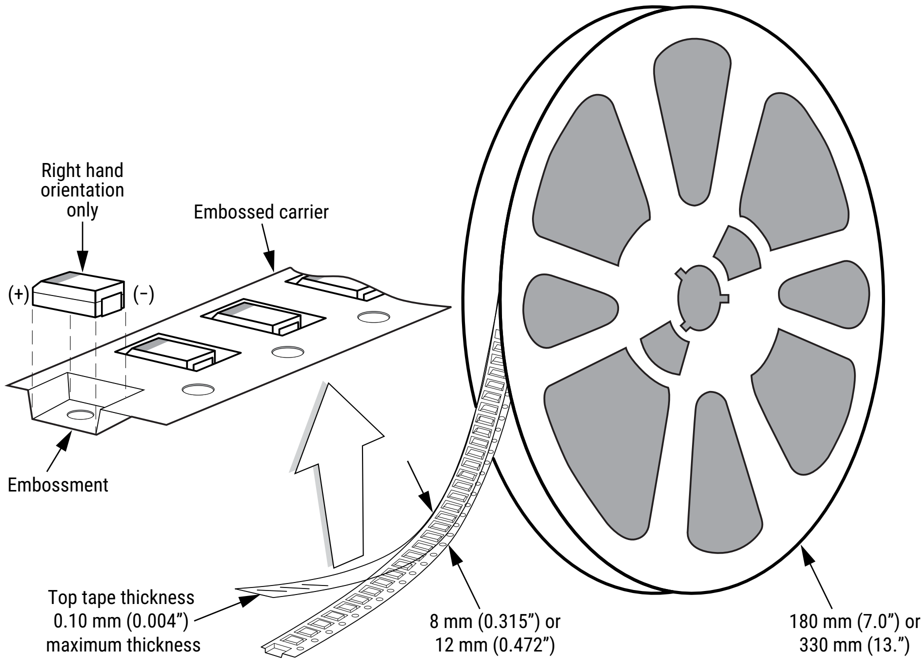


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
P	2012-10	8	3,000	N/A
R	2012-12	8	2,500	10,000
I	3216-10	8	3,000	N/A
S	3216-12	8	2,500	10,000
A	3216-18	8	2,000	N/A
T	3528-12	8	3,000	10,000
M	3528-15	8	2,500	8,000
B	3528-21	8	2,000	8,000
U	6032-15	12	1,000	5,000
L	6032-19	12	1,000	3,000
C	6032-28	12	500	3,000
Q	7343-12	12	1,000	3,000
W	7343-15	12	1,000	3,000
Z	7343-17	12	1,000	3,000
V	7343-19	12	1,000	3,000
D	7343-31	12	500	2,500
Y	7343-40	12	500	2,000
X	7343-43	12	500	2,000
J	7360-15	12	1,000	3,000
H	7360-20	12	1,000	3,000
O	7360-43	12	250	1,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

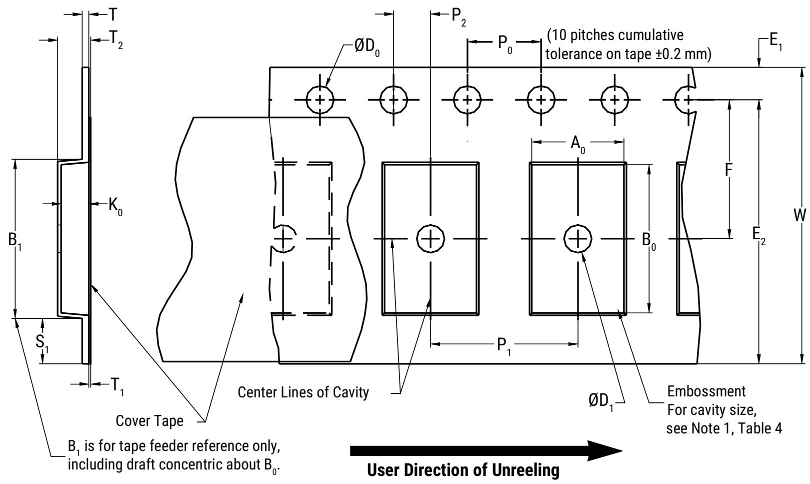


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/−0.0 (0.059 +0.004/−0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0, B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) and Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape, with or without components, shall pass around R without damage (see Figure 4).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
   (e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

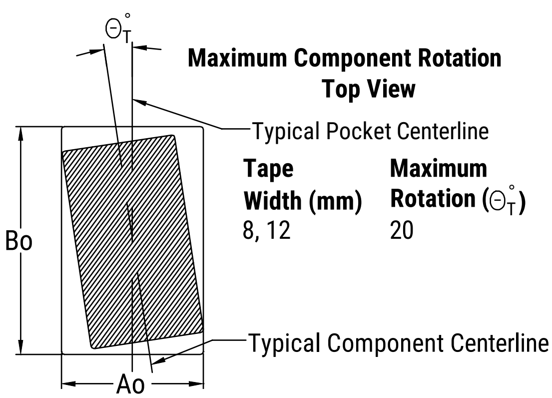
Packaging Information Performance Notes

1. Cover tape break force: 1.0 kg minimum.
2. Cover tape peel strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 newton (10 to 100 gf)
12 mm	0.1 to 1.3 newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624*.

Figure 2 – Maximum Component Rotation



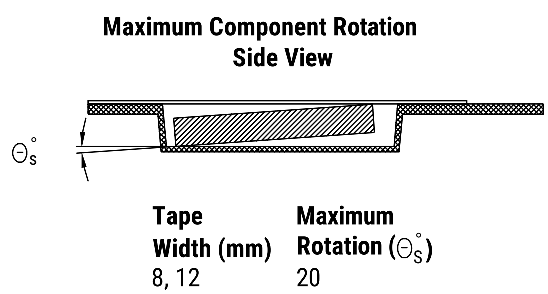


Figure 3 – Maximum Lateral Movement

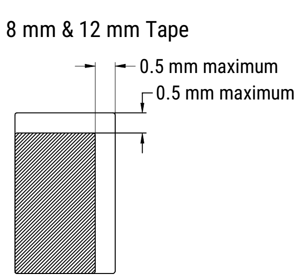


Figure 4 – Bending Radius

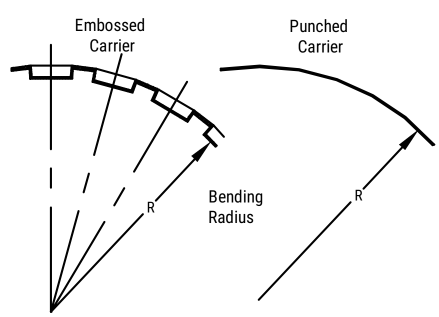
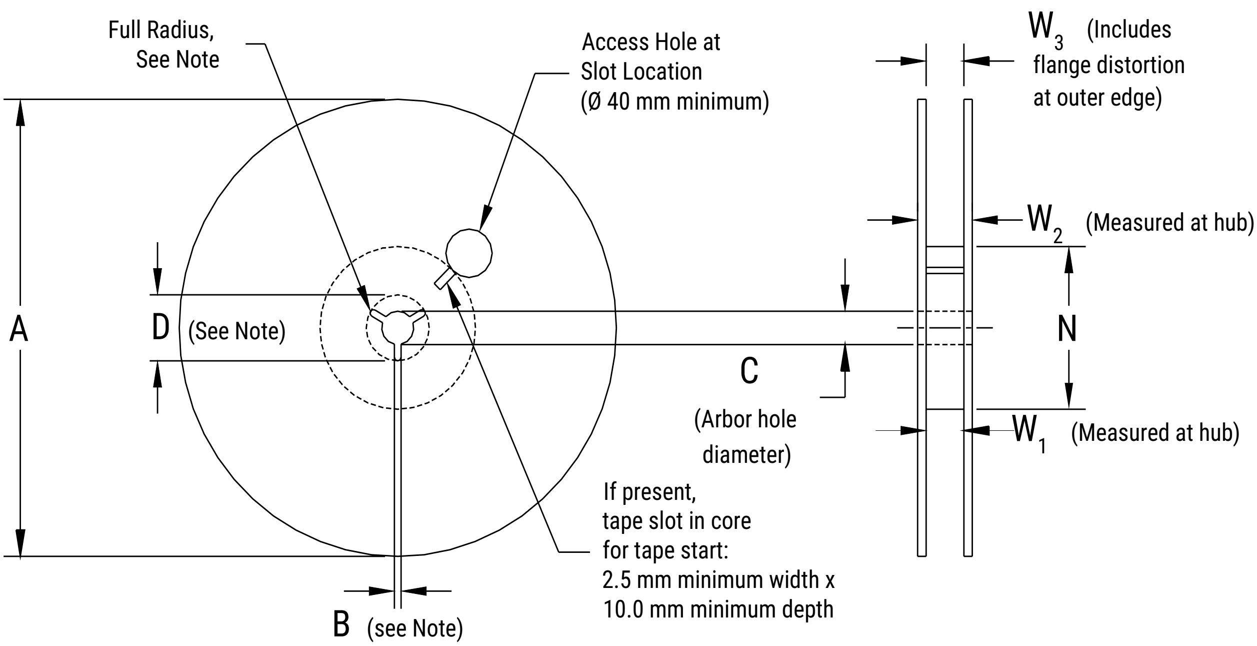


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
12 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

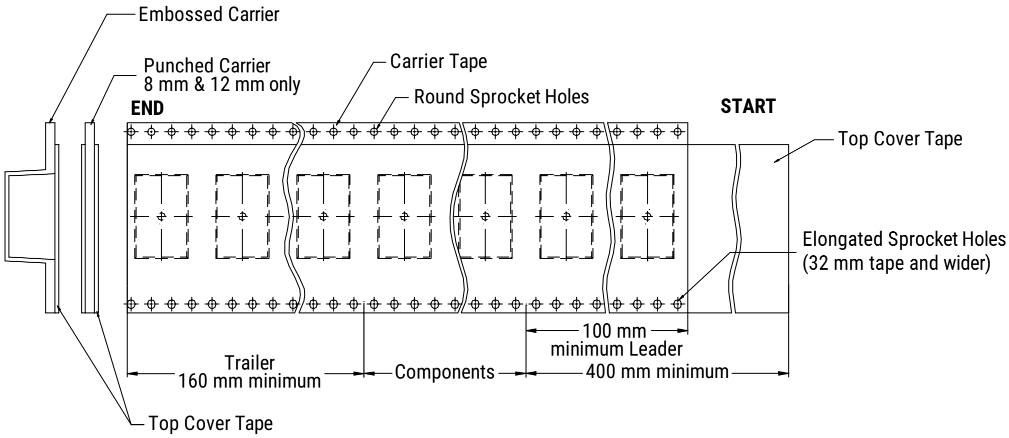
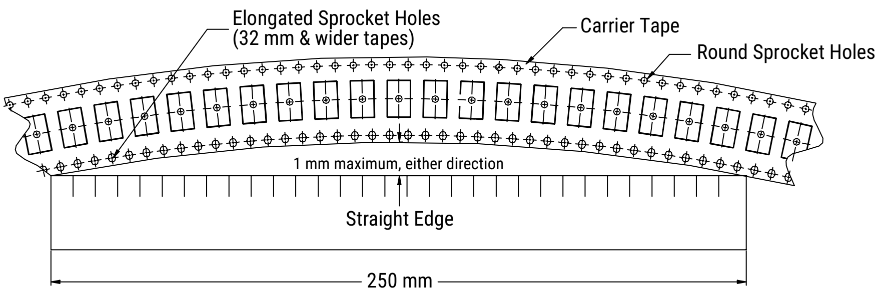


Figure 7 – Maximum Camber



T551 Axial & T556 Surface Mount 125°C

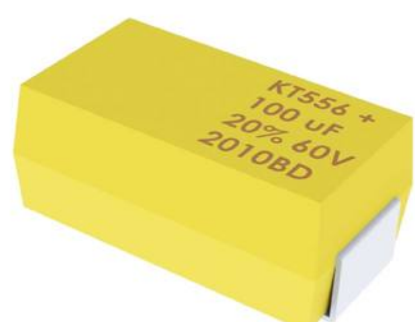
Overview

The T551 axial leaded and T556 surface mount polymer hermetically sealed (PHS) devices are tantalum capacitors with a Ta anode and Ta_2O_5 dielectric. A conductive, organic polymer replaces the traditionally used MnO_2 or wet electrolyte as the cathode plate of the capacitor. The result is very low ESR and improved capacitance retention at high frequency and low temperature. The PHS device also exhibits a benign failure mode, which eliminates the case breach that can occur in wet tantalum capacitors. Additionally, the part may be operated at voltages up to 80% of rated voltage, with equivalent or better reliability than traditional MnO_2 or wet tantalum capacitors operated at 50% of rated voltage.

PHS capacitors molded also offer higher ripple current handling capability and a lower ESR range than wet tantalums. With reduced ESR and enhanced capacitance retention at higher frequencies and low temperatures, these parts provide the highest total capacitance and the most economical solution for high power applications, all within an approximately 25% lighter package than the equivalent wet tantalum capacitor.

Benefits

- Includes F-Tech anode, which eliminates hidden defects in the dielectric
- 100% simulated breakdown screening
- Maximum operating temperature of +125°C
- Polymer cathode technology
- ≤ 0.0075 CV (µA) at rated voltage after 5 minutes
- Extremely low ESR
- High frequency and low temperature capacitance retention
- 100% constant voltage conditioning (240 hours)
- 100% surge current tested
- Volumetrically efficient
- Use at up to 80% of rated voltage
- Non-ignition failure mode
- Approximately 25% lighter than equivalent wet tantalum
- T551 case dimensions equivalent to MIL-PRF-39006/22/25/30/31
- T556 surface mount design (see dimensions diagram)



Applications

Typical applications include high voltage power management, such as buck/boost converters, filtering, hold-up capacitors, and other high ripple current applications.

Ordering Information

T	551	B	107	M	025	A	T	4251	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Product Level	Termination Finish	Surge Option*	Packaging*
T = Tantalum	551 = Axial Leaded PHS 556 = Surface Mount PHS	B	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	006 = 6.3 008 = 8 010 = 10 015 = 15 025 = 25 030 = 30 040 = 40 050 = 50 060 = 60 075 = 75	A = N/A	T = 100% tin (Sn)-plated H = Tin/lead (SnPb) solder coated (5% Pb minimum)	Blank = 25°C ±5°C, 10 cycles, after constant voltage conditioning (KEMET standard) 4251 = Surge current, 10 cycles, −55°C and +85°C 4252 = 10 cycles, −55°C and +85°C before constant voltage conditioning	Blank = Bulk/Sleeved 0100 = Bulk/Unsleeved 7200 = Tape & Reel/Sleeved 7293 = Ammo/Sleeved 7443 = Ammo/Sleeved

** Only for T551 (Surge options/packaging)*

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C
Rated Capacitance Range	20 – 680 µF at 120 Hz/25°C *
Capacitance Tolerance	K tolerance (10%), M tolerance (20%)
Rated Voltage Range	6.3 – 75 V
DF (120 Hz at 25°C)	Refer to Part Number Electrical Specification Table
ESR (100 kHz at 25°C)	Refer to Part Number Electrical Specification Table
Leakage Current	Refer to Part Number Electrical Specification Table (rated voltage up to +85°C and 66% of rated voltage applied at 125°C)
Packaging	T551 according to MIL-PRF-39006, T556 bulk

KEMET does not recommend storage above 85°C.
** Additional case sizes and capacitance/voltage are under development.*

Qualification - T551

Test Performed	Method Reference	Test Conditions
Reliability and Environmental Tests		
AC Ripple Life at 85°C	MIL–PRF–39006	85°C, 40 kHz ripple current, 2,000 hours
85°C Life	MIL–PRF–39006	85°C, rated voltage, 2,000 hours
125°C Life	KEMET Standard	125°C, 0.66 x rated voltage, 2,000 hours
Surge Voltage	MIL–PRF–39006	85°C, 1.15 x rated voltage, 1,000 cycles, except delta cap shall be +10%/-20%
Surge Current	MIL–PRF–39003	+25 °C, 10 cycles (Option A), Option B available
Low Temperature Storage	MIL–PRF–39006	-62°C for 72 hours followed by 1 hour at 125°C
Reverse Voltage	KEMET Catalog	1 V for 8 hours maximum at 25°C, 1 V for 2 hours maximum at 70°C
Physical, Mechanical and Process Tests		
Visual and Mechanical Examination (Internal and External)	MIL–PRF–39006	Case dimensions, marking
Terminal Strength	MIL–PRF–39006	Pull test and wire lead bend test
Resistance to Solvents	MIL–PRF–39006	Immersion in (3) solvents
Resistance to Soldering Heat	MIL–PRF–39006	Immersed to within 0.05 inch of capacitor body
Solderability	MIL–PRF–39006	Depth of insertion in flux and solder to within 0.062 inch of welded joint
Shock and Vibration	MIL–STD–202, Methods 213, 204	Shock Method 213, Condition I, 100 g peak, Vibration Method 204, Condition D, 20 g peak
Barometric Pressure (Reduced)	MIL–PRF–39006	150,000 feet for 5 minutes, voltage applied for 1 minute
Salt Atmosphere (Corrosion)	MIL–PRF–39006	Subjected to fine mist of salt solution
Moisture Resistance	MIL–PRF–39006	65°C at 6 volts
Dielectric Withstanding Voltage	MIL–PRF–39006	2,000 VDC, 60 seconds, sleeving examined for evidence of breakdown
Insulation Resistance	MIL–PRF–39003	500 VDC, 1 minute, insulation resistance not less than 1,000 MΩ
Electrical Characterization		
Temperature Stability	Reference MIL–PRF–39006	-55°C to 105°C
Frequency Scan	KEMET Standard	Impedance, ESR and capacitance versus frequency

Qualification - T556

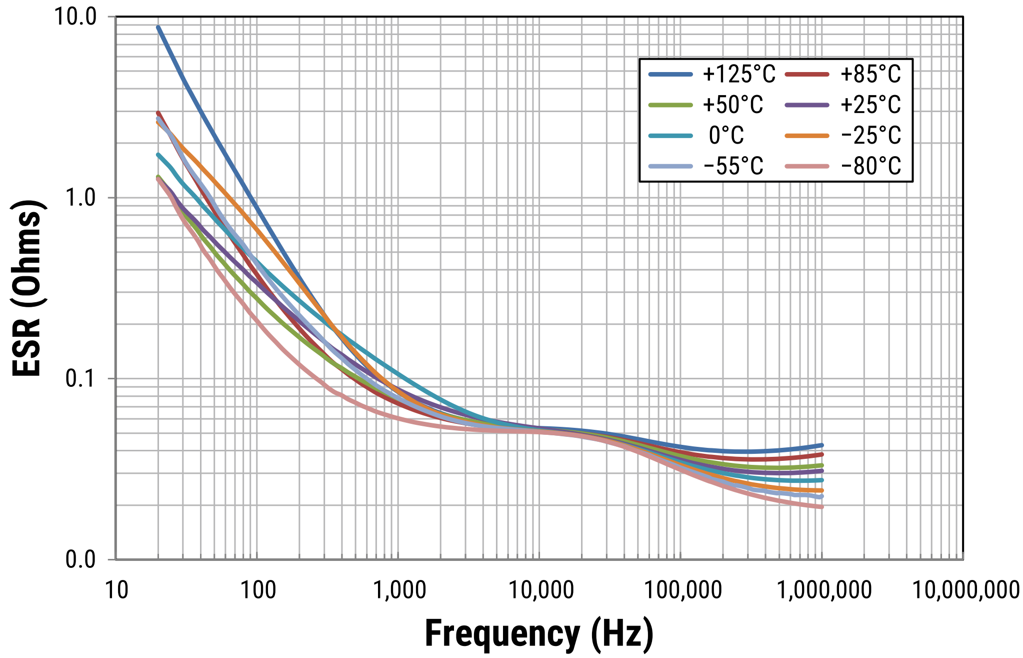
Test Performed	Method Reference	Test Conditions
Reliability and Environmental Tests		
105°C Life	KEMET Standard	105°C, 0.78 x rated voltage, 2,000 hours
Surge Voltage	MIL-PRF-39006	85°C, 1.15 x rated voltage, 1,000 cycles, except delta cap shall be +10%/−20%
Physical, Mechanical and Process Tests		
Visual and Mechanical Examination (Internal and External)	MIL-PRF-39003	Case dimensions, marking
Terminal Strength	MIL-PRF-39006	Pull test and wire lead bend test
Resistance to Solvents	MIL-PRF-39006	Immersion in (3) solvents
Resistance to Soldering Heat	MIL-PRF-39006	Immersed to within 0.05 inch of capacitor body
Solderability	MIL-PRF-39006	Depth of insertion in flux and solder to within 0.062 inch of welded joint
Shock and Vibration	MIL-STD-202, Methods 213, 204	Shock Method 213, Condition I, 100 g peak, Vibration Method 204, Condition D, 20 g peak
Electrical Characterization		
Temperature Stability	Reference MIL-PRF-39006	−55°C to 105°C

Environmental Compliance

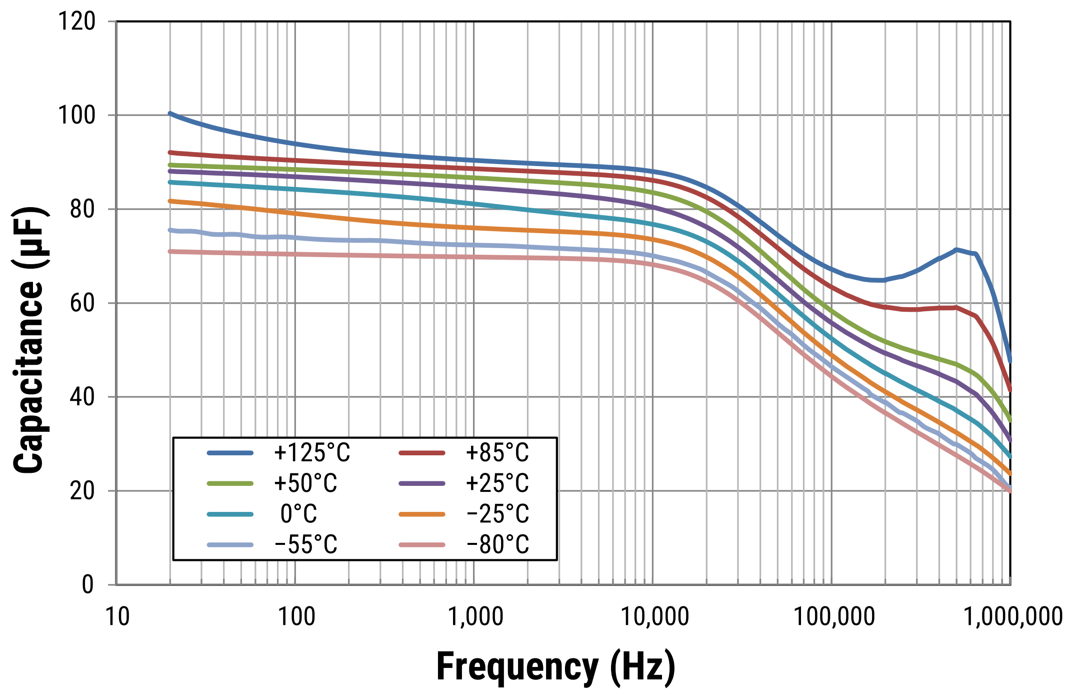
Epoxy compliant with UL 94 V–0.

Electrical Characteristics

ESR vs. Frequency

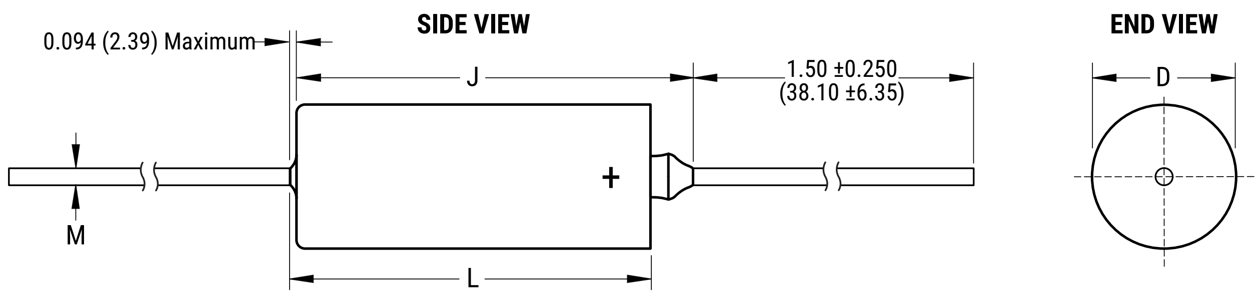


Capacitance vs. Frequency



Dimensions – Inches (Millimeters)

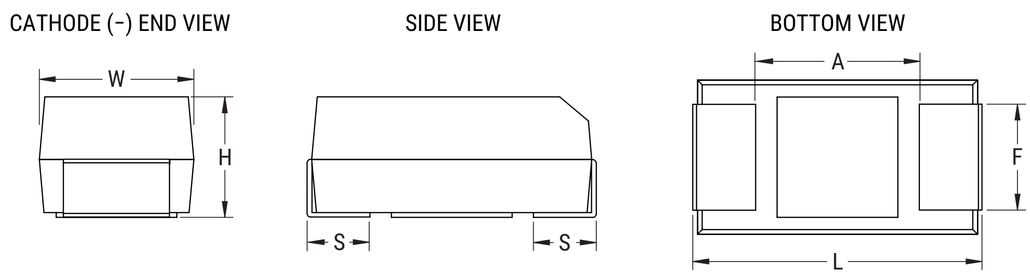
T551



Case Code	Case Size	Uninsulated Case				Insulated Case	
	MIL-PRF-39006	L ±0.031 (0.79)	D +0.016 (0.41) −0.015 (0.38)	M ±0.002 (0.05)	J maximum	D +0.016 (0.41) −0.015 (0.38)	L ± 0.031 (0.79)
B	T2	0.650 (16.51)	0.279 (7.09)	0.025 (0.64)	0.822 (20.88)	0.289 (7.34)	0.686 (17.42)

Dimensions – Millimeters

T556



Case Code						Weight (g)
	L ±0.5	W ±0.5	H ±0.5	F ±0.5	S minimum	Average
B Surface mount	24.5	8.5	9.1	4.2	3.0	5.54

Table 1A – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Size	KEMET Part Number	DC Leakage	DF	Maximum ESR	Ripple Current
(V) 85°C	µF	KEMET/EIA		µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Max	mΩ at 25°C 100 kHz	mArms at 85°C/40 kHz
6.3	140	B	T551B147(1)006A(2)	6.3	5.0	120	1,510
8	220	B	T551B227(1)008A(2)	13.2	5.0	120	1,510
8	680	B	T551B687(1)008A(2)	40.8	5.0	90	1,750
10	100	B	T551B107(1)010A(2)	7.5	5.0	140	1,400
10	180	B	T551B187(1)010A(2)	13.5	5.0	110	1,580
10	560	B	T551B567(1)010A(2)	42.0	5.0	90	1,750
15	70	B	T551B706(1)015A(2)	7.9	5.0	140	1,400
15	120	B	T551B127(1)015A(2)	13.5	5.0	110	1,580
15	390	B	T551B397(1)015A(2)	43.9	5.0	90	1,750
25	50	B	T551B506(1)025A(2)	9.4	5.0	170	1,275
25	100	B	T551B107(1)025A(2)	18.8	5.0	190	1,200
30	40	B	T551B406(1)030A(2)	9.0	5.0	170	1,275
30	68	B	T551B686(1)030A(2)	15.3	5.0	140	1,400
40	100	B	T551B107(1)040A(2)	30.0	5.0	150	1,350
40	120	B	T551B127(1)040A(2)	36.0	5.0	120	1,510
50	25	B	T551B256(1)050A(2)	9.4	5.0	170	1,275
50	47	B	T551B476(1)050A(2)	17.6	5.0	150	1,350
50	100	B	T551B107(1)050A(2)	37.5	5.0	130	1,450
50	120	B	T551B127(1)050A(2)	45.0	5.0	90	1,750
60	20	B	T551B206(1)060A(2)	9.0	5.0	200	1,175
60	39	B	T551B396(1)060A(2)	17.6	5.0	160	1,310
60	100	B	T551B107(1)060A(2)	45.0	5.0	100	1,660
75	75	B	T551B756(1)075A(2)	42.2	5.0	110	1,580

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert T = 100% matte tin (Sn)-plated, H = standard solder coated (SnPb 5% Pb minimum). Designates termination finish.
Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. The 85°C 40 kHz ripple limit is based on the maximum allowed power at 85°C and the maximum expected ESR at 40 kHz. For this calculation, the 100 kHz ESR limit is multiplied by a factor of 1.3 to account for the frequency dependence of ESR.

Table 1B – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Size	KEMET Part Number	DC Leakage	DF	Maximum ESR	Ripple Current
(V) 85°C	µF	KEMET/EIA		µA at 25°C Maximum/ 5 Minutes	% at 25°C 120 Hz Max	mΩ at 25°C 100 kHz	mArms at 85°C/40 kHz
6.3	140	B	T556B147(1)006A(2)	6.3	5.0	120	1,510
8	220	B	T556B227(1)008A(2)	13.2	5.0	120	1,510
8	680	B	T556B687(1)008A(2)	40.8	5.0	90	1,750
10	100	B	T556B107(1)010A(2)	7.5	5.0	140	1,400
10	180	B	T556B187(1)010A(2)	13.5	5.0	110	1,580
10	560	B	T556B567(1)010A(2)	42.0	5.0	90	1,750
15	70	B	T556B706(1)015A(2)	7.9	5.0	140	1,400
15	120	B	T556B127(1)015A(2)	13.5	5.0	110	1,580
15	390	B	T556B397(1)015A(2)	43.9	5.0	90	1,750
25	50	B	T556B506(1)025A(2)	9.4	5.0	170	1,275
25	100	B	T556B107(1)025A(2)	18.8	5.0	190	1,200
30	40	B	T556B406(1)030A(2)	9.0	5.0	170	1,275
30	68	B	T556B686(1)030A(2)	15.3	5.0	140	1,400
40	100	B	T556B107(1)040A(2)	30.0	5.0	150	1,350
40	120	B	T556B127(1)040A(2)	36.0	5.0	120	1,510
50	25	B	T556B256(1)050A(2)	9.4	5.0	170	1,275
50	47	B	T556B476(1)050A(2)	17.6	5.0	150	1,350
50	100	B	T556B107(1)050A(2)	37.5	5.0	130	1,450
50	120	B	T556B127(1)050A(2)	45.0	5.0	90	1,750
60	20	B	T556B206(1)060A(2)	9.0	5.0	200	1,175
60	39	B	T556B396(1)060A(2)	17.6	5.0	160	1,310
60	100	B	T556B107(1)060A(2)	45.0	5.0	100	1,660
75	75	B	T556B756(1)075A(2)	42.2	5.0	110	1,580

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
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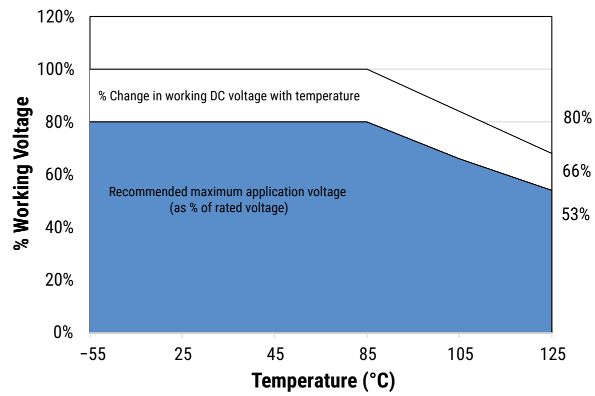
Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. The 85°C 40 kHz ripple limit is based on the maximum allowed power at 85°C and the maximum expected ESR at 40 kHz. For this calculation, the 100 kHz ESR limit is multiplied by a factor of 1.3 to account for the frequency dependence of ESR.

Recommended Voltage Derating Guidelines

	-55°C to 85°C	85°C to 105°C	105°C to 125°C
% Change in working DC voltage with temperature	V_R	78% of V_R	66% of V_R
Recommended maximum application voltage (as % of rated voltage)	80% of V_R	63% of V_R	53% of V_R



Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage that may be applied is limited by two criteria:

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage.

The maximum power dissipation by case size can be determined using the below left table. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Refer to the below right table for temperature compensation requirements.

Case Code		Maximum Power Dissipation (P_{max}) mWatts at 25°C with +60°C Rise
KEMET	MIL-PRF-39006/22/ 25/30/31 Case size	
B*	T2	715

** Applies to TH and SMD*

Temperature Compensation Multipliers for Maximum Power Dissipation (P_{max})		
T ≤ 45°C	45°C < T ≤ 85°C	85°C < T ≤ 125°C
1.00	0.70	0.10

T = Environmental temperature

Using the P_{max} of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{P_{max}/R}$
$E(max) = Z\sqrt{P_{max}/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
P_{max} = maximum power dissipation (watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (ohms)

The maximum power dissipation rating must be reduced with increasing environmental operating temperatures. Refer to the Temperature Compensation Multiplier table for details.

Reverse Voltage

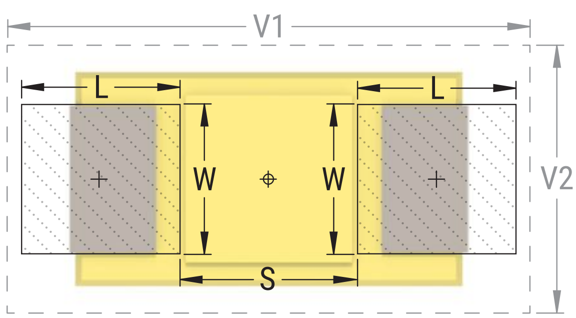
Solid tantalum polymer capacitors are polar devices and may be permanently damaged or destroyed if connected with the wrong polarity. A small reverse voltage is permissible for time periods per the below table. KEMET can offer lower capacitance in this voltage with higher reverse voltage capability. In addition, we continue to improve our capability for this characteristic.

Temperature	Permissible Reverse Voltage
25°C	1 V for 8 hours maximum
70°C	1 V for 2 hours maximum

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
B	3528–21	4.73	4.86	17.015	27.62	10	4.61	4.46	17.215	26.52	9.5	4.51	4.08	17.375	25.81	9.24

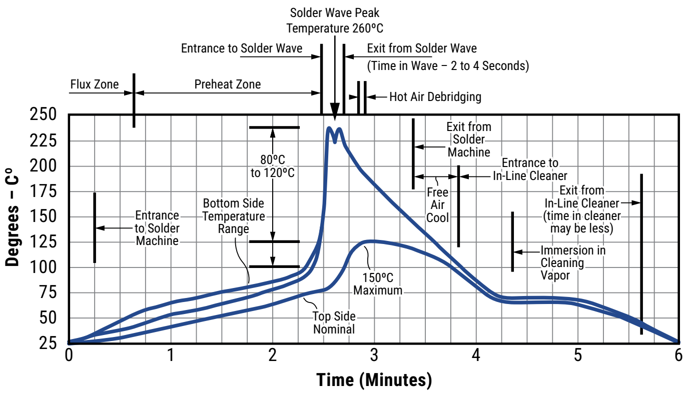
Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*



Grid Placement Courtyard

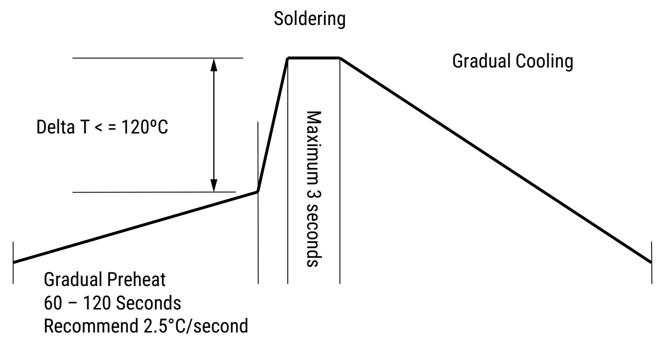
Soldering Process

Optimum Solder Wave Profile



Hand Soldering (Manual)*

Manual Solder Profile with Pre-heating



T555 MUST be hand soldered only.

Mounting

WARNING: T555/T556 MUST BE HAND SOLDERED. THE USE OF STANDARD SMD PROCESSES FOR BOARD MOUNT WILL CAUSE IRREVERSIBLE DAMAGE TO THIS PRODUCT.

T555 SMD

In hand-soldering tantalum polymer SMT capacitors, a manufacturer can utilize two (2) soldering methodologies that include pre-heating or not pre-heating the capacitors. KEMET recommends utilizing a pre-heating technique. However, due to the large temperature gradient between the capacitors and the tip of the soldering iron, take extreme caution in this process. The thermal stresses from the large thermal gradients and the propensity of the operator touching the tip of the soldering iron to the device can lead to mechanical and/or electrical damage.

When manually soldering, it is important the soldering process be carefully monitored and carried out so that the temperature gradient falls within the recommended conditions above (profile).

Mounting (cont'd.)

Process 1 (with preheating)

1) Utilize 1.0 mm thread eutectic solder with soldering flux in the core. Either a rosin-based or non-activated flux is recommended.
2) The capacitors shall be pre-heated so that the temperature gradient between the devices and the tip of the soldering iron is Delta T < = 120°C or below.
3) The temperature of the solder iron tip should not exceed 270°C.
4) The required amount of solder shall be melted in advance on the soldering tip.
5) After soldering, the capacitors shall be cooled gradually at room ambient temperature. Forced air cooling is not recommended.

Process 2 (without preheating)

1) Soldering iron tip shall never directly touch the termination egress or the case body of the capacitors.
2) Lands are sufficiently pre-heated with a soldering iron tip before sliding the soldering iron tip to the terminal electrode of the capacitor for soldering.

Reference	Condition
Case Size	All
Temperature of soldering iron	270°C
Wattage	20 W maximum
Shape of soldering iron	3 mm maximum
Soldering time with soldering iron	3 seconds maximum

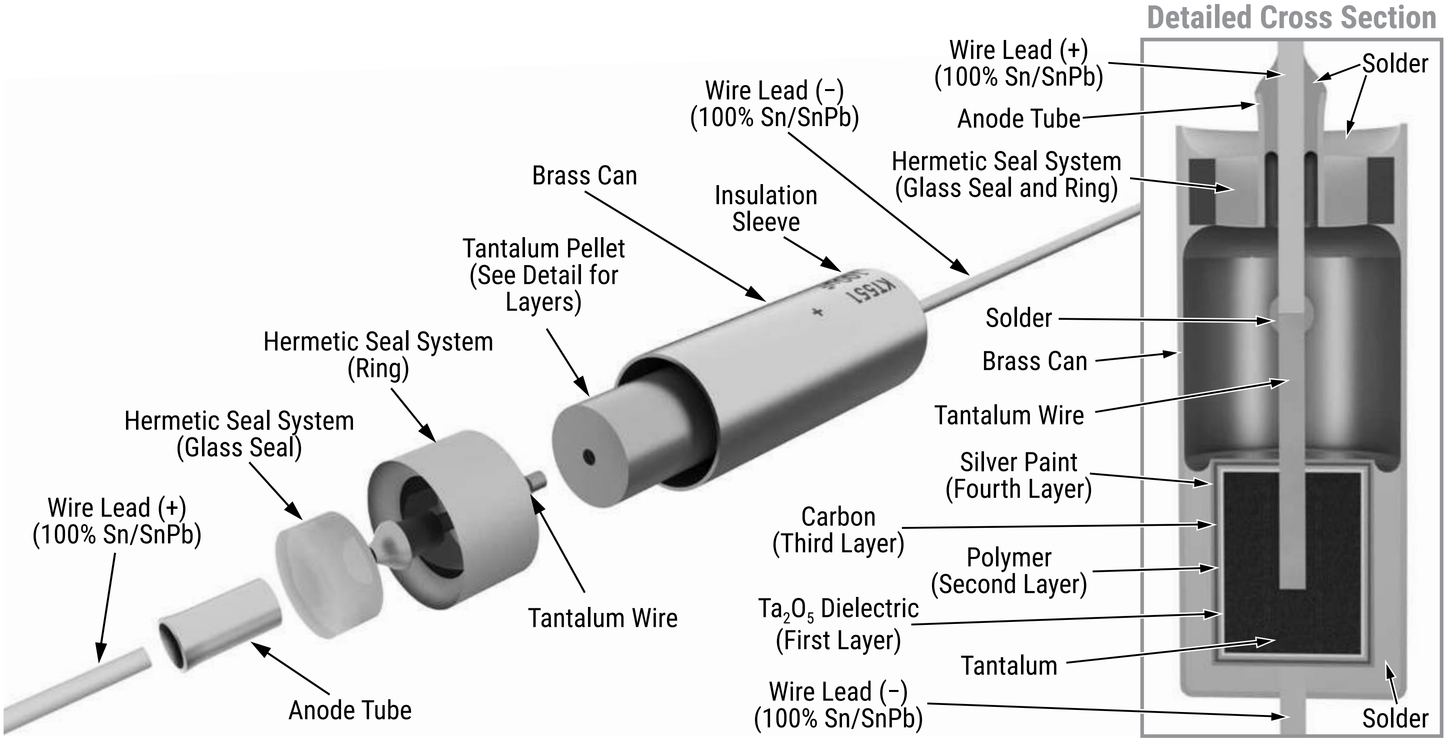
T551 Through-Hole
All encased capacitors will pass the resistance to soldering heat test of MIL-STD-202, Method 210, Condition C. This test simulates wave solder of topside board mount product. This demonstration of resistance to solder heat is in accordance with what is believed to be the industry standard. More severe treatment must be considered reflective of an improper soldering process. The above figure is a recommended solder wave profile for both axial and radial leaded solid tantalum capacitors.

Additional mounting recommendations (SMD and Through-Hole):

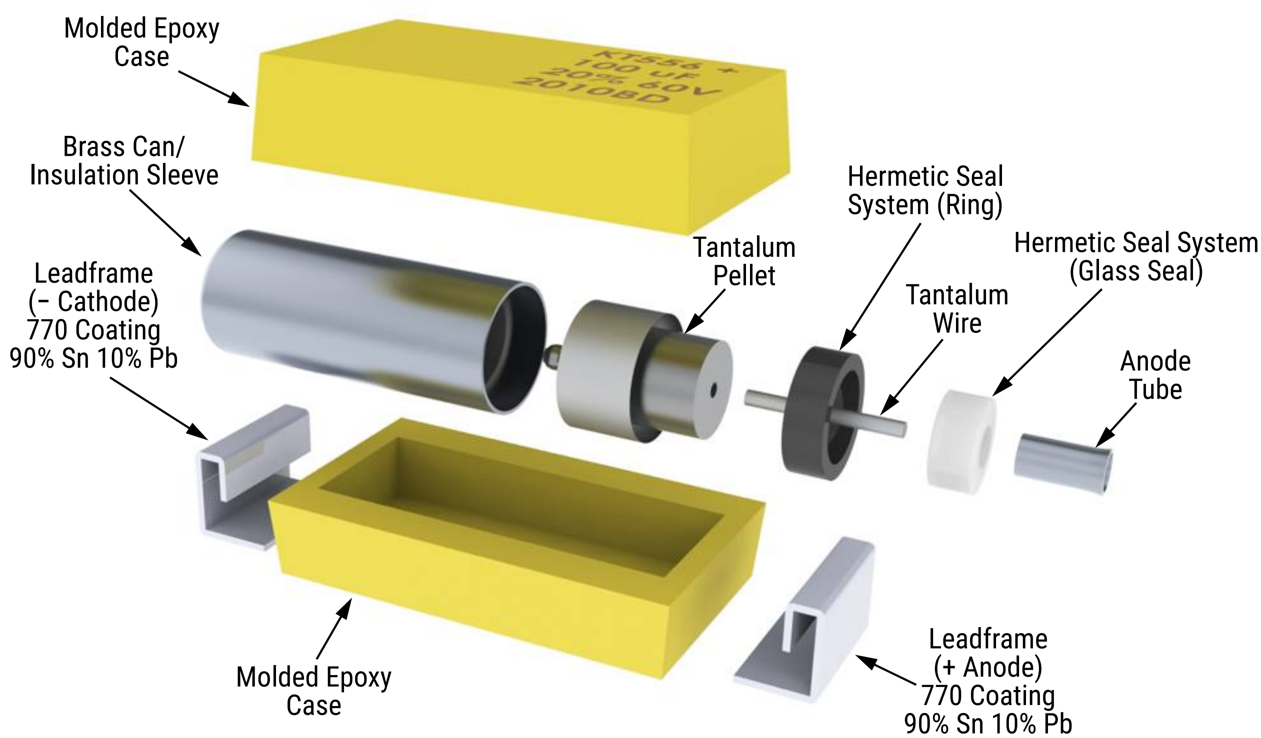
In order to increase the board mount integrity of KEMET's Polymer Hermetic Sealed (SMD or TH version) relative to mechanical shock and vibration, KEMET recommends the use of an adhesive between the component and the PCB. This is defined in the Space Application Electronic Hardware Addendum to J-STD-001 (Requirements for Solder Electrical and Electronic Assemblies.)

Construction

T551



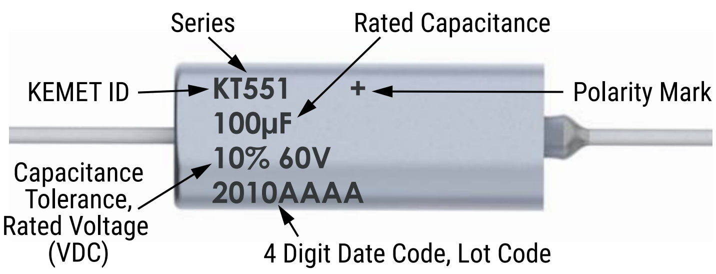
T556



Capacitor Marking

T551

B Case



T556

Date Code	
1st & 2nd Digit = Year	16 = 2016 17 = 2017 18 = 2018 19 = 2019 20 = 2020
3rd & 4th Digit = Week of the Year	01 = 1st week 52 = 52nd week

Storage

Tantalum hermetically sealed and SMD capacitors should be stored in normal working environments. While the capacitors themselves are quite robust in other environments, solderability will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. In addition, packaging materials will be degraded by high temperature – reels may soften or warp and tape peel force may increase. KEMET recommends that maximum storage temperature not exceed 40°C and maximum storage humidity not exceed 60% relative humidity. Temperature fluctuations should be minimized to avoid condensation on the parts and atmospheres should be free of chlorine and sulphur bearing compounds. For optimized solderability capacitors stock should be used promptly, preferably within three years of receipt.

Packaging

Case Size		Bulk	8.5" Reel*	Ammo Pack
	C-Spec	**Blank**	**7200**	**7443**
B Through-hole	–	20 per tray	150	250
B Surface mount	–	100 per box	N/A	

** For orders greater than 150 pieces, a 12" reel (500 pieces/reel) will be sent.*

Weight

Case Size		Average Weight (grams)
KEMET	**EIA**	
B Through-hole	T2	3.63
B Surface mount	–	5.54

T591, T598, T597, and T599 High Humidity and High Temperature Automotive Grade Polymer Electrolytic, 2.5 – 75 VDC

Overview

The KEMET Organic Capacitor (KO-CAP) is a solid electrolytic capacitor with a conductive polymer cathode, capable of delivering very low ESR and an improved capacitance retention at high frequencies. KO-CAP combines the low ESR of the multilayer ceramic, the high capacitance of aluminum electrolytic and the volumetric efficiency of tantalum into a single surface mount package. Unlike liquid electrolyte-based capacitors, KO-CAP has a very long operational life and a high ripple current capabilities.

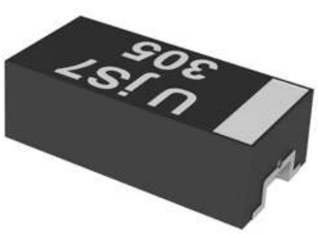
The T591/T597/T598/T599 High Humidity and High Temperature Polymer Electrolytic capacitors deliver higher capacitance and ESR stability under harsh environmental conditions. Enhancements to the design and selected material upgrades were introduced to deliver 500 hours (T591) or 1,000 hours (T598, T599) at 85°C/85% RH rated voltage and to fully comply with the AEC-Q200 qualification testing with maximum operational temperature life up to 125ºC and 150ºC respectively. These capacitors are manufactured in an ISO TS 16949 certified plants and are subjected to PPAP/PSW, as well as change control.

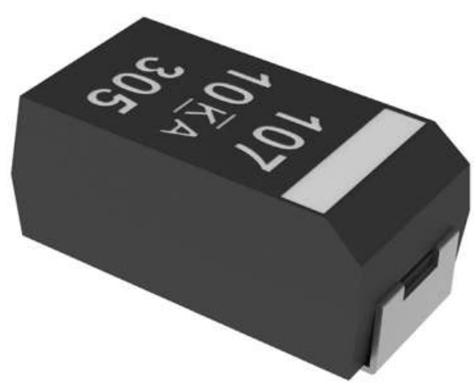
Benefits

- Ultra low ESR
- Full compliance with AEC-Q200 qualification test plan (T597 FD 125°C, T598 125°C, T599 150°C)
- Qualification plan based on AEC–Q200 with 85°C/85% RH load specification limited to 500 hours (T591)
- Extended endurance test qualification for T598/T599 (V_R < 16 V) , up to 2,000 hours 125°C
- Dedicated H termination and Surge current testing options (T598) for Defense and Aerospace Segment
- TS 16949 certified plants
- Subject to PPAP/PSW and change control
- Meets or exceeds EIA standard 535BAAC
- Tape & Reel standard packaging per EIA 481
- Halogen-free epoxy and RoHS compliant

Applications

Typical applications include decoupling and filtering in a variety of market segments, with special emphasis in automotive applications such as infotainment, ADAS, chassis and safety, as well as powertrain, where harsh conditions, such as high humidity and temperature, are a concern.





Ordering Information

Standard Construction

T	59X	D	107	M	010	A	T	E025	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR	Packaging (C-Spec)
T = Tantalum	591 = 500 Hours load humidity 598 = AEC-Q200 qualified (125°C) 599 = AEC-Q200 qualified (150°C)	B D V X	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	2R5 = 2.5 006 = 6.3 010 = 10 016 = 16 020 = 20 025 = 25 035 = 35 050 = 50 075 = 75	A = N/A	T = 100% Tin (Sn)	Maximum ESR in mΩ, 025 = 25 mΩ	Blank = 7" Reel 7280 = 13" Reel

*1 Capacitance tolerance K (±10%) available for select part numbers, please refer to the part numbers table identified with code (1) in the tolerance character.

Face Down Construction

T	597	S	476	M	006	A	P	E200	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR	Packaging (C-Spec)
T = Tantalum	597 = AEC-Q200 qualified (125°C) face down construction	S	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	2R5 = 2.5 006 = 6.3 010 = 10	A = N/A	P = Ni-Pd-Au	Maximum ESR in mΩ, 200 = 200 mΩ	Blank = 7" Reel

Up-Screen with H Termination and Surge Option

T	598	D	107	M	010	A	H	E	040	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	Surge	ESR	Packaging (C-Spec)
T = Tantalum	598 = AEC-Q200 qualified (125°C)	B D V X	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	2R5 = 2.5 004 = 4 006 = 6.3 010 = 10 016 = 16 025 = 25 035 = 35 050 = 50	A = N/A	H = Standard solder coated (SnPb 5% Pb minimum)	E = None S = 10 cycles 25°C	Maximum ESR in mΩ, 040 = 40 mΩ	Blank = 7" Reel 7280 = 13" Reel

*1 Capacitance tolerance K (±10%) available for select part numbers, please refer to the part numbers table identified with code (1) in the tolerance character.

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to 105°C/125°C/150°C
Rated Capacitance Range	1.5 – 680 µF at 120 Hz/25°C
Capacitance Tolerance	K Tolerance (10%), M Tolerance (20%)
Rated Voltage Range	2.5 – 75 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.1 CV (µA) at rated voltage after 5 minutes T597: ≤ 0.3 CV (µA) at rated voltage after 5 minutes

Environmental Compliance

- RoHS compliant when ordered with 100% Sn (AT) or Ni-Pd-Au (AP) termination
- End of Life Vehicle compliant according to 2003/53/EC as amended by (EU) 2016/774 when ordered with 100% Sn (AT) or Ni-Pd-Au (AP) termination
- NOT RoHS or End of Life Vehicle compliant when ordered with SnPb termination (AH) due to the content of Lead (CAS # 7439-92-1) in the termination
- REACH Candidate list of substance of very high concern, Lead (CAS# 7439-92-1) contained when ordered with SnPb termination (AH)
- Halogen-free/Epoxy compliant with UL 94 V-0

Qualification

<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">Temperature: 105°C,125°C,150°C[*2]
Voltage: 1.0 Rated Voltage
2/3 Rated Voltage for ≥ 125°C rating PN
Time: 2,000 Hours
1,000 Hours[*5]</td><td>Δ C/C</td><td colspan="3">Within −20%/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within 2 x initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 2 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">Temperature: 105°C,125°C,150°C[*2]
Voltage: 0 Voltage
Time: 2,000 Hours
1,000 Hours[*5]</td><td>Δ C/C</td><td colspan="3">Within −20%/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within 2 x initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 2 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2 x initial limit</td></tr>
<tr><td rowspan="4">Humidity</td><td colspan="2" rowspan="4">85°C, 85% RH, load, 500 hours (T591)
85°C, 85% RH, load, 1,000 hours
(T597, T598, T599)</td><td>Δ C/C</td><td colspan="3">Within −5%/+35% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within 1.5 x initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2 x initial limit</td></tr>
<tr><td rowspan="4">Moisture Resistance[*1]</td><td colspan="2" rowspan="4">MIL–STD–202, Method 106,
65°C, 90 – 100% RH, no load, 10 cycles</td><td>Δ C/C</td><td colspan="3">Within −10%/+20% of initial value [*6]</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2 x initial limit</td></tr>
<tr><td rowspan="4">Temperature Cycling</td><td colspan="2" rowspan="4">JESD22, Test Method A104,
−55°C to +105°C/+125°C/+150°C[*2], 1,000 cycles</td><td>Δ C/C</td><td colspan="3">Within −20%/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2 x initial limits</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">105°C, 1.32 x rated voltage, 1,000 cycles,
33 Ω in series
125°C/150°C, 1.32 x (0.67 x V_R), 1,000 cycles,
33 Ω in series[*2]</td><td>Δ C/C</td><td colspan="3">Within −20%/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within initial limits</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at
+25°C, −55°C, +25°C, +85°C,
+105°C/+125°C/+150°C[*2], +25°C</td><td></td><td>+25°C</td><td>−55°C</td><td>+85°C</td><td>+105°C/+125°C/+150°C[*2]</td></tr>
<tr><td>Δ C/C</td><td>IL[*3]</td><td>±20% [*7]</td><td>±20%</td><td>±30%[*4]</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>1.2 x IL</td><td>1.5 x IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>10 x IL</td><td>10 x IL</td></tr>
<tr><td rowspan="4">Mechanical Shock/ Vibration</td><td colspan="2" rowspan="2">AEC–Q200 (MIL–STD–202, Method 213, Figure 1, Condition F.)</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td colspan="2" rowspan="2">AEC–Q200 (MIL–STD–202, Method 204, 5 G for 20 minutes/12 cycles each of 3 orientations.
Test from 10 – 2, 000 Hz.)</td><td>ESR</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
</table>

[*1] *This test is not applicable to the T591 series ratings*
[*2] *Refer to part number specifications for individual temperature classification*
[*3] *IL = Initial limit*
[*4] *For T599 (≤ 16 V) apply −30%/+40%*
[*5] *1,000 hours for Endurance and Storage is applicable to T597 series offerings & PN T599X336M035ATE065*
[*6] *For T599 (2.5 V) apply −20%/+30%*
[*7] *For T599 (2.5 V) apply −25%/+20%*

Reliability

KO-CAP capacitors have an average failure rate of 0.5 %/1,000 hours at category voltage, U_C, and category temperature, T_C. These capacitors are qualified using industry test standards at U_C and T_C. The minimum test time (1,000 hours or 2,000 hours) is dependent on the product.

The actual life expectancy of KO-CAP capacitors increases when application voltage, U_A, and application temperature, T_A, are lower than U_C and T_C. As a general guideline, when $U_A < 0.9 * U_C$ and $T_A < 85°C$, the life expectancy will typically exceed the useful lifetime of most hardware (> 10 years).

The lifetime of a KO-CAP capacitor at a specific application voltage and temperature can be modeled using the equations below. A failure is defined as passing enough current to blow a 1-amp fuse. The calculation is an estimation based on empirical results and is not a guarantee.

$$VAF = \left(\frac{U_C}{U_A}\right)^n$$

where:

VAF = acceleration factor due to voltage, unitless

U_C = category voltage, volt

U_A = application voltage, volt

n = exponent, 16

$$TAF = e^{\left[\frac{E_a}{k}\left(\frac{1}{273+T_A} - \frac{1}{273+T_C}\right)\right]}$$

where:

TAF = acceleration factor due to temperature, unitless

E_a = activation energy, 1.4 eV

k = Boltzmann's constant, 8.617E-5 eV/K

T_A = application temperature, °C

T_C = category temperature, °C

$$AF = VAF * TAF$$

where:

AF = acceleration factor, unitless

TAF = accerlation factor due to temperature, unitless

VAF = acceleration factor due to voltage, unitless

$$Life_{U_A,T_A} = Life_{U_C,T_C} * AF$$

where:

$Life_{UA,\,TA}$ = estimated life application voltage and temperature, years

$Life_{UC,\,TC}$ = guaranteed life category voltage and temperature, years

AF = acceleration factor, unitless

Reliability Table 1 – Common Temperature Range Classifications

85°C (T_R)/ 85°C (T_C)	Rated voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R)/ 105°C (T_C)	Rated voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R)/ 125°C (T_C)	Rated voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category voltage (U_C)	1.7	2.7	4.2	5.4	6.7	8.4	10.7	13.4	16.8	23.5	33.5	42.2	50.3
105°C (T_R)/ 150°C (T_C)	Rated voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category voltage (U_C)	1.7	2.7	4.2	5.4	6.7	8.4	10.7	13.4	16.8	23.5	33.5	42.2	50.3

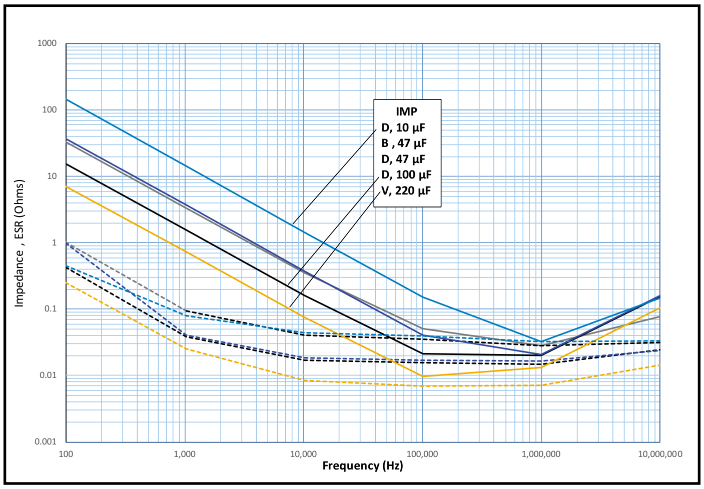
Terms:
Category voltage, U_C : Maximum recommended peak DC operating voltage for continuous operation at the category temperature, T_C.
Rated voltage, U_R : Maximum recommended peak DC operating voltage for continuous operation up to the rated temperature, T_R.
Category temperature, T_C : Maximum recommended operating temperature. Voltage derating may be required at T_C.
Rated temperature, T_R : Maximum recommended operating temperature without voltage derating. T_R is equal to or lower than T_C.

Certification

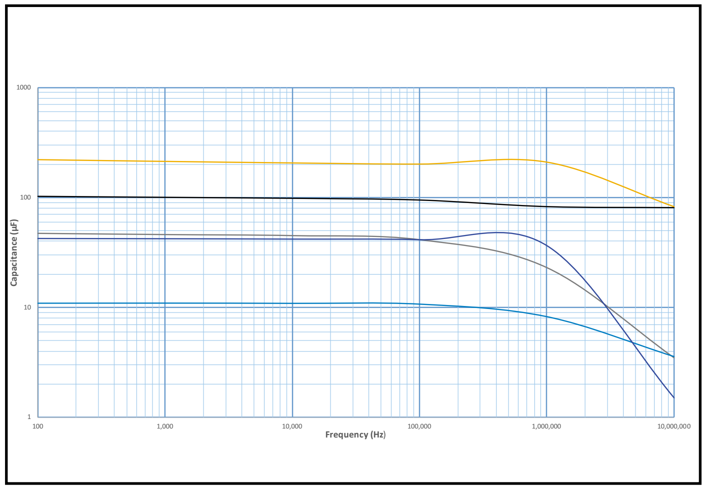
KEMET's internal qualification plan for this polymer electrolytic series of capacitors follows AEC-Q200 guidelines.
For T591 the humidity bias is limited to a maximum of 500 hours.
For T597 and T598 the qualification plan is fully compliant with AEC-Q200 with maximum operational temperature of 125°C.
For T599 the qualification plan is fully compliant with AEC-Q200 with maximum operational temperature of 150°C.

Electrical Characteristics

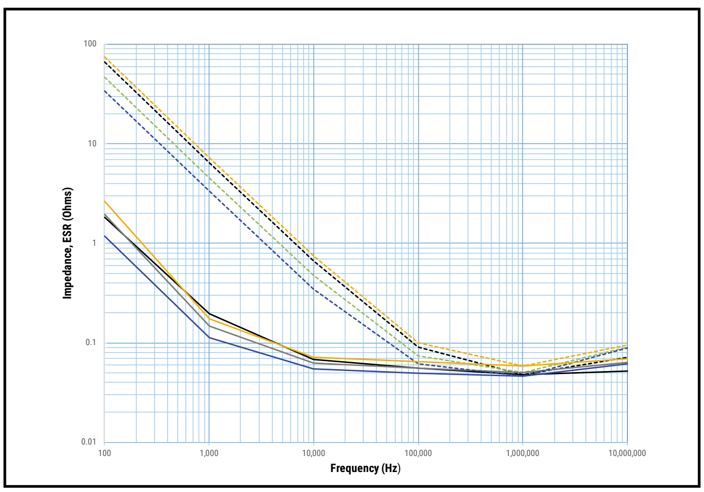
ESR vs. Frequency – T591



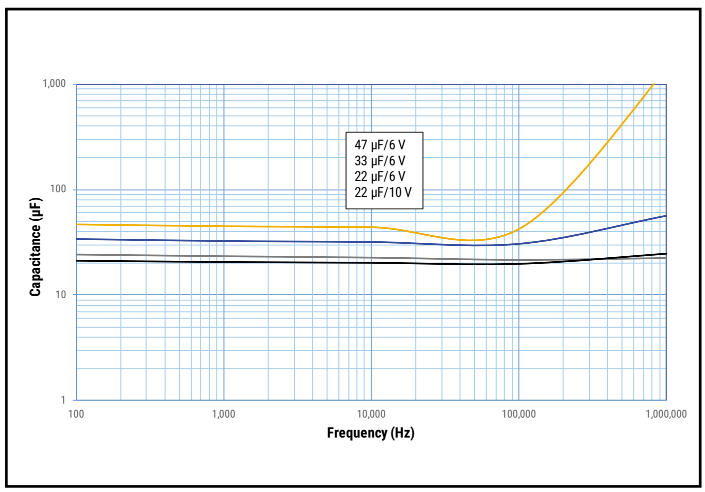
Capacitance vs. Frequency – T591



ESR vs. Frequency – T597

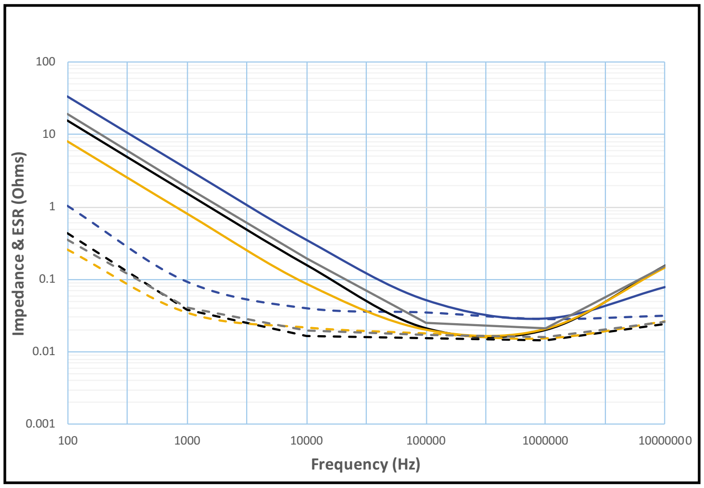


Capacitance vs. Frequency – T597

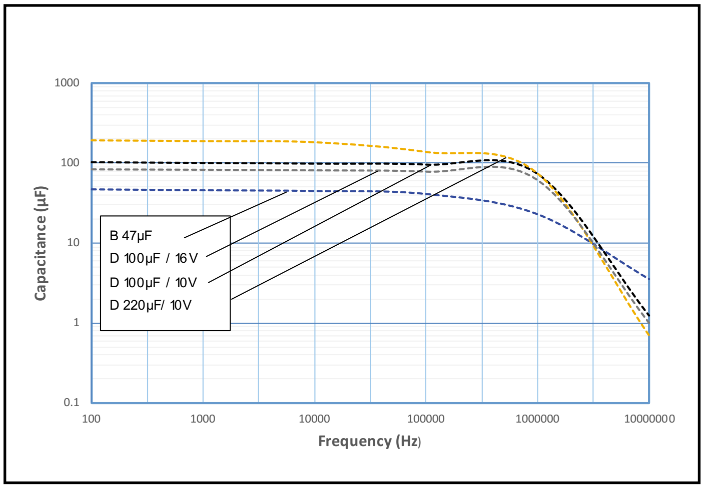


Electrical Characteristics cont.

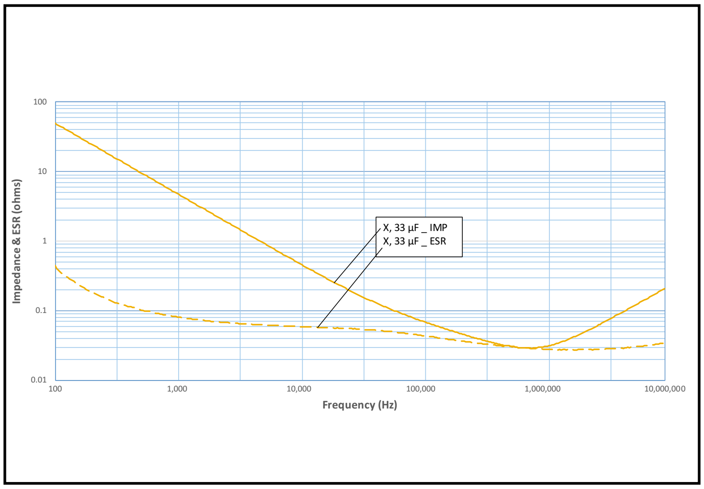
ESR vs. Frequency – T598



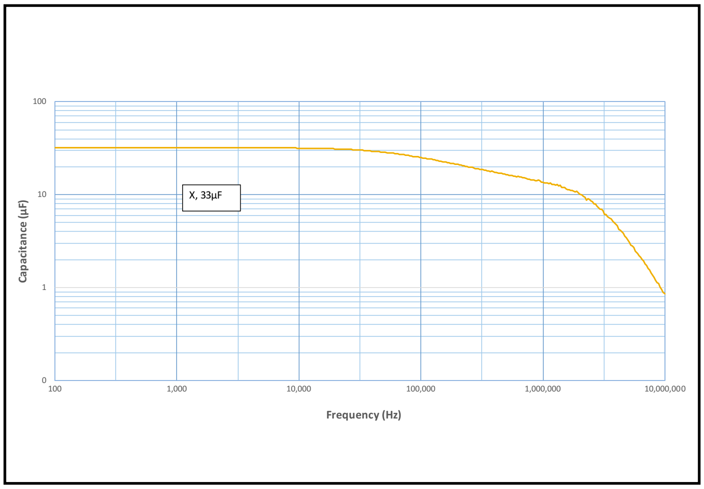
Capacitance vs. Frequency – T598



ESR vs. Frequency – T599



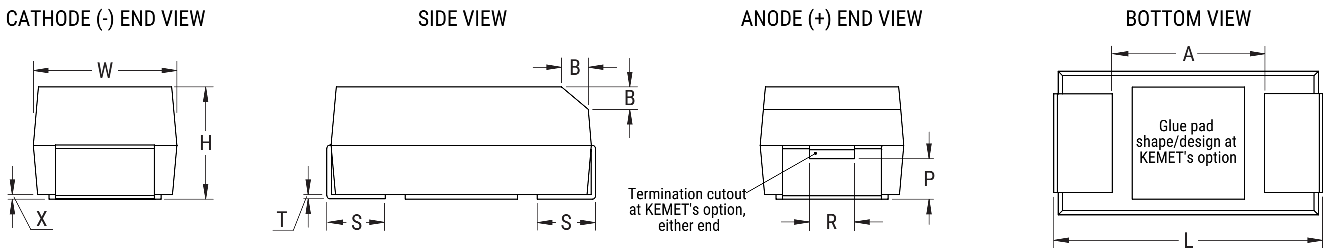
Capacitance vs. Frequency – T599



Dimensions – Millimeters (Inches)

Metric will govern

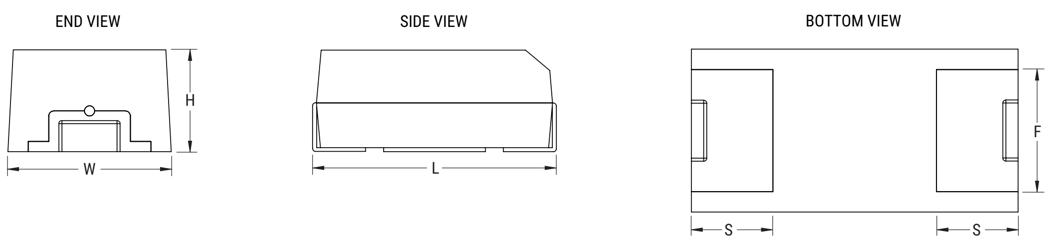
T591 / T598 / T599



Case Size		Component Dimensions											Typical Weight
KEMET	EIA	L	W	H	F ±0.1 ±(0.004)	S ±0.3 ±(0.012)	B ±0.15 (Ref) ±0.006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Minimum)	(mg)
B	3528−20	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.9 ±0.1 (0.075 ±0.004)	2.2 (0.087)	0.8 (0.031)	0.4 (0.016)	0.10 ±0.10 (0.004 ±0.004)	0.5 (0.020)	1.0 (0.039)	0.13 (0.005)	1.1 (0.043)	95
D	7343−31	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.8 ±0.3 (0.110 ±0.012)	2.4 (0.094)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	0.9 (0.035)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	435
V	7343-20	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.9 ±0.1 (0.075 ±0.004)	2.4 (0.094)	1.3 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	274
X	7343-43	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	4.0 ±0.3 (0.157±0.012)	2.4 (0.094)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	554

Notes: Reference (Ref) – Dimensions provided for reference only. For low profile cases, no dimensions are provided for B, P, or R, because these cases do not have a bevel or a notch.
These weights are provided as reference. If exact weights are needed, please contact your KEMET sales representative.

T597



Case Size		Component Dimensions					Weight
KEMET	EIA	L	W	H	F ±0.1 (±0.004)	S ±0.2 (±0.008)	(mg)
S	3216-12	3.2 ± 0.2 (0.126 ±0.008)	1.6 ±0.2 (0.063 ±0.008)	1.1 ±0.1 (0.043 ±0.004)	1.2 (0.047)	0.8 (0.031)	26.2

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC-Q200 Qualified
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
					105°C					
2.5	100	B/3528-21	T591B107M2R5ATE055	25	8	55	1,570	3	105	
2.5	100	B/3528-21	T591B107M2R5ATE070	25	8	70	1,390	3	105	
2.5	220	B/3528-21	T591B227M2R5ATE025	55	8	25	2,320	3	105	
2.5	220	V/7343-20	T591V227M2R5ATE009	55	10	9	6,670	3	105	
2.5	220	V/7343-20	T591V227M2R5ATE012	55	10	12	5,770	3	105	
2.5	220	V/7343-20	T591V227M2R5ATE015	55	10	15	5,160	3	105	
4	100	B/3528-21	T591B107M004ATE070	40	10	70	1,390	3	105	
4	220	V/7343-20	T591V227M004ATE018	88	10	18	4,710	3	105	
4	220	V/7343-20	T591V227M004ATE025	88	10	25	4,000	3	105	
6.3	220	B/3528-21	T591B227M006ATE035	139	8	35	1,960	3	105	
					125°C					
2.5	100	B/3528-21	T598B107M2R5ATE045	25	8	45	1,730	3	125	•
2.5	100	B/3528-21	T591B107M2R5ATE045	25	8	45	1,730	3	125	
2.5	100	B/3528-21	T598B107M2R5ATE055	25	8	55	1,570	3	125	•
2.5	100	B/3528-21	T598B107M2R5ATE070	25	8	70	1,390	3	125	•
2.5	220	B/3528-21	T598B227M2R5ATE025	55	10	25	2,320	3	125	•
2.5	220	D/7343-31	T598D227M2R5ATE006	55	10	6	8,660	3	125	•
2.5	220	D/7343-31	T598D227M2R5ATE009	55	10	9	7,070	3	125	•
2.5	220	D/7343-31	T598D227M2R5ATE012	55	10	12	6,120	3	125	•
2.5	220	D/7343-31	T591D227M2R5ATE009	55	10	9	7,070	3	125	
2.5	220	D/7343-31	T591D227M2R5ATE012	55	10	12	6,120	3	125	
2.5	330	V/7343-20	T591V337M2R5ATE012	82.5	10	12	5,770	3	125	
2.5	330	V/7343-20	T591V337M2R5ATE025	82.5	10	25	4,000	3	125	
2.5	330	D/7343-31	T598D337M2R5ATE006	82.5	10	6	8,660	3	125	•
2.5	330	D/7343-31	T598D337M2R5ATE009	82.5	10	9	7,070	3	125	•
2.5	330	D/7343-31	T598D337M2R5ATE012	82.5	10	12	6,120	3	125	•
2.5	330	D/7343-31	T591D337M2R5ATE009	82.5	10	9	7,070	3	125	
2.5	330	D/7343-31	T591D337M2R5ATE012	82.5	10	12	6,120	3	125	
2.5	330	D/7343-31	T591D337M2R5ATE015	82.5	10	15	5,480	3	125	
2.5	330	D/7343-31	T591D337M2R5ATE018	82.5	10	18	5,000	3	125	
2.5	470	D/7343-31	T598D477M2R5ATE006	117.5	10	6	8,660	3	125	•
2.5	470	D/7343-31	T591D477M2R5ATE006	117.5	10	6	8,660	3	125	
2.5	470	D/7343-31	T591D477M2R5ATE009	117.5	10	9	7,070	3	125	
2.5	470	D/7343-31	T598D477M2R5ATE009	117.5	10	9	7,070	3	125	•
2.5	680	D/7343-31	T598D687M2R5ATE009	170	10	9	7,070	3	125	•
2.5	680	D/7343-31	T591D687M2R5ATE009	170	10	9	7,070	3	125	
4	100	B/3528-21	T598B107M004ATE045	40	8	45	1,730	3	125	•
4	100	B/3528-21	T598B107M004ATE055	40	8	55	1,570	3	125	•
4	100	B/3528-21	T598B107M004ATE070	40	8	70	1,390	3	125	•
4	100	B/3528-21	T591B107M004ATE045	40	8	45	1,730	3	125	
4	100	B/3528-21	T591B107M004ATE055	40	8	55	1,570	3	125	
4	150	B/3528-21	T598B157M004ATE045	60	8	45	1,730	3	125	•
4	150	B/3528-21	T598B157M004ATE055	60	8	55	1,570	3	125	•
4	150	B/3528-21	T598B157M004ATE070	60	8	70	1,390	3	125	•
4	150	B/3528-21	T591B157M004ATE045	60	8	45	1,730	3	125	
4	150	B/3528-21	T591B157M004ATE055	60	8	55	1,570	3	125	
4	150	B/3528-21	T591B157M004ATE070	60	8	70	1,390	3	125	
4	330	V/7343-20	T598V337M004ATE025	132	10	25	4,000	3	125	•
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC–Q200 Qualified

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert E = None or S = 10 cycles +25°C ±5°C. Designates surge current option.
[1] T598 = AEC-Q200 qualified. T599 AEC-Q200 qualified 150°C and T591 = limited to 500 hours at 85°C/85% RH load.
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC-Q200 Qualified
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
125°C										
4	330	V/7343-20	T598V337M004ATE045	132	10	45	2,980	3	125	•
4	330	V/7343-20	T591V337M004ATE025	132	10	25	4,000	3	125	
4	330	V/7343-20	T591V337M004ATE045	132	10	45	2,980	3	125	
4	470	D/7343-31	T598D477M004ATE025	188	10	25	4,240	3	125	•
4	470	D/7343-31	T591D477M004ATE025	188	10	25	4,240	3	125	
6.3	22	B/3528-21	T598B226M006ATE070	13.9	8	70	1,390	3	125	•
6.3	22	B/3528-21	T591B226M006ATE070	13.9	8	70	1,390	3	125	
6.3	33	B/3528-21	T598B336M006ATE070	20.8	8	70	1,390	3	125	•
6.3	33	B/3528-21	T598B336M006ATE080	20.8	8	80	1,300	3	125	•
6.3	33	B/3528-21	T591B336M006ATE070	20.8	8	70	1,390	3	125	
6.3	33	B/3528-21	T591B336M006ATE080	20.8	8	80	1,300	3	125	
6.3	47	B/3528-21	T598B476M006ATE070	29.6	8	70	1,390	3	125	•
6.3	47	B/3528-21	T591B476M006ATE070	29.6	8	70	1,390	3	125	
6.3	68	B/3528-21	T598B686M006ATE070	43	8	70	1,390	3	125	•
6.3	68	B/3528-21	T591B686M006ATE070	43	8	70	1,390	3	125	
6.3	100	B/3528-21	T598B107M006ATE045	63	8	45	1,730	3	125	•
6.3	100	B/3528-21	T598B107M006ATE055	63	8	55	1,570	3	125	•
6.3	100	B/3528-21	T598B107M006ATE070	63	8	70	1,390	3	125	•
6.3	100	B/3528-21	T591B107M006ATE045	63	8	45	1,730	3	125	
6.3	100	B/3528-21	T591B107M006ATE055	63	8	55	1,570	3	125	
6.3	100	B/3528-21	T591B107M006ATE070	63	8	70	1,390	3	125	
6.3	150	B/3528-21	T598B157M006ATE045	94.5	8	45	1,730	3	125	•
6.3	150	B/3528-21	T598B157M006ATE055	94.5	8	55	1,570	3	125	•
6.3	150	B/3528-21	T598B157M006ATE070	94.5	8	70	1,390	3	125	•
6.3	150	B/3528-21	T591B157M006ATE045	94.5	8	45	1,730	3	125	
6.3	150	B/3528-21	T591B157M006ATE055	94.5	8	55	1,570	3	125	
6.3	150	B/3528-21	T591B157M006ATE070	94.5	8	70	1,390	3	125	
6.3	150	V/7343-20	T598V157M006ATE025	94.5	10	25	4,000	3	125	•
6.3	150	V/7343-20	T598V157M006ATE045	94.5	10	45	2,980	3	125	•
6.3	150	V/7343-20	T591V157M006ATE025	94.5	10	25	4,000	3	125	
6.3	150	V/7343-20	T591V157M006ATE045	94.5	10	45	2,980	3	125	
6.3	150	D/7343-31	T598D157M006ATE025	94.5	10	25	4,240	3	125	•
6.3	150	D/7343-31	T598D157M006ATE045	94.5	10	45	3,160	3	125	•
6.3	150	D/7343-31	T591D157M006ATE025	94.5	10	25	4,240	3	125	
6.3	150	D/7343-31	T591D157M006ATE045	94.5	10	45	3,160	3	125	
6.3	220	B/3528-21	T591B227M006ATE045	139	8	45	1,730	3	125	
6.3	220	B/3528-21	T591B227M006ATE070	139	8	70	1,390	3	125	
6.3	220	D/7343-31	T598D227M006ATE025	139	10	25	4,240	3	125	•
6.3	220	D/7343-31	T598D227M006ATE040	139	10	40	3,350	3	125	•
6.3	220	D/7343-31	T598D227M006ATE080	139	10	80	2,370	3	125	•
6.3	220	D/7343-31	T591D227M006ATE025	139	10	25	4,240	3	125	
6.3	220	D/7343-31	T591D227M006ATE040	139	10	40	3,350	3	125	
6.3	220	D/7343-31	T591D227M006ATE080	139	10	80	2,370	3	125	
6.3	220	V/7343-20	T598V227M006ATE025	139	10	25	4,000	3	125	•
6.3	220	V/7343-20	T598V227M006ATE045	139	10	45	2,980	3	125	•
6.3	220	V/7343-20	T591V227M006ATE025	139	10	25	4,000	3	125	
6.3	220	V/7343-20	T591V227M006ATE045	139	10	45	2,980	3	125	
6.3	330	D/7343-31	T598D337M006ATE025	208	10	25	4,240	3	125	•
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC–Q200 Qualified

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert E = None or S = 10 cycles +25°C ±5°C. Designates surge current option.
[1] T598 = AEC-Q200 qualified. T599 AEC-Q200 qualified 150°C and T591 = limited to 500 hours at 85°C/85% RH load.
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC-Q200 Qualified
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
					125°C					
6.3	330	D/7343-31	T598D337M006ATE040	208	10	40	3,350	3	125	•
6.3	330	D/7343-31	T598D337M006ATE080	208	10	80	2,370	3	125	•
6.3	330	D/7343-31	T591D337M006ATE025	208	10	25	4,240	3	125	
6.3	330	D/7343-31	T591D337M006ATE040	208	10	40	3,350	3	125	
6.3	330	D/7343-31	T591D337M006ATE080	208	10	80	2,370	3	125	
6.3	470	X/7343-43	T598X477M006ATE025	296	10	25	4,470	3	125	•
6.3	470	X/7343-43	T591X477M006ATE025	296	10	25	4,470	3	125	
6.3	680	X/7343-43	T598X687M006ATE025	428	10	25	4,470	3	125	•
6.3	680	X/7343-43	T591X687M006ATE025	428	10	25	4,470	3	125	
10	22	B/3528-21	T598B226M010ATE070	22	8	70	1,390	3	125	•
10	22	B/3528-21	T591B226M010ATE070	22	8	70	1,390	3	125	
10	33	B/3528-21	T598B336M010ATE070	33	8	70	1,390	3	125	•
10	33	B/3528-21	T598B336M010ATE080	33	8	80	1,300	3	125	•
10	33	B/3528-21	T591B336M010ATE070	33	8	70	1,390	3	125	
10	33	B/3528-21	T591B336M010ATE080	33	8	80	1,300	3	125	
10	47	B/3528-21	T598B476M010ATE070	47	8	70	1,390	3	125	•
10	47	B/3528-21	T591B476M010ATE070	47	8	70	1,390	3	125	
10	100	D/7343-31	T598D107M010ATE025	100	10	25	4,240	3	125	•
10	100	D/7343-31	T598D107M010ATE040	100	10	40	3,350	3	125	•
10	100	D/7343-31	T598D107M010ATE080	100	10	80	2,370	3	125	•
10	100	D/7343-31	T591D107M010ATE025	100	10	25	4,240	3	125	
10	100	D/7343-31	T591D107M010ATE040	100	10	40	3,350	3	125	
10	100	D/7343-31	T591D107M010ATE080	100	10	80	2,370	3	125	
10	100	V/7343-20	T598V107M010ATE025	100	10	25	4,000	3	125	•
10	100	V/7343-20	T598V107M010ATE045	100	10	45	2,980	3	125	•
10	100	V/7343-20	T591V107M010ATE025	100	10	25	4,000	3	125	
10	100	V/7343-20	T591V107M010ATE045	100	10	45	2,980	3	125	
10	150	D/7343-31	T598D157M010ATE025	150	10	25	4,240	3	125	•
10	150	D/7343-31	T598D157M010ATE045	150	10	45	3,160	3	125	•
10	150	D/7343-31	T591D157M010ATE025	150	10	25	4,240	3	125	
10	150	D/7343-31	T591D157M010ATE045	150	10	45	3,160	3	125	
10	150	V/7343-20	T598V157M010ATE025	150	10	25	4,000	3	125	•
10	150	V/7343-20	T598V157M010ATE045	150	10	45	2,980	3	125	•
10	150	V/7343-20	T591V157M010ATE025	150	10	25	4,000	3	125	
10	150	V/7343-20	T591V157M010ATE045	150	10	45	2,980	3	125	
10	220	D/7343-31	T598D227M010ATE025	220	10	25	4,240	3	125	•
10	220	D/7343-31	T598D227M010ATE040	220	10	40	3,350	3	125	•
10	220	D/7343-31	T598D227M010ATE080	220	10	80	2,370	3	125	•
10	220	D/7343-31	T591D227M010ATE025	220	10	25	4,240	3	125	
10	220	D/7343-31	T591D227M010ATE040	220	10	40	3,350	3	125	
10	220	D/7343-31	T591D227M010ATE080	220	10	80	2,370	3	125	
10	330	X/7343-43	T598X337M010ATE025	330	10	25	4,470	3	125	•
10	330	X/7343-43	T591X337M010ATE025	330	10	25	4,470	3	125	
10	470	X/7343-43	T598X477M010ATE025	470	10	25	4,470	3	125	•
10	470	X/7343-43	T591X477M010ATE025	470	10	25	4,470	3	125	
16	47	D/7343-31	T598D476M016ATE070	75.2	10	70	2,530	3	125	•
16	47	D/7343-31	T591D476M016ATE070	75.2	10	70	2,530	3	125	
16	100	D/7343-31	T598D107M016ATE050	160	10	50	3,000	3	125	•
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC–Q200 Qualified

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert E = None or S = 10 cycles +25°C ±5°C. Designates surge current option.
[1] T598 = AEC-Q200 qualified. T599 AEC-Q200 qualified 150°C and T591 = limited to 500 hours at 85°C/85% RH load.
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC-Q200 Qualified
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
125°C										
16	100	D/7343-31	T591D107M016ATE050	160	10	50	3,000	3	125	
16	150	D/7343-31	T598D157M016ATE065	240	10	65	2,630	3	125	•
16	150	D/7343-31	T591D157M016ATE065	240	10	65	2,630	3	125	
20	47	D/7343-31	T591D476M020ATE050	94	10	50	3,000	3	125	
20	68	D/7343-31	T591D686M020ATE040	136	10	40	3,350	3	125	
20	68	D/7343-31	T591D686M020ATE050	136	10	50	3,000	3	125	
25	22	D/7343-31	T591D226M025ATE060	55	10	60	2,740	3	125	
25	33	D/7343-31	T598D336M025ATE060	82.5	10	60	2,740	3	125	•
25	33	D/7343-31	T591D336M025ATE060	82.5	10	60	2,740	3	125	
25	47	D/7343-31	T598D476M025ATE060	117.5	10	60	2,740	3	125	•
25	47	D/7343-31	T591D476M025ATE060	117.5	10	60	2,740	3	125	
35	2.2	B/3528-21	T598B225M035ATE150	7.7	8	150	950	3	125	•
35	2.2	B/3528-21	T591B225M035ATE150	7.7	8	150	950	3	125	
35	2.2	B/3528-21	T598B225M035ATE200	7.7	8	200	820	3	125	•
35	2.2	B/3528-21	T591B225M035ATE200	7.7	8	200	820	3	125	
35	3.3	B/3528-21	T598B335M035ATE150	11.6	8	150	950	3	125	•
35	3.3	B/3528-21	T591B335M035ATE150	11.6	8	150	950	3	125	
35	3.3	B/3528-21	T598B335M035ATE200	11.6	8	200	820	3	125	•
35	3.3	B/3528-21	T591B335M035ATE200	11.6	8	200	820	3	125	
35	4.7	B/3528-21	T598B475M035ATE200	16.5	8	200	820	3	125	•
35	4.7	B/3528-21	T591B475M035ATE200	16.5	8	200	820	3	125	
35	10	D/7343-31	T598D106M035ATE120	35	10	120	1,940	3	125	•
35	10	D/7343-31	T591D106M035ATE120	35	10	120	1,940	3	125	
35	10	V/7343-20	T598V106M035ATE120	35	10	120	1,830	3	125	•
35	10	V/7343-20	T591V106M035ATE120	35	10	120	1,830	3	125	
35	15	D/7343-31	T598D156M035ATE065	52.5	10	65	2,630	3	125	•
35	22	D/7343-31	T598D226M035ATE065	77	10	65	2,630	3	125	•
35	22	D/7343-31	T591D226M035ATE065	77	10	65	2,630	3	125	
35	33	D/7343-31	T598D336M035ATE065	115.5	10	65	2,630	3	125	•
35	33	D/7343-31	T591D336M035ATE065	115.5	10	65	2,630	3	125	
35	33	X/7343-43	T598X336M035ATE065	115.5	10	65	2,770	3	125	•
35	47	X/7343-43	T598X476M035ATE075	164.5	9	75	2,580	3	125	•
35	47	X/7343-43	T591X476M035ATE075	164.5	9	75	2,580	3	125	
50	1.5	B/3528-21	T598B155(1)050ATE200	7.5	8	200	820	3	125	•
50	1.5	B/3528-21	T591B155(1)050ATE200	7.5	8	200	820	3	125	
50	2.2	B/3528-21	T598B225M050ATE150	11	8	150	950	3	125	•
50	2.2	B/3528-21	T598B225M050ATE200	11	8	200	820	3	125	•
50	2.2	B/3528-21	T591B225M050ATE150	11	8	150	950	3	125	
50	2.2	B/3528-21	T591B225M050ATE200	11	8	200	820	3	125	
50	10	D/7343-31	T598D106M050ATE090	50	10	90	2,240	3	125	•
50	10	D/7343-31	T591D106M050ATE090	50	10	90	2,240	3	125	
63	4.7	D/7343-31	T598D475M063ATE200	29.6	10	200	1,500	3	125	•
63	4.7	D/7343-31	T591D475M063ATE200	29.6	10	200	1,500	3	125	
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC–Q200 Qualified

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert E = None or S = 10 cycles +25°C ±5°C. Designates surge current option.
[1] T598 = AEC-Q200 qualified. T599 AEC-Q200 qualified 150°C and T591 = limited to 500 hours at 85°C/85% RH load.
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC-Q200 Qualified
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
125°C										
63	10	X/7343-43	T598X106M063ATE090	63	10	90	2,360	3	125	•
63	10	X/7343-43	T591X106M063ATE090	63	10	90	2,360	3	125	
63	15	X/7343-43	T598X156M063ATE075	94.5	10	75	2,580	3	125	•
63	15	X/7343-43	T591X156M063ATE075	94.5	10	75	2,580	3	125	
75	4.7	D/7343-31	T598D475M075ATE200	35.3	10	200	1,500	3	125	•
75	4.7	D/7343-31	T591D475M075ATE200	35.3	10	200	1,500	3	125	
75	10	X/7343-43	T598X106M075ATE090	75.0	10	90	2,360	3	125	•
75	10	X/7343-43	T591X106M075ATE090	75.0	10	90	2,360	3	125	
75	15	X/7343-43	T598X156M075ATE075	112.5	10	75	2,580	3	125	•
75	15	X/7343-43	T591X156M075ATE075	112.5	10	75	2,580	3	125	
150°C										
2.5	100	B/3528-21	T599B107(1)2R5ATE055	25	8	55	1,570	3	150	•
4	33	B/3528-21	T599B336M004ATE070	13.2	8	70	1,390	3	150	•
4	33	B/3528-21	T599B336M004ATE090	13.2	8	90	1,220	3	150	•
4	47	B/3528-21	T599B476M004ATE070	18.8	8	70	1,390	3	150	•
4	47	B/3528-21	T599B476M004ATE090	18.8	8	90	1,220	3	150	•
4	68	B/3528-21	T599B686M004ATE070	27.2	8	70	1,390	3	150	•
4	68	B/3528-21	T599B686M004ATE090	27.2	8	90	1,220	3	150	•
4	150	D/7343-31	T599D157M004ATE025	60	10	25	4,240	3	150	•
4	150	D/7343-31	T599D157M004ATE045	60	10	45	3,160	3	150	•
6.3	33	B/3528-21	T599B336M006ATE070	20.8	8	70	1,390	3	150	•
6.3	33	B/3528-21	T599B336M006ATE090	20.8	8	90	1,220	3	150	•
6.3	47	B/3528-21	T599B476M006ATE070	29.6	8	70	1,390	3	150	•
6.3	47	B/3528-21	T599B476M006ATE090	29.6	8	90	1,220	3	150	•
6.3	150	D/7343-31	T599D157M006ATE025	94.5	10	25	4,240	3	150	•
6.3	150	D/7343-31	T599D157M006ATE045	94.5	10	45	3,160	3	150	•
10	33	B/3528-21	T599B336M010ATE070	33	8	70	1,390	3	150	•
10	33	B/3528-21	T599B336M010ATE090	33	8	90	1,220	3	150	•
10	33	B/3528-21	T599B336M010ATE150	33	8	150	850	3	150	•
35	33	X/7343-43	T599X336M035ATE065	115.5	10	65	2,770	3	150	•
50	10	D/7343-31	T599D106M050ATE120	50	10	120	1,940	3	150	•
50	10	D/7343-31	T599D106M050ATE150	50	10	150	1,730	3	150	•
Facedown Construction										
2.5	100	S/3216-12	T597S107M2R5APE100	75	10	100	770	3	125	•
6.3	33	S/3216-12	T597S336M006APE100	62.4	10	100	770	3	125	•
6.3	33	S/3216-12	T597S336M006APE200	62.4	10	200	570	3	125	•
6.3	47	S/3216-12	T597S476M006APE100	88.8	10	100	770	3	125	•
6.3	47	S/3216-12	T597S476M006APE200	88.8	10	200	570	3	125	•
10	22	S/3216-12	T597S226M010APE100	66	10	100	770	3	125	•
10	22	S/3216-12	T597S226M010APE200	66	10	200	570	3	125	•
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC–Q200 Qualified

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert E = None or S = 10 cycles +25°C ±5°C. Designates surge current option.
[1] T598 = AEC-Q200 qualified. T599 AEC-Q200 qualified 150°C and T591 = limited to 500 hours at 85°C/85% RH load.
Refer to Ordering Information for additional detail.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC-Q200 Qualified
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
T598 Up-Screen with H termination and Surge Current Screening Option										
2.5	100	B/3528-21	T598B107M2R5AH(2)055	25	8	55	1,570	3	125	•
2.5	100	B/3528-21	T598B107M2R5AH(2)070	25	8	70	1,390	3	125	•
2.5	470	D/7343-31	T598D477M2R5AH(2)006	117.5	10	6	8,660	3	125	•
2.5	470	D/7343-31	T598D477M2R5AH(2)009	117.5	10	9	7,070	3	125	•
4	100	B/3528-21	T598B107M004AH(2)045	40	8	45	1,730	3	125	•
4	100	B/3528-21	T598B107M004AH(2)055	40	8	55	1,570	3	125	•
4	100	B/3528-21	T598B107M004AH(2)070	40	8	70	1,390	3	125	•
4	150	B/3528-21	T598B157M004AH(2)045	60	8	45	1,730	3	125	•
4	150	B/3528-21	T598B157M004AH(2)055	60	8	55	1,570	3	125	•
4	150	B/3528-21	T598B157M004AH(2)070	60	8	70	1,390	3	125	•
4	330	V/7343-20	T598V337M004AH(2)025	132	10	25	4,000	3	125	•
4	330	V/7343-20	T598V337M004AH(2)045	132	10	45	2,980	3	125	•
6.3	22	B/3528-21	T598B226M006AH(2)070	13.9	8	70	1,390	3	125	•
6.3	33	B/3528-21	T598B336M006AH(2)070	20.8	8	70	1,390	3	125	•
6.3	33	B/3528-21	T598B336M006AH(2)080	20.8	8	80	1,300	3	125	•
6.3	47	B/3528-21	T598B476M006AH(2)070	29.6	8	70	1,390	3	125	•
6.3	68	B/3528-21	T598B686M006AH(2)070	43	8	70	1,390	3	125	•
6.3	100	B/3528-21	T598B107M006AH(2)045	63	8	45	1,730	3	125	·
6.3	100	B/3528-21	T598B107M006AH(2)055	63	8	55	1,570	3	125	•
6.3	100	B/3528-21	T598B107M006AH(2)070	63	8	70	1,390	3	125	•
6.3	150	B/3528-21	T598B157M006AH(2)045	94.5	8	45	1,730	3	125	•
6.3	150	B/3528-21	T598B157M006AH(2)055	94.5	8	55	1,570	3	125	•
6.3	150	B/3528-21	T598B157M006AH(2)070	94.5	8	70	1,390	3	125	•
6.3	150	V/7343-20	T598V157M006AH(2)025	94.5	10	25	4,000	3	125	•
6.3	150	V/7343-20	T598V157M006AH(2)045	94.5	10	45	2,980	3	125	•
6.3	150	D/7343-31	T598D157M006AH(2)025	94.5	10	25	4,240	3	125	•
6.3	150	D/7343-31	T598D157M006AH(2)045	94.5	10	45	3,160	3	125	•
6.3	220	D/7343-31	T598D227M006AH(2)025	139	10	25	4,240	3	125	•
6.3	220	D/7343-31	T598D227M006AH(2)040	139	10	40	3,350	3	125	•
6.3	220	D/7343-31	T598D227M006AH(2)080	139	10	80	2,370	3	125	•
6.3	220	V/7343-20	T598V227M006AH(2)025	139	10	25	4,000	3	125	•
6.3	220	V/7343-20	T598V227M006AH(2)045	139	10	45	2,980	3	125	•
6.3	330	D/7343-31	T598D337M006AH(2)025	207.9	10	25	4,240	3	125	•
6.3	330	D/7343-31	T598D337M006AH(2)040	207.9	10	40	3,350	3	125	•
6.3	330	D/7343-31	T598D337M006AH(2)080	207.9	10	80	2,370	3	125	•
10	22	B/3528-21	T598B226M010AH(2)070	22	8	70	1,390	3	125	•
10	33	B/3528-21	T598B336M010AH(2)070	33	8	70	1,390	3	125	•
10	33	B/3528-21	T598B336M010AH(2)080	33	8	80	1,300	3	125	•
10	47	B/3528-21	T598B476M010AH(2)070	47	8	70	1,390	3	125	•
10	100	D/7343-31	T598D107M010AH(2)025	100	10	25	4,240	3	125	•
10	100	D/7343-31	T598D107M010AH(2)040	100	10	40	3,350	3	125	•
10	100	D/7343-31	T598D107M010AH(2)080	100	10	80	2,370	3	125	•
10	100	V/7343-20	T598V107M010AH(2)025	100	10	25	4,000	3	125	•
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC–Q200 Qualified

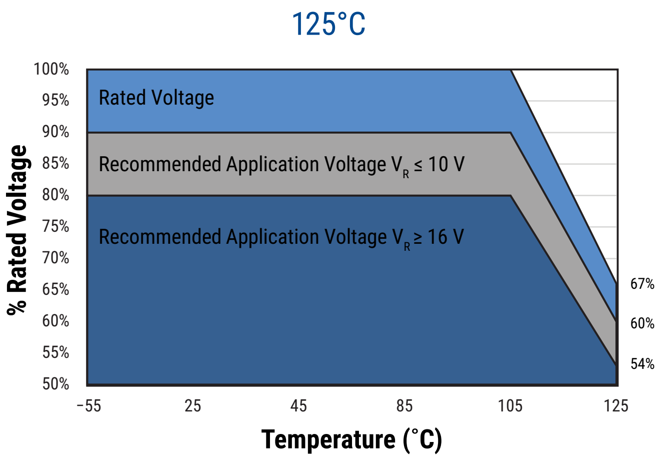
(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert E = None or S = 10 cycles +25°C ±5°C. Designates surge current option.
[1] T598 = AEC-Q200 qualified. T599 AEC-Q200 qualified 150°C and T591 = limited to 500 hours at 85°C/85% RH load.
Refer to Ordering Information for additional detail.

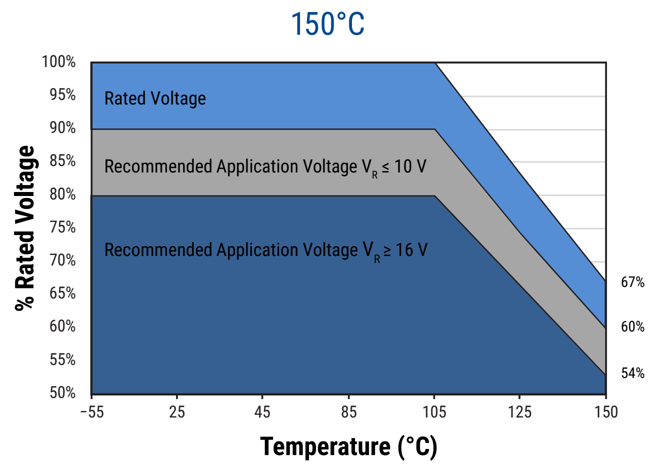
Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC-Q200 Qualified
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
T598 Up-Screen with H termination and Surge Current Screening Option										
10	100	V/7343-20	T598V107M010AH(2)045	100	10	45	2,980	3	125	•
10	150	D/7343-31	T598D157M010AH(2)025	150	10	25	4,240	3	125	•
10	150	D/7343-31	T598D157M010AH(2)045	150	10	45	3,160	3	125	•
10	150	V/7343-20	T598V157M010AH(2)025	150	10	25	4,000	3	125	•
10	150	V/7343-20	T598V157M010AH(2)045	150	10	45	2,980	3	125	•
10	220	D/7343-31	T598D227M010AH(2)025	220	10	25	4,240	3	125	•
10	220	D/7343-31	T598D227M010AH(2)040	220	10	40	3,350	3	125	•
10	220	D/7343-31	T598D227M010AH(2)080	220	10	80	2,370	3	125	•
16	47	D/7343-31	T598D476M016AH(2)070	75.2	10	70	2,530	3	125	•
16	100	D/7343-31	T598D107M016AH(2)050	160	10	50	3,000	3	125	•
16	150	D/7343-31	T598D157M016AH(2)065	240	10	65	2,630	3	125	•
25	33	D/7343-31	T598D336M025AH(2)060	82.5	10	60	2,740	3	125	•
25	47	D/7343-31	T598D476M025AH(2)060	117.5	10	60	2,740	3	125	•
35	2.2	B/3528-21	T598B225M035AH(2)150	7.7	8	150	950	3	125	•
35	2.2	B/3528-21	T598B225M035AH(2)200	7.7	8	200	820	3	125	•
35	3.3	B/3528-21	T598B335M035AH(2)150	11.55	8	150	950	3	125	•
35	3.3	B/3528-21	T598B335M035AH(2)200	11.6	8	200	820	3	125	•
35	4.7	B/3528-21	T598B475M035AH(2)200	16.5	8	200	820	3	125	•
35	10	D/7343-31	T598D106M035AH(2)120	35	10	120	1,940	3	125	•
35	10	V/7343-20	T598V106M035AH(2)120	35	10	120	1,830	3	125	•
35	15	D/7343-31	T598D156M035AH(2)065	52.5	10	65	2,630	3	125	•
35	22	D/7343-31	T598D226M035AH(2)065	77	10	65	2,630	3	125	•
35	33	D/7343-31	T598D336M035AH(2)065	115.5	10	65	2,630	3	125	•
35	33	X/7343-43	T598X336M035AH(2)065	115.5	10	65	2,770	3	125	•
50	1.5	B/3528-21	T598B155(1)050AH(2)200	7.5	8	200	820	3	125	•
50	2.2	B/3528-21	T598B225M050AH(2)150	11	8	150	950	3	125	•
50	2.2	B/3528-21	T598B225M050AH(2)200	11	8	200	820	3	125	•
VDC at 105°C	µF	KEMET/EIA		µA at +25°C Max/5 Minutes	% at +25°C 120 Hz Max	mΩ at +25°C 100 kHz Max	(rms) mA at +45°C 100 kHz	Reflow Temp ≤ 260°C	°C	T597/T598/T599 Only[1]
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp	AEC-Q200 Qualified

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert E = None or S = 10 cycles +25°C ±5°C. Designates surge current option.
[1] T598 = AEC-Q200 qualified. T599 AEC-Q200 qualified 150°C and T591 = limited to 500 hours at 85°C/85% RH load.
Refer to Ordering Information for additional detail.

Derating Guidelines





Recommended Application Voltage

KO-CAPs are solid state capacitors that demonstrate no wearout mechanism when operated within their recommended guidelines. While the KO-CAP can be operated at full rated voltage, most circuit designers seek a minimum level of assurance in long term reliability, which should be demonstrated with data. A voltage derating can provide the desired level of demonstrated reliability based on industry accepted acceleration models. Since most applications do require long term reliability, KEMET recommends that designers consider a voltage derating, according the graph above, for the maximum steady state voltage.

Voltage Rating	Maximum Recommended Steady State Voltage		
	-55°C to 105°C	105°C to 125°C (T598)	105°C to 150°C (T599)
2.5 V ≤ V_R ≤ 10 V	90% of V_R	60% of V_R	60% of V_R
V_R ≥ 16 V	80% of V_R	54% of V_R	54% of V_R

V_R = Rated voltage

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage which may be applied is limited by two criteria:

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage. See the Reverse Voltage section for allowable limits.

The maximum power dissipation by case size can be determined using the table at right. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Refer to the table below for temperature compensation requirements.

Case Code	EIA Case Code	Maximum Power Dissipation (Pmax) mWatts at 45°C with +30°C Rise
B	3528-21	135
D	7343-31	450
S	3216-12	60
V	7343-20	400
X	7343-43	500

Using the Pmax of the device, the maximum allowable rms ripple current or voltage may be determined.

I(max) = $\sqrt{Pmax/R}$
E(max) = Z $\sqrt{Pmax/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
Pmax = maximum power dissipation (watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (ohms)

Temperature Compensation Multipliers for Maximum Ripple Current					
Maximum Operational Temperature	−55°C < T ≤ 45°C	45°C < T ≤ 85°C	85°C < T ≤ 105°C	105°C < T ≤ 125°C	125°C < T ≤ 150°C
105°C	1.00	0.70	0.25	-	-
125°C *1	1.00	1.00	0.70	0.25	
150°C	1.00	1.00	1.00	0.70	0.25

T = Environmental temperature
**1 = For T597 series please refer for the online specsheet for ripple current calculations at different temperatures*

The maximum power dissipation rating must be reduced with increasing environmental operating temperatures. Refer to the Temperature Compensation Multiplier table for details.

Surge Voltage

Surge voltage is the maximum voltage (peak value) which may be applied to the capacitor. The surge voltage must not be applied for periodic charging and discharging in course of normal operation and cannot be part of the application voltage. Surge voltage capability is demonstrated by application of 1,000 cycles at operating temperature. The parts are charged through a 33 Ohm resistor for 30 seconds and then discharged though a 33 Ohm resistor for each cycle.

Rated Voltage (V)	Surge Voltage (V)	Category Voltage (V)	Category Surge Voltage (V)	Category Voltage (V)	Category Surge Voltage (V)
−55°C to 105°C		up to 125°C		up to 150°C*	
2.5	3.3	1.7	2.2	1.7	2.2
6.3	8.2	4.2	5.5	4.2	5.5
10	13	6.7	8.7	6.7	8.7
16	20.8	10.7	13.9	10.7	13.9
20	26	13.4	17.4	13.4	17.4
25	32.5	16.8	21.8	16.8	21.8
35	45.5	23.5	30.5	23.5	30.5
50	65	33.5	43.6	33.5	43.6
75	99	50.3	65.3	–	–

**T599 Only*

Reverse Voltage

Polymer electrolytic capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a small degree of transient voltage reversal for short periods as shown in the below table.

Temperature	Permissible Transient Reverse Voltage
25°C	15% of rated voltage
55°C	10% of rated voltage
85°C	5% of rated voltage
105°C	3% of rated voltage
125°C*	1% of rated voltage
150°C**	1% of rated voltage

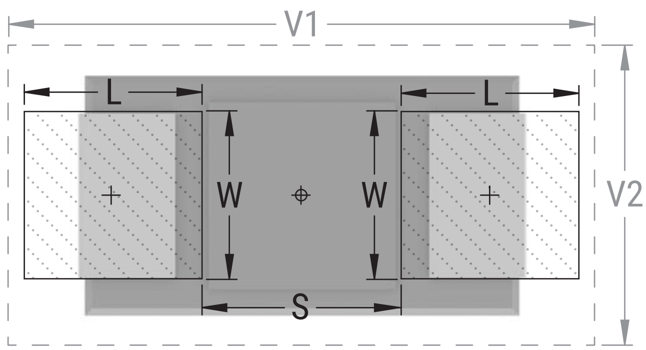
**For series rated to 125°C*
*** For series rated to 150°C*

Table 2 – Land Dimensions/Courtyard

T591 / T598 / T599

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
B	3528–21	2.35	2.21	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
D	7343–31	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
V	7343–21	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
X[1]	7343–43	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84

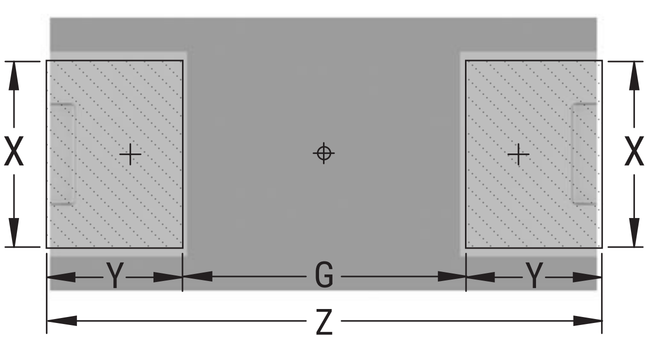
Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] *Height of these chips may create problems in wave soldering.*



Grid Placement Courtyard

T597

KEMET	Metric Size Code	Dimensions (mm) Minimum – Maximum			
Case	**EIA**	**G**	**Z**	**X**	**Y**
S	3216-12	1.00 – 1.65	3.25 – 3.80	1.1 – 1.30	0.8 – 1.40



Soldering Process

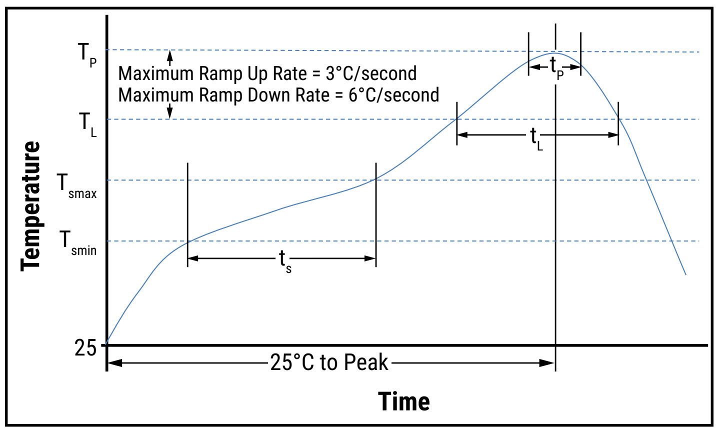
KEMET's families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/second maximum	3°C/second maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/second maximum	6°C/second maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



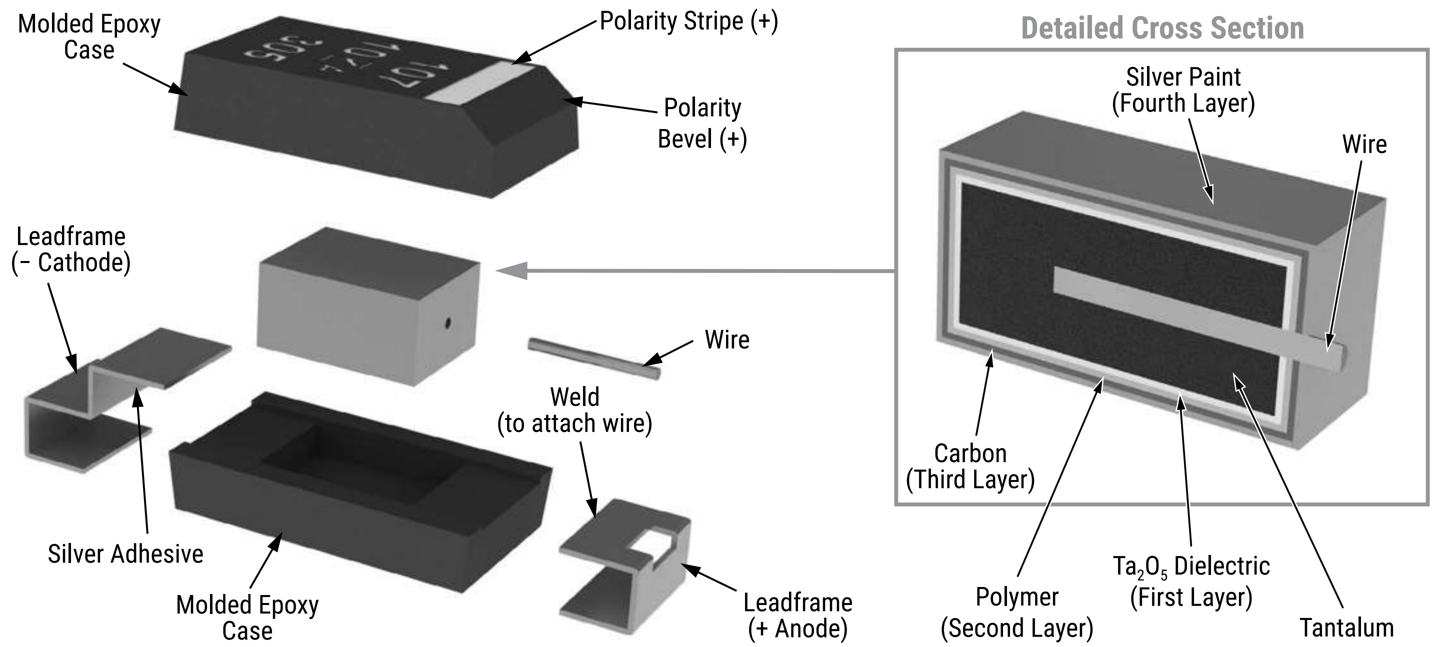
Storage

All KO-CAP capacitors are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as moisture sensitivity level 3 (MSL3) per IPC/JEDEC J-STD-020 and packaged per IPC/JEDEC J–STD–033, MSL3 specifies a floor time of 168 H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

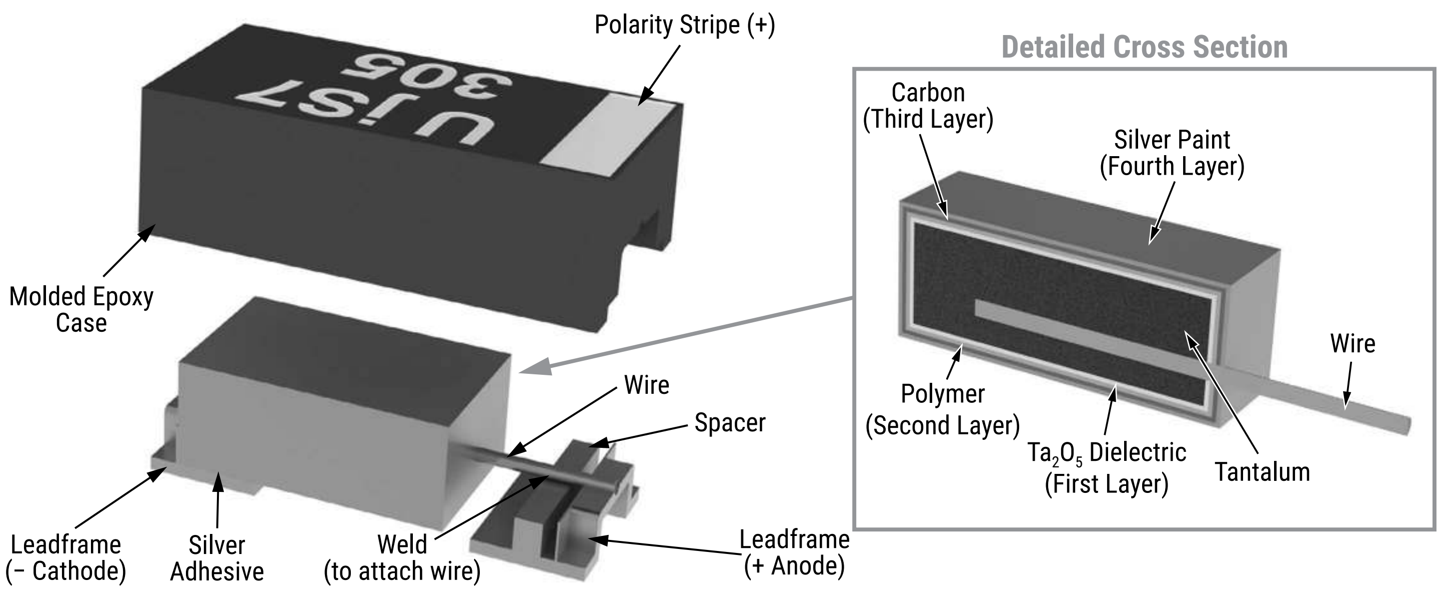
Calculated shelf life in sealed bag:
– 12 months from bag seal date in a storage environment of < 40°C and humidity < 90% RH
– 24 months from bag seal date in a storage environment of < 30°C and humidity < 70% RH
If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure.

Construction

T591 / T598 / T599

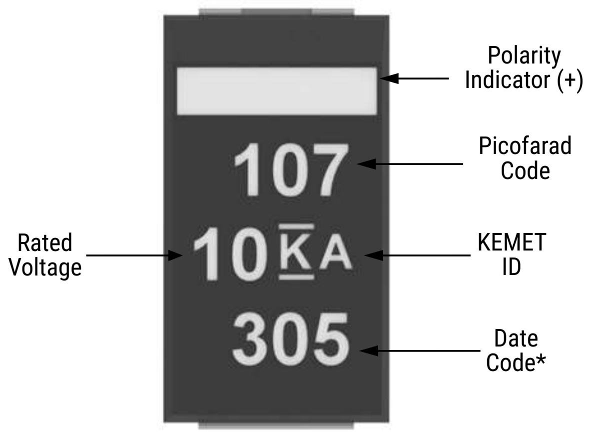


T597



Capacitor Marking

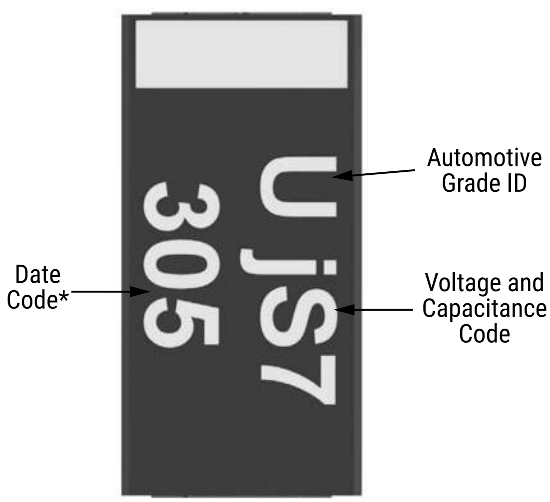
T591/ T598 / T599



* 305 = 5th week of 2023

Date Code *	
1st digit = Last number of year	0 = 2020 1 = 2021 2 = 2022 3 = 2023
2nd and 3rd digit = Week of the year	01 = 1st week of the year to 52 = 52nd week of the year

T597



* 305 = 5th week of 2023

Voltage Code		
e	j	A
2.5 V	6.3 V	10 V

Capacitance Code				
J7	N7	S7	A8	J8
22	33	47	100	220

Date Code *	
1st digit = Last number of year	0 = 2020 1 = 2021 2 = 2022 3 = 2023
2nd and 3rd digit = Week of the year	01 = 1st week of the year to 52 = 52nd week of the year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

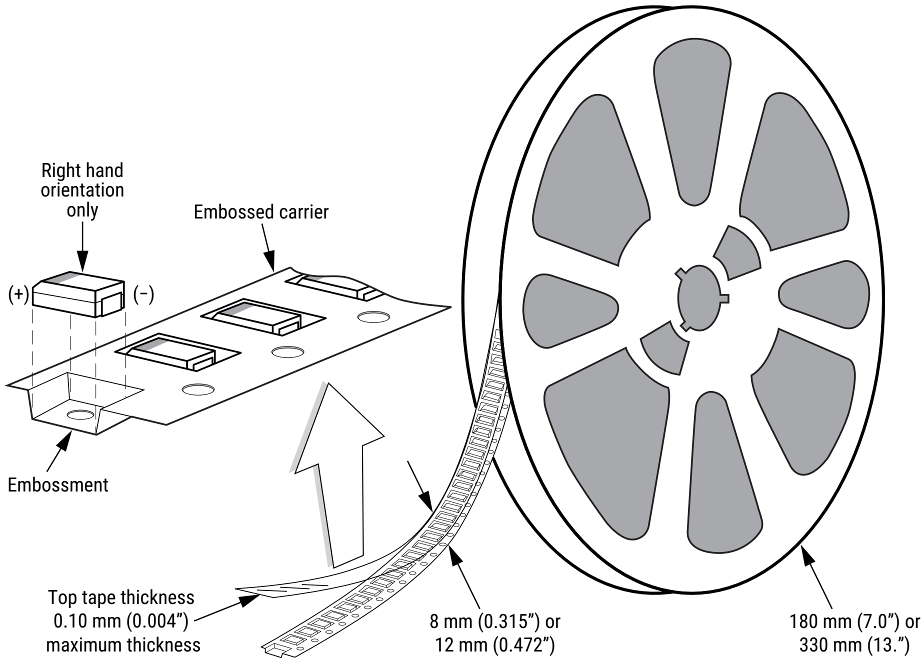


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
P	2012-10	8	3,000	N/A
R	2012-12	8	2,500	10,000
I	3216-10	8	3,000	N/A
S	3216-12	8	3,000	N/A
A	3216-18	8	2,000	N/A
T	3528-12	8	3,000	10,000
M	3528-15	8	2,500	8,000
B	3528-21	8	2,000	8,000
U	6032-15	12	1,000	5,000
L	6032-19	12	1,000	3,000
C	6032-28	12	500	3,000
Q	7343-12	12	1,000	3,000
W	7343-15	12	1,000	3,000
Z	7343-17	12	1,000	3,000
V	7343-19	12	1,000	3,000
D	7343-31	12	500	2,500
Y	7343-40	12	500	2,000
X	7343-43	12	500	2,000
J	7360-15	12	1,000	3,000
H	7360-20	12	1,000	3,000
O	7360-43	12	250	1,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

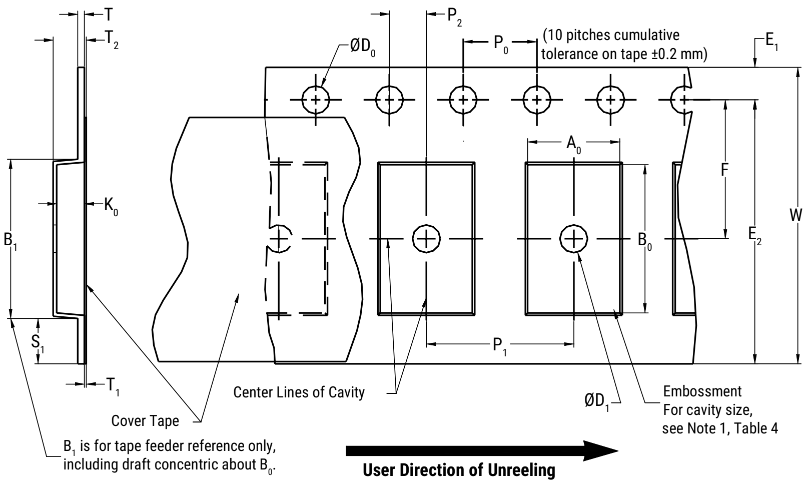


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/−0.0 (0.059 +0.004/−0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0, B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) and Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	

1. The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.

2. The tape, with or without components, shall pass around R without damage (see Figure 4).

3. If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).

4. B_1 dimension is a reference dimension for tape feeder clearance only.

5. The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:
(a) the component does not protrude above the top surface of the carrier tape.
(b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
(c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
(d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
(e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

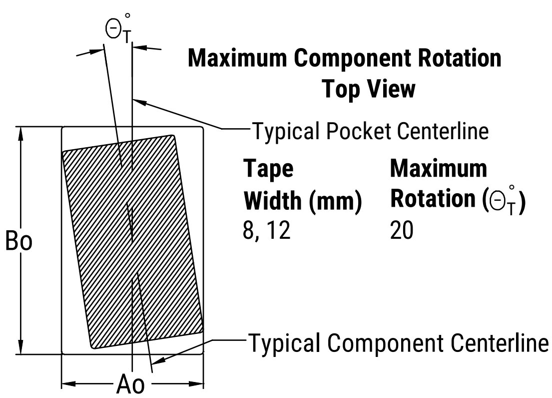
Packaging Information Performance Notes

1. Cover tape break force: 1.0 kg minimum.
2. Cover tape peel strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 newton (10 to 100 gf)
12 mm	0.1 to 1.3 newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the cover tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624.*

Figure 2 – Maximum Component Rotation



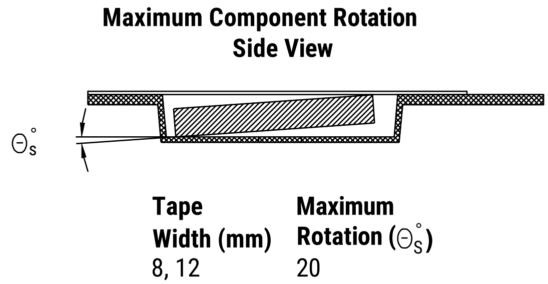


Figure 3 – Maximum Lateral Movement

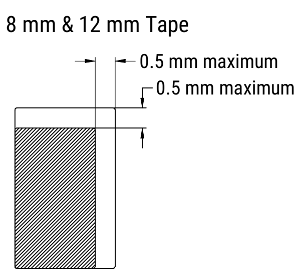


Figure 4 – Bending Radius

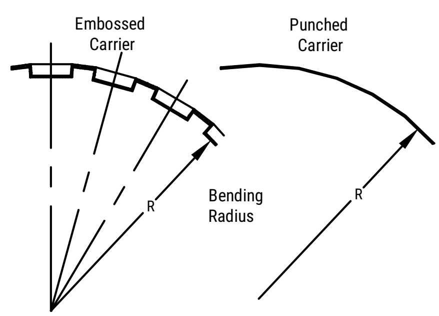
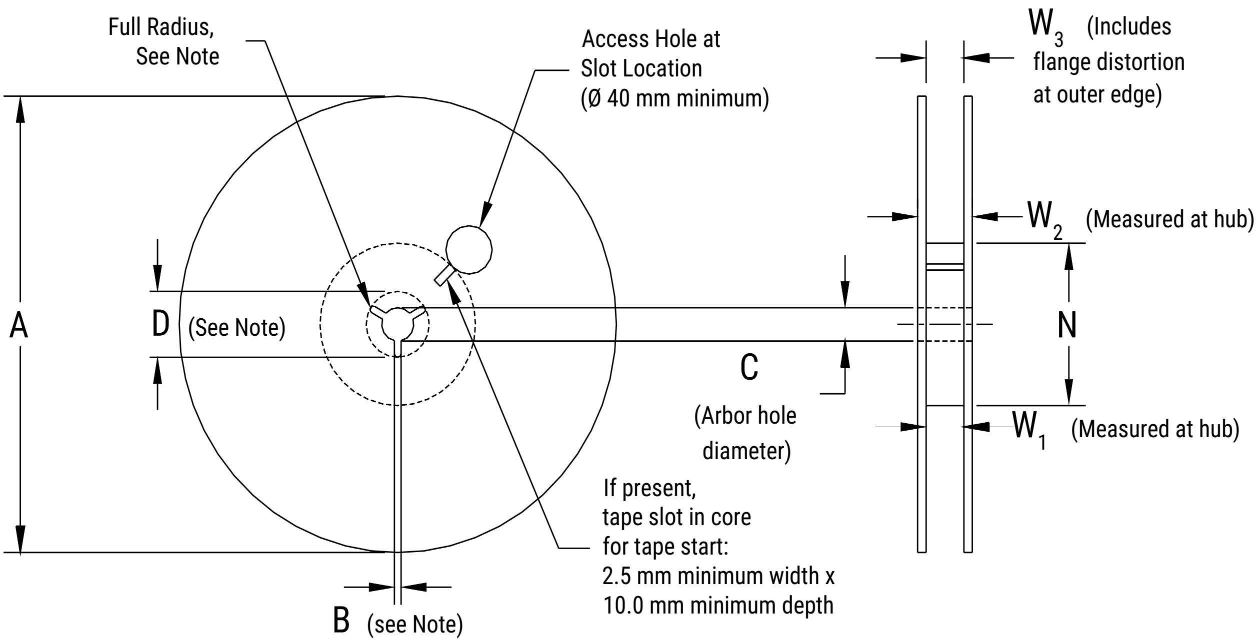


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
12 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

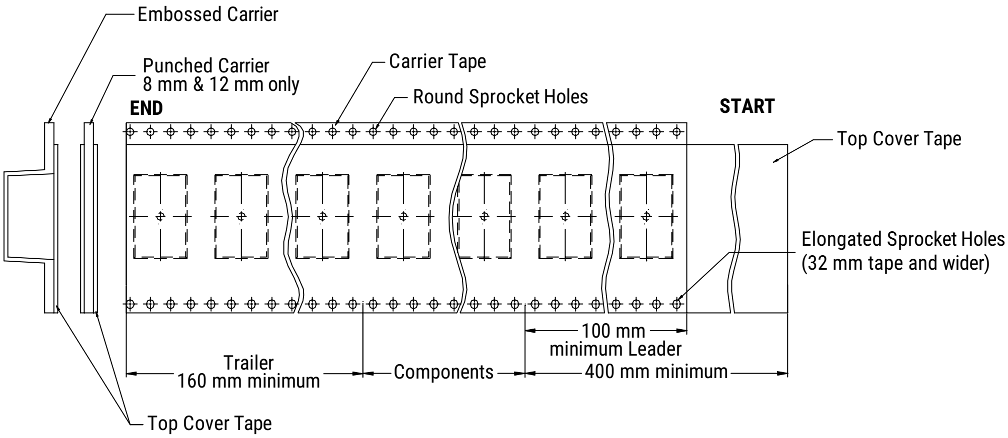
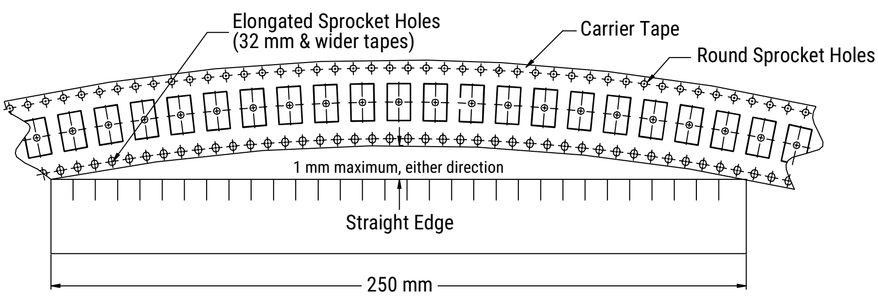


Figure 7 – Maximum Camber



M55 Module Polymer Hermetic Seal

KEMET a YAGEO company

Overview

KEMET's M550 and M551 Modular Series are manufactured by placing T550 or T551 Polymer Hermetic Sealed Capacitors (PHS) in parallel or series. The T550 and T551 Series are made utilizing KEMET's exclusive F-Tech process and are 100% tested per KEMET's patented Simulated Breakdown Screening process. This configuration provides high and stable capacitance (up to 8,200 µF), extremely low ESR (down to 15 mΩ) and extremely low and stable leakage current, all in a mechanically robust package.

The M55 Modules are available in two temperature offerings: 105°C (M550 Series) and 125°C (M551 Series). With reduced ESR and enhanced capacitance retention at higher frequencies and low temperatures, KEMET modules provide the highest total capacitance and the lowest total cost of ownership for high power applications.

Benefits

- Extremely low and stable ESR (as low as 15 mΩ)
- Voltage Ratings from 6 to 180 VDC
- High frequency capacitance retention
- Low temperature capacitance stability
- High ripple current capability (17,500 mA_{rms})
- High inrush current capability
- Excellent power dissipation capability
- Stackable packaging
- Mechanically robust assembly and epoxy housing
- Operates at up to 80% rated voltage
- Customized solutions available

Applications

Designed for mission critical applications requiring high power, filtering, hold-up, and current pulse generation.

Module 1

Module 2

Ordering Information

M	550	B	108	M	060	A	A
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Product Level	Termination Finish
M = Module	550 = Capacitor series (PHS 105°C) 551 = Capacitor series (PHS 125°C)	B	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	006 = 6 008 = 8 010 = 10 015 = 15 025 = 25 030 = 30 040 = 40 050 = 50 060 = 60 075 = 75 100 = 100 180 = 180	A = N/A B* = DLA 13030 standard reliability T* = DLA 13030 high reliability	A = 100% Silver (Ag) T = 100% Tin (Sn)-plated H = Tin/lead (SnPb) solder-coated (5% Pb minimum) S = Solder-coated (60% Sn, 40% Pb) G = 100% gold (Au)

** Only available on DLA discrete part numbers. Refer to part number table for details.*

Performance Characteristics

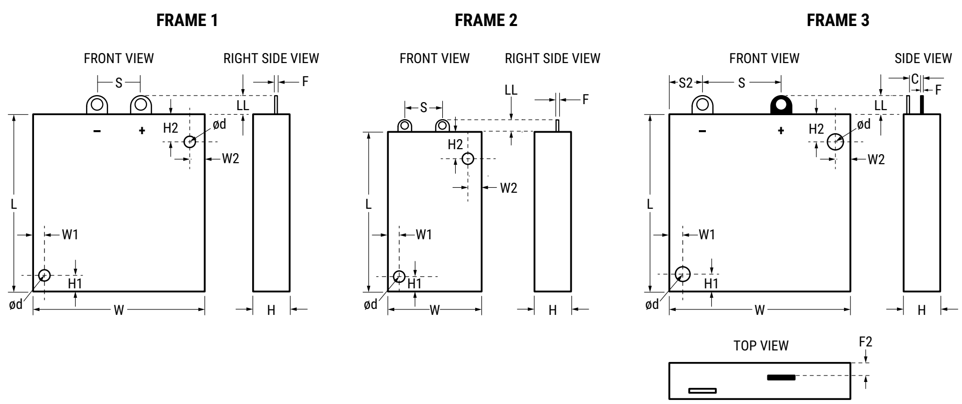
Item	Performance Characteristics
Operating Temperature	–55°C to 105°C/125°C*
Rated Capacitance Range	60 – 8,200 µF at 120 Hz/25°C
Capacitance Tolerance	K Tolerance (10%), M Tolerance (20%)
Rated Voltage Range	6 – 180 V
DF (120 Hz at 25°C)	Refer to Part Number Electrical Specification Table
ESR (100 kHz at 25°C)	Refer to Part Number Electrical Specification Table
Leakage Current	Refer to Part Number Electrical Specification Table

** Refer to the part number specification table.*

Qualification

Test Performed	Method Reference	Test Conditions
Reliability and Environmental Tests		
AC Ripple Life at 85˚C, 0.67 V_r	MIL–PRF–39006	85˚C, 40 kHz ripple current, 2,000 hours
Thermal Shock	MIL–PRF–39006	Condition A, –55°C to +105°C 5 cycles
Temperature Stability	MIL–PRF–39006	Extreme temperature exposure at a succession of continuous steps at +25°C, –55°C, +25°C, +85°C, +105, +25°C
Physical, Mechanical and Process Tests		
Mechanical Shock	MIL–PRF–39006	Condition I
Vibration High Frequency	MIL–PRF–39006	Method 204, Test condition D, 20 g peak

Dimensions – Millimeters (Inches)



Dimensions mm (In)															
Frame Size	L ±0.38 (0.015)	W ±0.38 (0.015)	H ±0.20 (0.008)	S ref	S2 ref	LL ± 0.1 (0.004)	F ref	C ref	H1 ± 0.1 (0.004)	W1 ± 0.1 (0.004)	H2 ± 0.1 (0.004)	W2 ± 0.1 (0.004)	F2 ref	d ref	Weight per module (g)
1	52.1 (2.05)	50.6 (1.99)	11.1 (0.44)	12.71 (0.50)	N/A	5.6 (0.22)	0.81 (0.03)	N/A	4.5 (0.18)	3.2 (0.13)	8.2 (0.32)	4.4 (0.17)	N/A	3.2 (0.13)	80
2	48.4 (1.90)	28.2 (1.11)	11.1 (0.44)	11.50 (0.45)	N/A	3.2 (0.13)	0.81 (0.03)	N/A	4.5 (0.18)	3.2 (0.13)	8.2 (0.32)	4.4 (0.17)	N/A	3.2 (0.13)	50
3	52.1 (2.05)	50.6 (1.99)	11.1 (0.44)	21.00 (0.83)	7.5	5.6 (0.22)	0.81 (0.03)	5.34 (0.21)	4.5 (0.18)	3.2 (0.13)	8.2 (0.32)	4.4 (0.17)	3.70 (0.15)	3.2 (0.13)	90

Table 1 – Ratings & Part Number Reference

Rated Voltage (V) 85°C	Rated Capacitance (µF)	Frame Size	KEMET Module Part Number	DC Leakage µA at 25°C max/5min	DF% at 25°C 120 Hz Max	Maximum ESR mΩ at 25°C 100 kHz	Ripple Current mArms at 85°C/40 kHz	Maximum Operating Temperature (°C)
6	700	2	M550B707(1)006A(3)	32	5	40	7550	105
6	700	2	M551B707(1)006A(3)	32	5	40	7550	125
6	4100	2	M550B418(1)006A(3)	185	5	30	8750	105
6	4100	2	M551B418(1)006A(3)	185	5	30	8750	125
6	8200	1	M550B828(1)006A(3)	369	5	15	17500	105
6	8200	1	M551B828(1)006A(3)	369	5	15	17500	125
8	1100	2	M550B118(1)008A(3)	66	5	40	7550	105
8	1100	2	M551B118(1)008A(3)	66	5	40	7550	125
8	3400	2	M550B348(1)008A(3)	204	5	30	8750	105
8	3400	2	M551B348(1)008A(3)	204	5	30	8750	125
8	6800	1	M550B688(1)008A(3)	408	5	15	17500	105
8	6800	1	M551B688(1)008A(3)	408	5	15	17500	125
10	500	2	M550B507(1)010A(3)	38	5	50	7000	105
10	500	2	M551B507(1)010A(3)	38	5	50	7000	125
10	900	2	M550B907(1)010A(3)	68	5	40	7900	105
10	900	2	M551B907(1)010A(3)	68	5	40	7900	125
10	2200	2	M550B228(1)010A(3)	210	5	30	8750	105
10	2200	2	M551B228(1)010A(3)	210	5	30	8750	125
10	5600	1	M550B568(1)010A(3)	420	5	15	17500	105
10	5600	1	M551B568(1)010A(3)	420	5	15	17500	125
15	350	2	M550B357(1)015A(3)	40	5	50	7000	105
15	350	2	M551B357(1)015A(3)	40	5	50	7000	125
15	600	2	M550B607(1)015A(3)	68	5	40	7900	105
15	600	2	M551B607(1)015A(3)	68	5	40	7900	125
15	2000	2	M550B208(1)015A(3)	225	5	30	8750	105
15	2000	2	M551B208(1)015A(3)	225	5	30	8750	125
15	3900	1	M550B398(1)015A(3)	439	5	15	17500	105
15	3900	1	M551B398(1)015A(3)	439	5	15	17500	125
25	250	2	M550B257(1)025A(3)	47	5	50	6375	105
25	250	2	M551B257(1)025A(3)	47	5	50	6375	125
25	500	2	M550B507(1)025(2)(3) *	94	5	60	6000	105
25	500	2	M551B507(1)025(2)(3) *	94	5	60	6000	125
25	1000	1	M550B108(1)025(2)(3) *	188	5	30	12000	105
25	1000	1	M551B108(1)025A(3)	188	5	30	12000	125
30	200	2	M550B207(1)030A(3)	45	5	50	6375	105
30	200	2	M551B207(1)030A(3)	45	5	50	6375	125
30	340	2	M550B347(1)030A(3)	77	5	50	7000	105
30	340	2	M551B347(1)030A(3)	77	5	50	7000	125
30	680	1	M550B687(1)030A(3)	153	5	25	14000	105
30	680	1	M551B687(1)030A(3)	153	5	25	14000	125
40	500	2	M550B507(1)040(2)(3) *	150	5	50	6750	105
40	500	2	M551B507(1)040(2)(3) *	150	5	50	6750	125
40	600	2	M550B607(1)040(2)(3) *	180	5	40	6750	105
40	600	2	M551B607(1)040(2)(3) *	180	5	40	6750	125
40	1000	1	M550B108(1)040(2)(3) *	300	5	25	13500	105
40	1000	1	M551B108(1)040A(3)	300	5	25	13500	125
40	1200	1	M550B128(1)040(2)(3) *	360	5	20	15100	105
40	1200	1	M551B128(1)040A(3)	360	5	20	15100	125
50	120	2	M550B127(1)050A(3)	47	5	50	6375	105
50	120	2	M551B127(1)050A(3)	47	5	50	6375	125
50	240	2	M550B247(1)050A(3)	90	5	50	6750	105
50	240	2	M551B247(1)050A(3)	90	5	50	6750	125
50	500	2	M550B507(1)050(2)(3) *	188	5	40	7250	105
50	500	2	M551B507(1)050(2)(3) *	188	5	40	7250	125
50	600	2	M550B607(1)050(2)(3) *	225	5	30	8750	105

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert B = standard reliability, or T = high reliability. See Ordering Information table for details.
(3) To complete KEMET part number, insert T = 100% matte tin (Sn) plated, H = standard solder coated (SnPb 5% Pb minimum), S = 60% tin (Sn) 40% lead (Pb) , G = 100% gold (Au) , A = 100% silver (Ag). Designates termination finish.

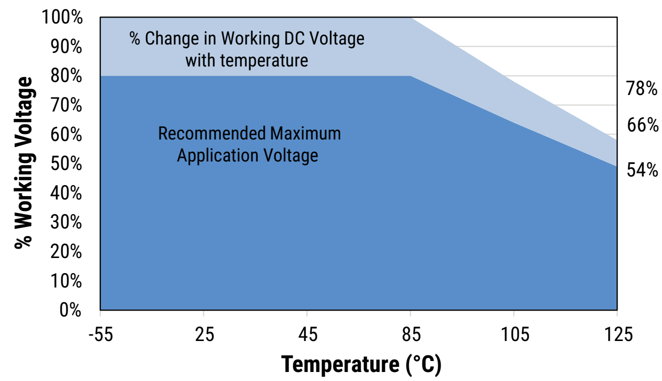
Table 1 – Ratings & Part Number Reference cont.

Rated Voltage (V) 85°C	Rated Capacitance (µF)	Frame Size	KEMET Module Part Number	DC Leakage µA at 25°C max/5min	DF% at 25°C 120 Hz Max	Maximum ESR mΩ at 25°C 100 kHz	Ripple Current mArms at 85°C/40 kHz	Maximum Operating Temperature (°C)
50	600	2	M551B607(1)050(2)(3) *	225	5	30	8750	125
50	1000	1	M550B108(1)050(2)(3) *	375	5	20	14500	105
50	1000	1	M551B108(1)050A(3)	375	5	20	14500	125
50	1200	1	M550B128(1)050(2)(3) *	450	5	15	17500	105
50	1200	1	M551B128(1)050A(3)	450	5	15	17500	125
60	100	2	M550B107(1)060A(3)	45	5	60	5875	105
60	100	2	M551B107(1)060A(3)	45	5	60	5875	125
60	500	2	M550B507(1)060A(3)	225	5	50	8300	105
60	500	2	M551B507(1)060A(3)	225	5	50	8300	125
60	1000	1	M550B108(1)060(2)(3) *	450	5	25	16600	105
60	1000	1	M551B108(1)060A(3)	450	5	25	16600	125
75	370	2	M550B377(1)075A(3)	208	5	40	7900	105
75	750	1	M550B757(1)075(2)(3) *	422	5	20	15800	105
100	120	2	M550B127(1)100A(3)	90	5	60	6375	105
100	250	1	M550B257(1)100(2)(3) *	188	5	30	12750	105
108	250	3	M550B257(1)108A(3)	350	5	50	8300	105
108	250	3	M551B257(1)108A(3)	350	5	50	8300	125
135	180	3	M550B187(1)135A(3)	302	5	50	7900	105
180	60	3	M550B606(1)180(2)(3) *	141	5	80	6000	105

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert B = standard reliability, or T = high reliability. See Ordering Information table for details.
(3) To complete KEMET part number, insert T = 100% matte tin (Sn) plated, H = standard solder coated (SnPb 5% Pb minimum), S = 60% tin (Sn) 40% lead (Pb) , G = 100% gold (Au) , A = 100% silver (Ag). Designates termination finish.

Recommended Voltage Derating Guidelines

	-55°C to 105°C	105°C to 125°C
% Change in Working DC Voltage with Temperature	78% of V_R	66% of V_R
Recommended Maximum Application Voltage (As % of Rated Voltage)	63% of V_R	54% of V_R



Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage that may be applied is limited by two criteria:

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage.

The maximum power dissipation by case size can be determined using the below left table. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Refer to the below right table for temperature compensation requirements.

Case Code		Maximum Power Dissipation (P_{max}) mWatts at 25°C with +60°C Rise
KEMET	MIL–PRF–39006/22/ 25/30/31 Case Size	
B	T2	715

Temperature Compensation Multipliers for Maximum Power Dissipation (P_{max})		
T ≤ 45°C	45°C < T ≤ 85°C	85°C < T ≤ 125°C
1.00	0.70	0.10

T= Environmental Temperature

Using the P_{max} of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{P_{max}/R}$
$E(max) = Z\sqrt{P_{max}/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
P_{max} = maximum power dissipation (watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (ohms)

The maximum power dissipation rating must be reduced with increasing environmental operating temperatures. Refer to the Temperature Compensation Multiplier table for details.

Reverse Voltage

Solid tantalum polymer capacitors are polar devices and may be permanently damaged or destroyed if connected with the wrong polarity. A small reverse voltage is permissible for time periods per the table at right. KEMET can offer lower capacitance in this voltage with higher reverse voltage capability. In addition, we continue to improve our capability for this characteristic.

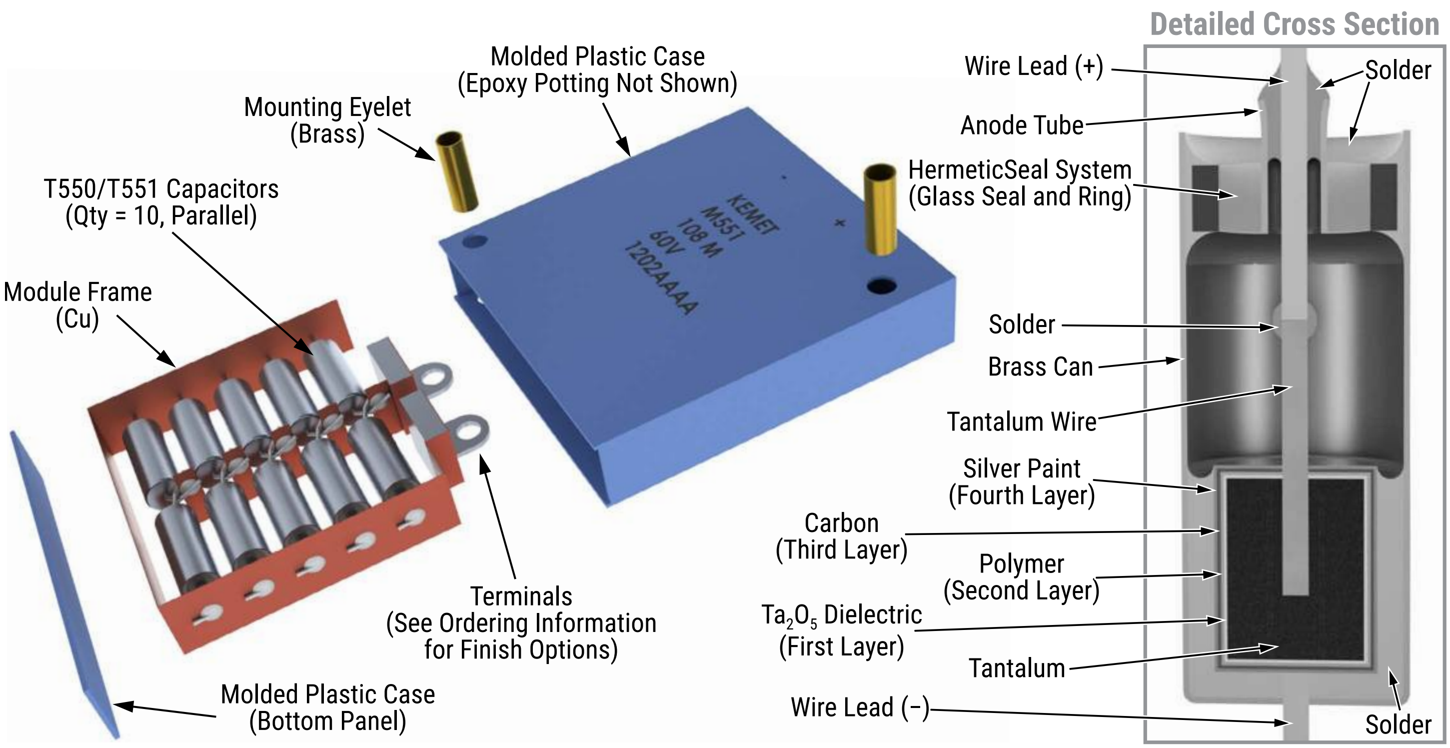
Temperature	Permissible Reverse Voltage
25°C	1 V for 8 hours Maximum
70°C	1 V for 2 hours Maximum

Mounting

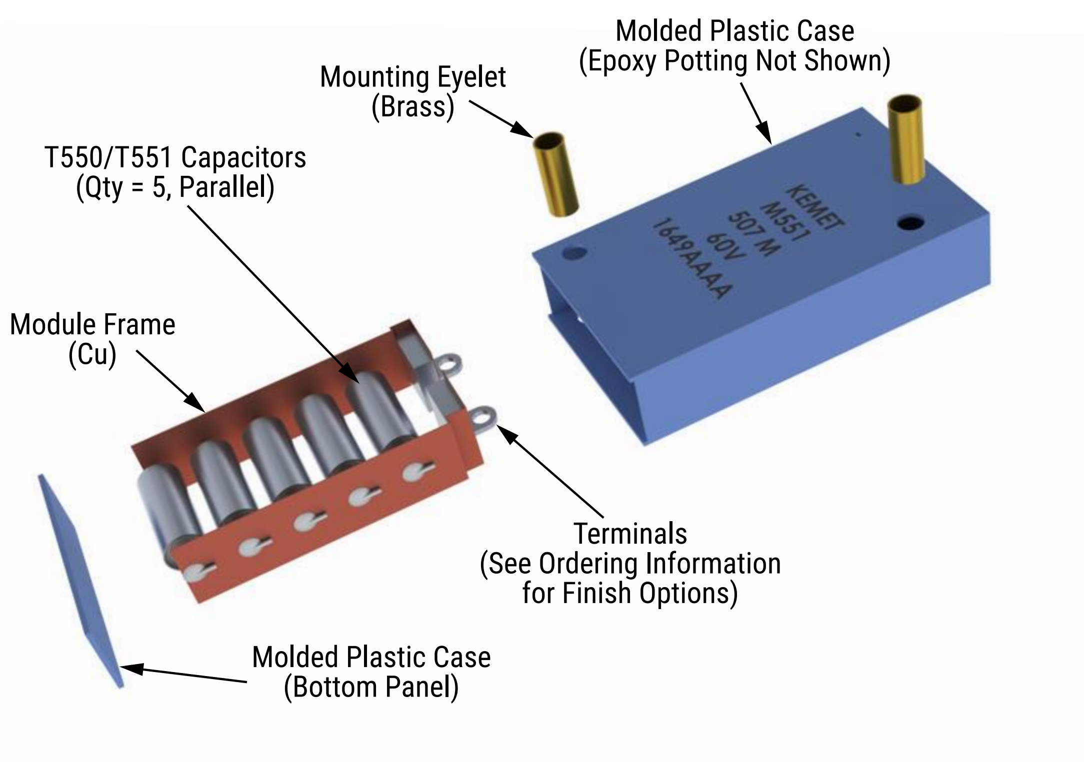
The M550 and M551 Modular Series are suitable for stacking to the board. The use of a heat sink is recommended. These products are not suitable for reflow soldering. For manual-soldering process with soldering iron, the maximum recommended temperature is 350°C for no more than 3 seconds. Care should be taken to avoid contact of the soldering iron to the epoxy housing. The iron should be used to heat the solder pad, applying solder between the pad and the terminal of the module, until reflow occurs.

Construction

Module 1

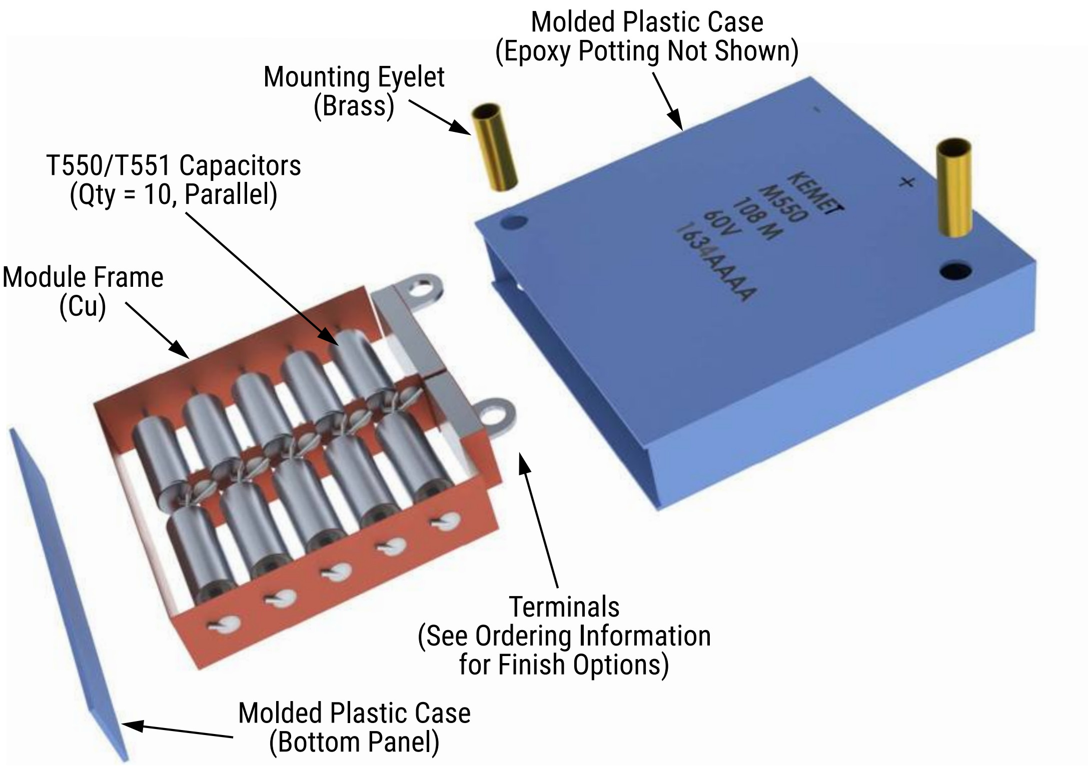


Module 2

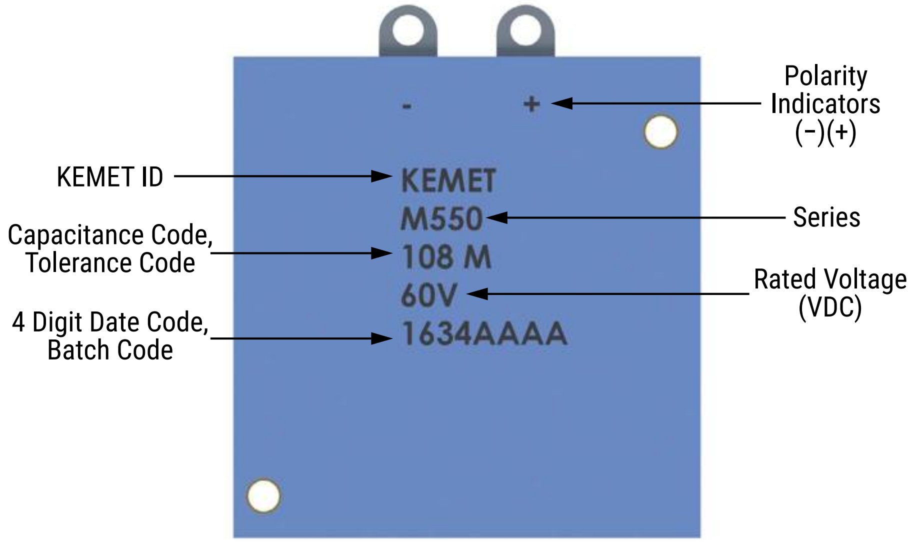


Construction cont.

Module 3



Capacitor Marking



Storage

Polymer Hermetic Seal Modules should be stored in normal working environments. KEMET recommends that maximum storage temperature not exceed 40°C and maximum storage humidity not exceed 90% RH. For optimal solderability, module stock should be used promptly, preferably within three years of receipt.

Packaging

Modules shall be packaged in carton boxes. Packaging methods and materials used shall prevent degradation of physical and mechanical characteristics. MSL 1

Series	Carton Box Qty
M55	10 max

T540/T541 High Reliability Series (HRA) Polymer Electrolytic, 2.5 – 63 VDC

KEMET a YAGEO company

KO-CAP Polymer Capacitors

Overview

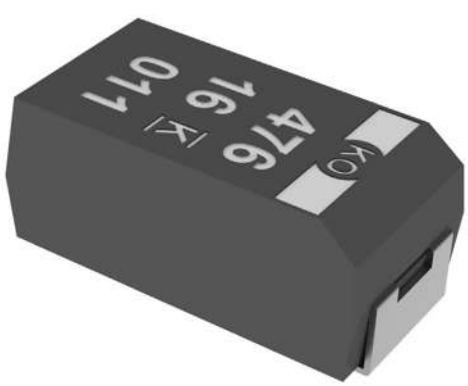
The KEMET Organic Capacitor (KO-CAP) is a solid electrolytic capacitor with a conductive polymer cathode capable of delivering very low ESR and improved capacitance retention at high frequencies. KO-CAP combines the low ESR of multilayer ceramic, the high capacitance of aluminum electrolytic, and the volumetric efficiency of tantalum into a single surface mount package. Unlike liquid electrolyte-based capacitors, KO-CAP has a very long operational life and high ripple current capabilities.

The HRA Polymer Electrolytic offers the same performance advantages as other KO-CAP series with screening options associated with high reliability (Hi-Rel) applications. These HRA grade components offer several surge current screening options. The recommended application derating for these capacitors is 10 – 20%, rendering them suitable for application voltages from 2.5 to 63 VDC.

These are the first polymer electrolytic capacitors available with failure rate options as defined by KEMET's KO-CAP Reliability Assessment method. This method utilizes accelerated conditions (voltage and temperature) applied to board-mounted samples to assess long term device reliability. The failure rates available are B (0.1% per 1,000 hours), C (0.01% per 1,000 hours), and D (0.001% per 1,000 hours). The KO-CAP Reliability Assessment method was developed as a result of over 10 years of research

Benefits

- Approved for DLA Drawing 04051/04052
- DLA Drawing 04052 Part Numbers with Surge Current Option B are approved under ESA/EPPL part 2
- B, C, and D failure rates available
- 100% accelerated steady state aging
- High frequency capacitance retention
- Improved humidity capability 85°C/85% RH, 1.0 V_R (in black color epoxy) available
- Very low ESR values down to 5 mΩ
- Surge current testing options
- Volumetrically efficient
- EIA standard case sizes
- KEMET's KO-CAP Reliability Assessment method



Applications

Typical applications include decoupling , filtering and hold-up in defense and aerospace applications that require low ESR or a benign failure mode.
When extreme temperatures and humidity are taken into account, polymer capacitors offer a number of advantages over other types of capacitors. KEMET continues to investigate the behavior of polymer capacitors in extreme conditions. If you have questions about using these capacitors in a specific environment or application, we suggest you contact your local KEMET representative or Field Application Engineer.

Environmental Compliance

RoHS compliant when ordered with 100% Sn solder.

- Halogen-free
- Epoxy compliant with UL94 V–0

Ordering Information

T	541	D	157	M	10	A	H	65	10	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	Surge Option	ESR	Packaging (C-Spec)
T = Tantalum	540 = Polymer COTS 541 = Polymer COTS Multiple Anode	A, B, C, D, O, X, Y	First two digits represent significant figures. Third digit specifies number of zeros.	K = ± 10% M = ±20%	2R5 = 2.5 003 = 3 004 = 4 006 = 6.3 010 = 10 016 = 16 020= 20 025 = 25 035 = 35 050 = 50 063 = 63	A = N/A B* = 0.1%/KHrs C* = 0.01%/KHrs D*= 0.001%/KHrs L = Life (+125°C, 2,000 hrs) V = Vibration, Surge , Resistance to soldering heat and Life (+125°C, 2,000 Hrs)	H = Standard solder coated (SnPb 5% Pb minimum) T = 100% Matte Tin (Sn)-plated	65 = 4 cycles at 25°C ±5°C** 66 = 10 cycles at 25°C ±5°C*** 67 = 10 cycles at -55°C +0°C/-5°C and +85°C ±5°C*** 85 = 4 cycles at 25°C ±5°C ** and improved humidity capability 86 = 10 cycles at 25°C ±5°C*** and improved humidity capability 87= 10 cycles at −55°C +0°C/−5°C and +85°C ±5°C*** and improved humidity capability	05 = ESR - High 10 = ESR - Standard 20 = ESR - Low 30* = ESR - Ultra Low ESR	Blank = 7" Reel 7280 = 13" Reel 7611 = Bulk Bag 7640 = Bulk plastic box WAFL = Waffle Pack

** Select part numbers*
*** Before voltage aging*
**** After voltage aging*

Ordering Information – DLA Drawing

04051-	002	K	A	A
Drawing Number	Dash Number	Capacitance Tolerance	Additional Testing Option	Surge Current Option
04051	See Part Number List	K = ±10% M = ±20%	See Part Number List	Blank = 4 cycles +25°C ±5°C Before Voltage Aging A = 10 cycles +25°C ±5°C After Voltage Aging B = 10 cycles −55°C +0°C/−5°C and +85°C ±5°C After Voltage Aging

04052-	002	A
Drawing Number	Dash Number	Surge Current Option
04052	See Part Number List	Blank = 4 cycles +25°C ±5°C Before Voltage Aging A = 10 cycles +25°C ±5°C After Voltage Aging B = 10 cycles −55°C +0°C/−5°C and +85°C ±5°C After Voltage Aging

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to 125°C *
Rated Capacitance Range	4.7 – 1,500 µF at 120 Hz/25°C
Capacitance Tolerance	K Tolerance (10%), M Tolerance (20%)
Rated Voltage Range	2.5 – 63 V
DF (120 Hz)	≤ 10%
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.1 CV (µA) at rated voltage after 5 minutes

** KEMET's Polymer COTS (T540/T541 Series) capacitors are rated for operation between −55°C and +125°C. Parametric electrical performance remains within stated specification limits after 1,000 hours of continuous operation and/or storage at +125°C. Long-term duty cycles or storage at or above +125°C may result in an increase in ESR performance outside of the stated specification limits.*

Qualification

<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">105°C at rated voltage, 2,000 hours
125°C at 2/3 rated voltage, 2,000 hours</td><td>Δ C/C</td><td colspan="3">Within −20/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ initial limit</td></tr>
<tr><td>DCL **</td><td colspan="3">1.25 x IL at 125°C</td></tr>
<tr><td>ESR</td><td colspan="3">2 x IL (105°C); 5 x IL (125°C)</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">125°C at 0 volts, 2,000 hours</td><td>Δ C/C</td><td colspan="3">Within −20/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL **</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 5.0 x initial limit</td></tr>
<tr><td rowspan="3">Humidity</td><td colspan="2" rowspan="3">60°C, 90% RH, 500 hours, rated voltage
60°C, 90% RH, 500 hours, no load
85°C, 85% RH, 1,000 hours, rated voltage ***</td><td>Δ C/C</td><td colspan="3">Within −5%/+35% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ initial limit
Within 1.5 x IL ***</td></tr>
<tr><td>DCL</td><td colspan="3">Within 3.0 x initial limit</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at +25°C, −55°C, +25°C, +85°C, +125°C, +25°C</td><td></td><td>+25°C</td><td>−55°C</td><td>+85°C (1)</td><td>+125°C (2)</td></tr>
<tr><td>Δ C/C</td><td>±5%</td><td>±10%</td><td>±20%</td><td>±30%</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>1.2 x IL</td><td>1.5 x IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>10 x IL</td><td>10 x IL</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">105°C, 1.32 x rated voltage, 33 Ω resistance, 1,000 cycles</td><td>Δ C/C</td><td colspan="3">Within −20/+5% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within initial limits</td></tr>
<tr><td rowspan="3">Mechanical Shock/ Vibration</td><td colspan="2" rowspan="3">Mil-Std-202, Method 213, Condition I, 100 G peak
Mil-Std-202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>Additional qualifcation testing per MIL-PRF-55365/8</td><td colspan="6">Please contact KEMET for more information</td></tr>
</table>

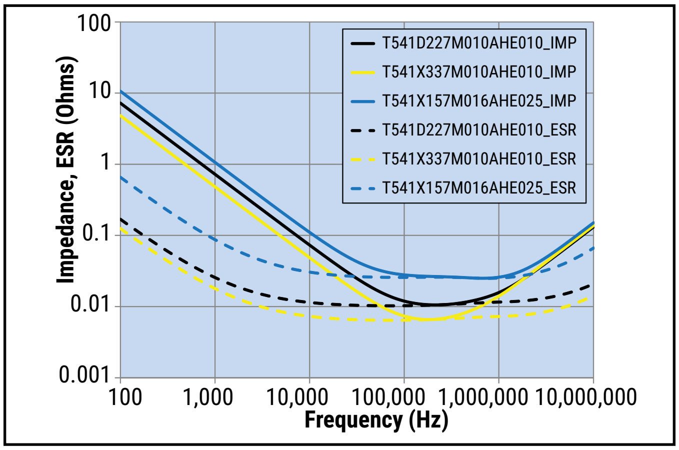
**IL = Initial limit*
*** The test voltage shall be maintained during the cool down from elevated test temperature to +25°C. After cool down, the capacitors shall be discharged for a minimum of 5 minutes. DC leakage measurements are allowed at this time.*
(1) ≥16V - ΔC/C = ±30%
(2) ≥16V - ΔC/C = ±40%
**** For Part Number with surge options 85, 86, and 87*

Certification

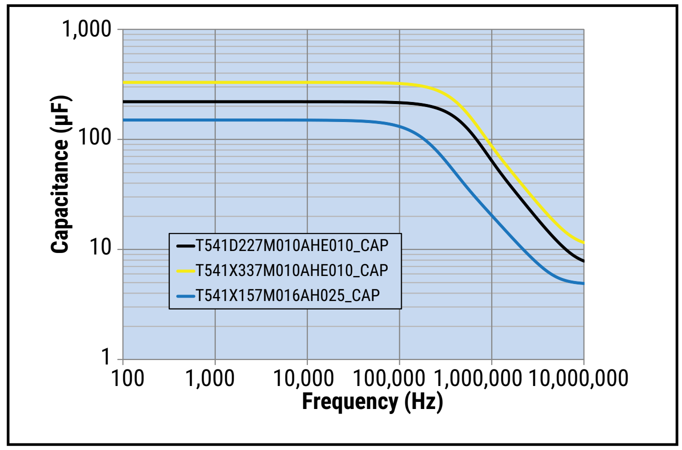
DLA Drawing 04051 & 04052

Electrical Characteristics

ESR vs. Frequency

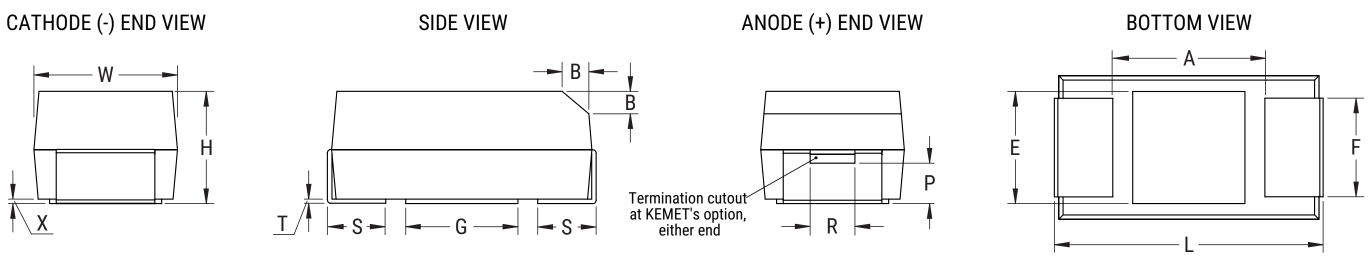


Capacitance vs. Frequency



Dimensions – Millimeters (Inches)

Metric will govern



Case Size		Component Dimensions													Typical Weight
KEMET	EIA	L	W	H	F±0.1 ±(0.004)	S±0.3 ±(0.012)	B±0.15 (Ref)±0.006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Minimum)	G (Ref)	E (Ref)	(mg)
A	3216-18	3.2 ±0.2 (0.126 ±0.008)	1.6 ±0.2 (0.063 ±0.008)	1.6 ±0.2 (0.063 ±0.008)	1.2 (0.047)	0.8 (0.031)	0.4 (0.016)	0.10 ±0.10 (0.004 ±0.004)	0.4 (0.016)	0.4 (0.016)	0.13 (0.005)	1.2 (0.047)	1.1 (0.043)	1.3 (0.051)	53.17
B	3528-21	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.9 ±0.2 (0.075 ±0.008)	2.2 (0.087)	0.8 (0.031)	0.4 (0.016)	0.10 ±0.10 (0.004 ±0.004)	0.5 (0.020)	1.0 (0.039)	0.13 (0.005)	1.9 (0.075)	1.8 (0.071)	2.2 (0.087)	98.30
C	6032-28	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.3 (0.126 ±0.012)	2.5 ±0.3 (0.098 ±0.012)	2.2 (0.087)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	0.9 (0.035)	1.0 (0.039)	0.13 (0.005)	3.1 (0.122)	2.8 (0.110)	2.4 (0.095)	193.46
D	7343-31	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.8 ±0.3 (0.110 ±0.012)	2.4 (0.095)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	0.9 (0.035)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	307.51
O	7360-43	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	4.0 ±0.3 (0.157 ±0.012)	4.1 (0.161)	1.3 (0.051)	N/A	0.10 ±0.10 (0.004 ±0.004)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	696.00
X	7343-43	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	4.0 ±0.3 (0.157 ±0.012)	2.4 (0.095)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	410.89
Y	7343-40	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	3.8 ±0.2 (0.150 ±0.008)	2.4 (0.095)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	378.06

Notes: (Ref) – Dimensions provided for reference only.
These weights are provided as reference. If exact weights are needed, please contact your KEMET Sales Representative

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
2.5	330	D/7343-31	T540D337(5)2R5(9)H(1)10	04051-002(5)(8)(2)	•		83	10	25	3,000	3	125
2.5	330	D/7343-31	T540D337(5)2R5(3)(6)(1)10	N/A			83	10	25	3,000	3	125
2.5	330	D/7343-31	T540D337(5)2R5(3)(6)(7)05	N/A		•	83	10	40	2,372	3	125
2.5	470	D/7343-31	T540D477(5)2R5(9)H(1)10	04051-003(5)(8)(2)	•		118	10	25	3,000	3	125
2.5	470	D/7343-31	T540D477(5)2R5(3)(6)(1)10	N/A			118	10	25	3,000	3	125
2.5	470	D/7343-31	T540D477(5)2R5(3)(6)(7)05	N/A		•	118	10	40	2,372	3	125
2.5	470	D/7343-31	T541D477M2R5AH(1)20	04052-002(2)	•		118	10	6	6,519	3	125
2.5	470	D/7343-31	T541D477(5)2R5(3)(6)(1)20	N/A			118	10	6	6,519	3	125
2.5	470	D/7343-31	T541D477M2R5AH(1)10	04052-003(2)	•		118	10	10	5,050	3	125
2.5	470	D/7343-31	T541D477(5)2R5(3)(6)(1)10	N/A			118	10	10	5,050	3	125
2.5	680	D/7343-31	T540D687(5)2R5(9)H(1)10	04051-004(5)(8)(2)	•		170	10	25	3,000	3	125
2.5	680	D/7343-31	T540D687(5)2R5(3)(6)(1)10	N/A			170	10	25	3,000	3	125
2.5	680	D/7343-31	T540D687(5)2R5(3)(6)(7)05	N/A		•	170	10	40	2,372	3	125
2.5	680	D/7343-31	T541D687M2R5AH(1)20	04052-007(2)	•		170	10	6	6,519	3	125
2.5	680	D/7343-31	T541D687(5)2R5(3)(6)(1)20	N/A			170	10	6	6,519	3	125
2.5	680	D/7343-31	T541D687M2R5AH(1)10	04052-008(2)	•		170	10	10	5,050	3	125
2.5	680	D/7343-31	T541D687(5)2R5(3)(6)(1)10	N/A			170	10	10	5,050	3	125
2.5	680	Y/7343-40	T541Y687M2R5AH(1)30	04052-005(2)	•		170	10	5	7,253	3	125
2.5	680	Y/7343-40	T541Y687(5)2R5(3)(6)(1)30	N/A			170	10	5	7,253	3	125
2.5	680	Y/7343-40	T541Y687M2R5AH(1)20	04052-006(2)	•		170	10	6	6,621	3	125
2.5	680	Y/7343-40	T541Y687(5)2R5(3)(6)(1)20	N/A			170	10	6	6,621	3	125
2.5	680	Y/7343-40	T541Y687M2R5AH(1)10	04052-042(2)	•		170	10	10	5,128	3	125
2.5	680	Y/7343-40	T541Y687(5)2R5(3)(6)(1)10	N/A			170	10	10	5,128	3	125
2.5	1,000	X/7343-43	T541X108M2R5AH(1)30	04052-009(2)	•		250	10	5	7,348	3	125
2.5	1,000	X/7343-43	T541X108(5)2R5(3)(6)(1)30	N/A			250	10	5	7,348	3	125
2.5	1,000	X/7343-43	T541X108M2R5AH(1)20	04052-010(2)	•		250	10	6	6,708	3	125
2.5	1,000	X/7343-43	T541X108(5)2R5(3)(6)(1)20	N/A			250	10	6	6,708	3	125
2.5	1,000	X/7343-43	T541X108M2R5AH(1)10	04052-043(2)	•		250	10	10	5,196	3	125
2.5	1,000	X/7343-43	T541X108(5)2R5(3)(6)(1)10	N/A			250	10	10	5,196	3	125
2.5	1,000	X/7343-43	T541X108(5)2R5(3)(6)(7)05	N/A		•	250	10	12	4,743	3	125
2.5	1,500	X/7343-43	T541X158M2R5AH(1)30	04052-011(2)	•		375	10	5	7,348	3	125
2.5	1,500	X/7343-43	T541X158(5)2R5(3)(6)(1)30	N/A			375	10	5	7,348	3	125
2.5	1,500	X/7343-43	T541X158M2R5AH(1)20	04052-044(2)	•		375	10	6	6,708	3	125
2.5	1,500	X/7343-43	T541X158(5)2R5(3)(6)(1)20	N/A			375	10	6	6,708	3	125
2.5	1,500	X/7343-43	T541X158M2R5AH(1)10	04052-045(2)	•		375	10	10	5,196	3	125
2.5	1,500	X/7343-43	T541X158(5)2R5(3)(6)(1)10	N/A			375	10	10	5,196	3	125
2.5	1,500	X/7343-43	T541X158(5)2R5(3)(6)(7)05	N/A		•	375	10	12	4,743	3	125
3	100	B/3528-21	T540B107(5)003(9)H(1)10	04051-005(5)(8)(2)	•		30	8	80	1,260	3	125
3	100	B/3528-21	T540B107(5)003(3)(6)(1)10	N/A			30	8	80	1,260	3	125
3	100	B/3528-21	T540B107(5)003(3)(6)(7)10	N/A		•	30	8	80	1,260	3	125
3	150	B/3528-21	T540B157(5)003(9)H(1)10	04051-006(2)	•		45	8	80	1,260	3	125
3	150	B/3528-21	T540B157(5)003(3)(6)(1)10	N/A			45	8	80	1,260	3	125
3	150	B/3528-21	T540B157(5)003(3)(6)(7)10	N/A		•	45	8	80	1,260	3	125
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles −55°C and +85°C, Designates surge current option.
(2) To complete DLA part number, insert Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles −55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert A = N/A ,insert B = 0.1%/1,000 hours, C = 0.01%/1,000 hours, D=0.001%/1,000 hours. Designates Reliability Level.
(4) To complete KEMET part number for non-DLA, insert A = N/A, insert B = 0.1%/1,000 hours or C = 0.01%/1,000 hours. Designates Reliability Level.
(5) To complete DLA or KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(6) To complete KEMET part number insert, H = Solder Plated, T = 100% Tin (Sn). Designates termination finish.
*(7) To complete KEMET part number, insert 85 = 4 cycles at 25°C ±5°C ** + improved humidity capability, 86 = 10 cycles at 25°C ±5°C*** + improved humidity capability, 87= 10 cycles at −55°C +0°C/−5°C and +85°C ±5°C*** + improved humidity capability. Designates surge current option on improved humidity capability.*
(8) = To complete DLA part number, insert A = Life (+125°C, 2000 Hrs), B = Vibration, Surge, Resistance to soldering heat and Life or Z = No additional testing. Designates additional testing option.
(9) = To complete KEMET part number, insert A = No additional testing, L = Life (+125°C, 2000 Hrs) or V = Vibration, Surge, Resistance to soldering heat and Life. Designates additional testing option.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
3	330	D/7343-31	T540D337(5)003(9)H(1)10	04051-007(5)(8)(2)	•		99	10	25	3,000	3	125
3	330	D/7343-31	T540D337(5)003(3)(6)(1)10	N/A			99	10	25	3,000	3	125
3	330	D/7343-31	T540D337(5)003(3)(6)(7)05	N/A		•	99	10	40	2,372	3	125
3	470	D/7343-31	T540D477(5)003(9)H(1)10	04051-008(5)(8)(2)	•		141	10	25	3,000	3	125
3	470	D/7343-31	T540D477(5)003(3)(6)(1)10	N/A			141	10	25	3,000	3	125
3	470	D/7343-31	T540D477(5)003(3)(6)(7)05	N/A		•	141	10	40	2,372	3	125
3	470	D/7343-31	T541D477M003AH(1)10	04052-012(2)	•		141	10	10	5,050	3	125
3	470	D/7343-31	T541D477(5)003(3)(6)(1)10	N/A			141	10	10	5,050	3	125
3	680	D/7343-31	T540D687(5)003(9)H(1)10	04051-009(5)(8)(2)	•		204	10	25	3,000	3	125
3	680	D/7343-31	T540D687(5)003(3)(6)(1)10	N/A			204	10	25	3,000	3	125
3	680	D/7343-31	T540D687(5)003(3)(6)(7)05	N/A		•	204	10	40	2,372	3	125
3	680	D/7343-31	T541D687M003AH(1)10	04052-013(2)	•		204	10	10	5,050	3	125
3	680	D/7343-31	T541D687(5)003(3)(6)(1)10	N/A			204	10	10	5,050	3	125
3	1,000	X/7343-43	T541X108M003AH(1)10	04052-014(2)	•		300	10	10	5,196	3	125
3	1,000	X/7343-43	T541X108(5)003(3)(6)(1)10	N/A			300	10	10	5,196	3	125
3	1,000	X/7343-43	T541X108(5)003(3)(6)(7)05	N/A		•	300	10	12	4,743	3	125
3	1,500	X/7343-43	T541X158M003AH(1)10	04052-015(2)	•		450	10	8	5,809	3	125
3	1,500	X/7343-43	T541X158(5)003(3)(6)(1)10	N/A			450	10	8	5,809	3	125
3	1,500	X/7343-43	T541X158(5)003(3)(6)(7)05	N/A		•	450	10	12	4,743	3	125
3	2,000	O/7360-43	T541O208M003(3)(6)(1)10	N/A			600	10	10	5,480	3	125
4	68	B/3528-21	T540B686(5)004(9)H(1)10	04051-011(5)(8)(2)	•		28	8	80	1,260	3	125
4	68	B/3528-21	T540B686(5)004(3)(6)(1)10	N/A			28	8	80	1,260	3	125
4	68	B/3528-21	T540B686(5)004(3)(6)(7)10	N/A		•	28	8	80	1,260	3	125
4	100	B/3528-21	T540B107(5)004(9)H(1)10	04051-012(5)(8)(2)	•		40	8	80	1,260	3	125
4	100	B/3528-21	T540B107(5)004(3)(6)(1)10	N/A			40	8	80	1,260	3	125
4	100	B/3528-21	T540B107(5)004(3)(6)(7)10	N/A		•	40	8	80	1,260	3	125
4	220	D/7343-31	T540D227(5)004(9)H(1)10	04051-013(5)(8)(2)	•		88	10	25	3,000	3	125
4	220	D/7343-31	T540D227(5)004(3)(6)(1)10	N/A			88	10	25	3,000	3	125
4	220	D/7343-31	T540D227(5)004(3)(6)(7)05	N/A		•	88	10	40	2,372	3	125
4	330	D/7343-31	T540D337(5)004(9)H(1)10	04051-014(5)(8)(2)	•		132	10	25	3,000	3	125
4	330	D/7343-31	T540D337(5)004(3)(6)(1)10	N/A			132	10	25	3,000	3	125
4	330	D/7343-31	T540D337(5)004(3)(6)(7)05	N/A		•	132	10	40	2,372	3	125
4	330	D/7343-31	T541D337M004AH(1)20	04052-017(2)	•		132	10	6	6,519	3	125
4	330	D/7343-31	T541D337(5)004(3)(6)(1)20	N/A			132	10	6	6,519	3	125
4	330	D/7343-31	T541D337M004AH(1)10	04052-046(2)	•		132	10	10	5,050	3	125
4	330	D/7343-31	T541D337(5)004(3)(6)(1)10	N/A			132	10	10	5,050	3	125
4	470	D/7343-31	T540D477(5)004(9)H(1)20	04051-015(5)(8)(2)	•		188	10	25	3,000	3	125
4	470	D/7343-31	T540D477(5)004(3)(6)(1)20	N/A			188	10	25	3,000	3	125
4	470	D/7343-31	T540D477(5)004(9)H(1)10	04051-016(5)(8)(2)	•		188	10	40	2,372	3	125
4	470	D/7343-31	T540D477(5)004(3)(6)(1)10	N/A			188	10	40	2,372	3	125
4	470	D/7343-31	T540D477(5)004(3)(6)(7)10	N/A		•	188	10	40	2,372	3	125
4	470	D/7343-31	T541D477M004AH(1)10	04052-018(2)	•		188	10	10	5,050	3	125
4	470	D/7343-31	T541D477(5)004(3)(6)(1)10	N/A			188	10	10	5,050	3	125
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles −55°C and +85°C, Designates surge current option.
(2) To complete DLA part number, insert Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles −55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert A = N/A ,insert B = 0.1%/1,000 hours, C = 0.01%/1,000 hours, D=0.001%/1,000 hours. Designates Reliability Level.
(4) To complete KEMET part number for non-DLA, insert A = N/A, insert B = 0.1%/1,000 hours or C = 0.01%/1,000 hours. Designates Reliability Level.
(5) To complete DLA or KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(6) To complete KEMET part number insert, H = Solder Plated, T = 100% Tin (Sn). Designates termination finish.
*(7) To complete KEMET part number, insert 85 = 4 cycles at 25°C ±5°C ** + improved humidity capability, 86 = 10 cycles at 25°C ±5°C*** + improved humidity capability, 87= 10 cycles at −55°C +0°C/−5°C and +85°C ±5°C*** + improved humidity capability. Designates surge current option on improved humidity capability.*
(8) = To complete DLA part number, insert A = Life (+125°C, 2000 Hrs), B = Vibration, Surge, Resistance to soldering heat and Life or Z = No additional testing. Designates additional testing option.
(9) = To complete KEMET part number, insert A = No additional testing, L = Life (+125°C, 2000 Hrs) or V = Vibration, Surge, Resistance to soldering heat and Life. Designates additional testing option.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
4	470	Y/7343-40	T541Y477M004AH(1)30	04052-019(2)	•		188	10	5	7,253	3	125
4	470	Y/7343-40	T541Y477(5)004(3)(6)(1)30	N/A			188	10	5	7,253	3	125
4	470	Y/7343-40	T541Y477M004AH(1)20	04052-020(2)	•		188	10	6	6,621	3	125
4	470	Y/7343-40	T541Y477(5)004(3)(6)(1)20	N/A			188	10	6	6,621	3	125
4	470	Y/7343-40	T541Y477M004AH(1)10	04052-047(2)	•		188	10	10	5,128	3	125
4	470	Y/7343-40	T541Y477(5)004(3)(6)(1)10	N/A			188	10	10	5,128	3	125
4	680	X/7343-43	T541X687M004AH(1)30	04052-021(2)	•		272	10	5	7,348	3	125
4	680	X/7343-43	T541X687(5)004(3)(6)(1)30	N/A			272	10	5	7,348	3	125
4	680	X/7343-43	T541X687M004AH(1)20	04052-022(2)	•		272	10	6	6,708	3	125
4	680	X/7343-43	T541X687(5)004(3)(6)(1)20	N/A			272	10	6	6,708	3	125
4	680	X/7343-43	T541X687M004AH(1)10	04052-023(2)	•		272	10	10	5,196	3	125
4	680	X/7343-43	T541X687(5)004(3)(6)(1)10	N/A			272	10	10	5,196	3	125
4	680	X/7343-43	T541X687(5)004(3)(6)(7)05	N/A		•	272	10	12	4,743	3	125
4	1,000	X/7343-43	T541X108M004AH(1)20	04052-024(2)	•		400	10	6	6,708	3	125
4	1,000	X/7343-43	T541X108(5)004(3)(6)(1)20	N/A			400	10	6	6,708	3	125
4	1,000	X/7343-43	T541X108M004AH(1)10	04052-048(2)	•		400	10	10	5,196	3	125
4	1,000	X/7343-43	T541X108(5)004(3)(6)(1)10	N/A			400	10	10	5,196	3	125
4	1,000	X/7343-43	T541X108(5)004(3)(6)(7)05	N/A		•	400	10	12	4,743	3	125
4	1,500	O/7360-43	T541O158M004(3)(6)(1)10	N/A			600	10	10	5,480	3	125
6.3	33	B/3528-21	T540B336(5)006(9)H(1)10	04051-017(5)(8)(2)	•		21	8	80	1,260	3	125
6.3	33	B/3528-21	T540B336(5)006(3)(6)(1)10	N/A			21	8	80	1,260	3	125
6.3	33	B/3528-21	T540B336(5)006(3)(6)(7)10	N/A		•	21	8	80	1,260	3	125
6.3	47	B/3528-21	T540B476(5)006(9)H(1)10	04051-019(5)(8)(2)	•		30	8	80	1,260	3	125
6.3	47	B/3528-21	T540B476(5)006(3)(6)(1)10	N/A			30	8	80	1,260	3	125
6.3	47	B/3528-21	T540B476(5)006(3)H(7)10	N/A		•	30	8	80	1,260	3	125
6.3	68	B/3528-21	T540B686(5)006(9)H(1)10	04051-020(5)(8)(2)	•		43	8	80	1,260	3	125
6.3	68	B/3528-21	T540B686(5)006(3)(6)(1)10	N/A			43	8	80	1,260	3	125
6.3	68	B/3528-21	T540B686(5)006(3)(6)(7)10	N/A		•	43	8	80	1,260	3	125
6.3	150	D/7343-31	T540D157(5)006(9)H(1)10	04051-021(5)(8)(2)	•		95	10	25	3,000	3	125
6.3	150	D/7343-31	T540D157(5)006(3)(6)(1)10	N/A			95	10	25	3,000	3	125
6.3	150	D/7343-31	T540D157(5)006(3)(6)(7)05	N/A		•	95	10	40	2,372	3	125
6.3	220	D/7343-31	T540D227(5)006(9)H(1)10	04051-022(5)(8)(2)	•		139	10	25	3,000	3	125
6.3	220	D/7343-31	T540D227(5)006(3)(6)(1)10	N/A			139	10	25	3,000	3	125
6.3	220	D/7343-31	T540D227(5)006(3)(6)(7)05	N/A		•	139	10	40	2,372	3	125
6.3	220	D/7343-31	T541D227M006AH(1)20	04052-026(2)	•		139	10	6	6,519	3	125
6.3	220	D/7343-31	T541D227(5)006(3)(6)(1)20	N/A			139	10	6	6,519	3	125
6.3	220	D/7343-31	T541D227M006AH(1)10	04052-049(2)	•		139	10	10	5,050	3	125
6.3	220	D/7343-31	T541D227(5)006(3)(6)(1)10	N/A			139	10	10	5,050	3	125
6.3	330	D/7343-31	T540D337(5)006(9)H(1)20	04051-023(5)(8)(2)	•		208	10	25	3,000	3	125
6.3	330	D/7343-31	T540D337(5)006(3)(6)(1)20	N/A			208	10	25	3,000	3	125
6.3	330	D/7343-31	T540D337(5)006(9)H(1)10	04051-024(5)(8)(2)	•		208	10	40	2,372	3	125
6.3	330	D/7343-31	T540D337(5)006(3)(6)(1)10	N/A			208	10	40	2,372	3	125
6.3	330	D/7343-31	T540D337(5)006(3)(6)(7)10	N/A		•	208	10	40	2,372	3	125
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles −55°C and +85°C, Designates surge current option.
(2) To complete DLA part number, insert Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles −55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert A = N/A ,insert B = 0.1%/1,000 hours, C = 0.01%/1,000 hours, D=0.001%/1,000 hours. Designates Reliability Level.
(4) To complete KEMET part number for non-DLA, insert A = N/A, insert B = 0.1%/1,000 hours or C = 0.01%/1,000 hours. Designates Reliability Level.
(5) To complete DLA or KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(6) To complete KEMET part number insert, H = Solder Plated, T = 100% Tin (Sn). Designates termination finish.
*(7) To complete KEMET part number, insert 85 = 4 cycles at 25°C ±5°C ** + improved humidity capability, 86 = 10 cycles at 25°C ±5°C*** + improved humidity capability, 87= 10 cycles at −55°C +0°C/−5°C and +85°C ±5°C*** + improved humidity capability. Designates surge current option on improved humidity capability.*
(8) = To complete DLA part number, insert A = Life (+125°C, 2000 Hrs), B = Vibration, Surge, Resistance to soldering heat and Life or Z = No additional testing. Designates additional testing option.
(9) = To complete KEMET part number, insert A = No additional testing, L = Life (+125°C, 2000 Hrs) or V = Vibration, Surge, Resistance to soldering heat and Life. Designates additional testing option.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
6.3	330	D/7343-31	T541D337M006AH(1)10	04052-027(2)	•		208	10	10	5,050	3	125
6.3	330	D/7343-31	T541D337(5)006(3)(6)(1)10	N/A			208	10	10	5,050	3	125
6.3	330	Y/7343-40	T541Y337M006AH(1)30	04052-028(2)	•		208	10	5	7,253	3	125
6.3	330	Y/7343-40	T541Y337(5)006(3)(6)(1)30	N/A			208	10	5	7,253	3	125
6.3	330	Y/7343-40	T541Y337M006AH(1)20	04052-029(2)	•		208	10	6	6,621	3	125
6.3	330	Y/7343-40	T541Y337(5)006(3)(6)(1)20	N/A			208	10	6	6,621	3	125
6.3	330	Y/7343-40	T541Y337M006AH(1)10	04052-030(2)	•		208	10	10	5,128	3	125
6.3	330	Y/7343-40	T541Y337(5)006(3)(6)(1)10	N/A			208	10	10	5,128	3	125
6.3	470	X/7343-43	T541X477M006AH(1)30	04052-031(2)	•		296	10	5	7,348	3	125
6.3	470	X/7343-43	T541X477(5)006(3)(6)(1)30	N/A			296	10	5	7,348	3	125
6.3	470	X/7343-43	T541X477M006AH(1)20	04052-032(2)	•		296	10	6	6,708	3	125
6.3	470	X/7343-43	T541X477(5)006(3)(6)(1)20	N/A			296	10	6	6,708	3	125
6.3	470	X/7343-43	T541X477M006AH(1)10	04052-033(2)	•		296	10	10	5,196	3	125
6.3	470	X/7343-43	T541X477(5)006(3)(6)(1)10	N/A			296	10	10	5,196	3	125
6.3	470	X/7343-43	T541X477(5)006(3)(6)(7)05	N/A		•	296	10	12	4,743	3	125
6.3	680	X/7343-43	T541X687(5)006(3)(6)(1)10	N/A			428	10	15	4,243	3	125
6.3	680	X/7343-43	T541X687(5)006A(6)(7)10	N/A		•	428	10	15	4,243	3	125
6.3	1,000	O/7360-43	T541O108M006(3)(6)(1)10	N/A			630	10	12	5,000	3	125
10	22	A/3216-18	T540A226M010(4)(6)(1)10	N/A			22	8	80	1,183	3	125
10	22	B/3528-21	T540B226(5)010(9)H(1)10	04051-025(5)(8)(2)	•		22	8	80	1,260	3	125
10	22	B/3528-21	T540B226(5)010(3)(6)(1)10	N/A			22	8	80	1,260	3	125
10	22	B/3528-21	T540B226(5)010(3)(6)(7)10	N/A		•	22	8	80	1,260	3	125
10	33	B/3528-21	T540B336(5)010(9)H(1)10	04051-027(5)(8)(2)	•		33	8	80	1,260	3	125
10	33	B/3528-21	T540B336(5)010(3)(6)(1)10	N/A			33	8	80	1,260	3	125
10	33	B/3528-21	T540B336(5)010(3)(6)(7)10	N/A		•	33	8	80	1,260	3	125
10	47	B/3528-21	T540B476M010(4)(6)(1)20	N/A			47	8	35	1,905	3	125
10	47	B/3528-21	T540B476M010(4)(6)(1)10	N/A			47	8	100	1,127	3	125
10	100	D/7343-31	T540D107(5)010(9)H(1)20	04051-028(5)(8)(2)	•		100	10	25	3,000	3	125
10	100	D/7343-31	T540D107(5)010(3)(6)(1)20	N/A			100	10	25	3,000	3	125
10	100	D/7343-31	T540D107(5)010(9)H(1)10	04051-029(5)(8)(2)	•		100	10	55	2,023	3	125
10	100	D/7343-31	T540D107(5)010(3)(6)(1)10	N/A			100	10	55	2,023	3	125
10	100	D/7343-31	T540D107(5)010(3)(6)(7)10	N/A		•	100	10	55	2,023	3	125
10	150	D/7343-31	T540D157(5)010(9)H(1)20	04051-030(5)(8)(2)	•		150	10	25	3,000	3	125
10	150	D/7343-31	T540D157(5)010(3)(6)(1)20	N/A			150	10	25	3,000	3	125
10	150	D/7343-31	T540D157(5)010(9)H(1)10	04051-031(5)(8)(2)	•		150	10	55	2,023	3	125
10	150	D/7343-31	T540D157(5)010(3)(6)(1)10	N/A			150	10	55	2,023	3	125
10	150	D/7343-31	T540D157(5)010(3)(6)(7)10	N/A		•	150	10	55	2,023	3	125
10	150	D/7343-31	T541D157M010AH(1)20	04052-035(2)	•		150	10	6	6,519	3	125
10	150	D/7343-31	T541D157(5)010(3)(6)(1)20	N/A			150	10	6	6,519	3	125
10	150	D/7343-31	T541D157M010AH(1)10	04052-050(2)	•		150	10	10	5,050	3	125
10	150	D/7343-31	T541D157(5)010(3)(6)(1)10	N/A			150	10	10	5,050	3	125
10	220	D/7343-31	T540D227(5)010(9)H(1)10	04051-032(5)(8)(2)	•		220	10	25	3,000	3	125
10	220	D/7343-31	T540D227(5)010(3)(6)(1)10	N/A			220	10	25	3,000	3	125
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles −55°C and +85°C, Designates surge current option.
(2) To complete DLA part number, insert Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles −55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert A = N/A ,insert B = 0.1%/1,000 hours, C = 0.01%/1,000 hours, D=0.001%/1,000 hours. Designates Reliability Level.
(4) To complete KEMET part number for non-DLA, insert A = N/A, insert B = 0.1%/1,000 hours or C = 0.01%/1,000 hours. Designates Reliability Level.
(5) To complete DLA or KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(6) To complete KEMET part number insert, H = Solder Plated, T = 100% Tin (Sn). Designates termination finish.
*(7) To complete KEMET part number, insert 85 = 4 cycles at 25°C ±5°C ** + improved humidity capability, 86 = 10 cycles at 25°C ±5°C*** + improved humidity capability, 87= 10 cycles at −55°C +0°C/−5°C and +85°C ±5°C*** + improved humidity capability. Designates surge current option on improved humidity capability.*
(8) = To complete DLA part number, insert A = Life (+125°C, 2000 Hrs), B = Vibration, Surge, Resistance to soldering heat and Life or Z = No additional testing. Designates additional testing option.
(9) = To complete KEMET part number, insert A = No additional testing, L = Life (+125°C, 2000 Hrs) or V = Vibration, Surge, Resistance to soldering heat and Life. Designates additional testing option.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.
VDC at 105°C	μF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	μA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
10	220	D/7343-31	T540D227(5)010(3)(6)(7)05	N/A		•	220	10	35	3,000	3	125
10	220	D/7343-31	T541D227M010AH(1)20	04052-036(2)	•		220	10	6	6,519	3	125
10	220	D/7343-31	T541D227(5)010(3)(6)(1)20	N/A			220	10	6	6,519	3	125
10	220	D/7343-31	T541D227M010AH(1)10	04052-037(2)	•		220	10	10	5,050	3	125
10	220	D/7343-31	T541D227(5)010(3)(6)(1)10	N/A			220	10	10	5,050	3	125
10	220	Y/7343-40	T541Y227M010AH(1)20	04052-038(2)	•		220	10	6	6,621	3	125
10	220	Y/7343-40	T541Y227(5)010(3)(6)(1)20	N/A			220	10	6	6,621	3	125
10	220	Y/7343-40	T541Y227M010AH(1)10	04052-051(2)	•		220	10	10	5,128	3	125
10	220	Y/7343-40	T541Y227(5)010(3)(6)(1)10	N/A			220	10	10	5,128	3	125
10	330	X/7343-43	T541X337M010AH(1)30	04052-039(2)	•		330	10	5	7,348	3	125
10	330	X/7343-43	T541X337(5)010(4)(6)(1)30	N/A			330	10	5	7,348	3	125
10	330	X/7343-43	T541X337M010AH(1)20	04052-040(2)	•		330	10	6	6,708	3	125
10	330	X/7343-43	T541X337(5)010(4)(6)(1)20	N/A			330	10	6	6,708	3	125
10	330	X/7343-43	T541X337M010AH(1)10	04052-041(2)	•		330	10	10	5,196	3	125
10	330	X/7343-43	T541X337(5)010(3)(6)(1)10	N/A			330	10	10	5,196	3	125
10	330	X/7343-43	T541X337(5)010(4)(6)(7)05	N/A		•	330	10	15	4,243	3	125
10	470	X/7343-43	T541X477(5)010(3)(6)(1)10	N/A			470	10	20	3,674	3	125
10	470	X/7343-43	T541X477(5)010(3)(6)(7)10	N/A		•	470	10	20	3,674	3	125
10	680	O/7360-43	T541O687M010(3)(6)(1)10	N/A			680	10	15	4,470	3	125
16	47	D/7343-31	T540D476(5)016(9)H(1)20	04051-033(5)(8)(2)	•		76	10	35	2,535	3	125
16	47	D/7343-31	T540D476(5)016(3)(6)(1)20	N/A			76	10	35	2,535	3	125
16	47	D/7343-31	T540D476(5)016(9)H(1)10	04051-034(5)(8)(2)	•		76	10	65	1,861	3	125
16	47	D/7343-31	T540D476(5)016(3)(6)(1)10	N/A			76	10	65	1,861	3	125
16	47	D/7343-31	T540D476(5)016(3)(6)(7)10	N/A		•	76	10	65	1,861	3	125
16	68	D/7343-31	T540D686(5)016(9)H(1)10	04051-035(5)(8)(2)	•		109	10	75	1,732	3	125
16	68	D/7343-31	T540D686(5)016(3)(6)(1)10	N/A			109	10	75	1,732	3	125
16	68	D/7343-31	T540D686(5)016(3)(6)(7)10	N/A		•	109	10	75	1,732	3	125
16	100	D/7343-31	T540D107(5)016(9)H(1)10	04051-036(5)(8)(2)	•		160	10	50	2,121	3	125
16	100	D/7343-31	T540D107(5)016(3)(6)(1)10	N/A			160	10	50	2,121	3	125
16	100	D/7343-31	T540D107(5)016(3)(6)(7)05	N/A		•	160	10	75	2,121	3	125
16	150	X/7343-43	T541X157M016AH(1)20	04052-052(2)	•		240	10	25	3,286	3	125
16	150	X/7343-43	T541X157(5)016(3)(6)(1)20	N/A			240	10	25	3,286	3	125
16	150	X/7343-43	T541X157M016AH(1)10	04052-053(2)	•		240	10	40	2,598	3	125
16	150	X/7343-43	T541X157(5)016(3)(6)(1)10	N/A			240	10	40	2,598	3	125
16	150	X/7343-43	T541X157(5)016(3)(6)(7)10	N/A		•	240	10	40	2,598	3	125
16	220	X/7343-43	T541X227M016AH(1)20	04052-054(2)	•		352	10	25	3,286	3	125
16	220	X/7343-43	T541X227(5)016(3)(6)(1)20	N/A			352	10	25	3,286	3	125
16	220	X/7343-43	T541X227M016AH(1)10	04052-055(2)	•		352	10	40	2,598	3	125
16	220	X/7343-43	T541X227(5)016(3)(6)(1)10	N/A			352	10	40	2,598	3	125
16	220	X/7343-43	T541X227(5)016(3)(6)(7)10	N/A		•	352	10	40	2,598	3	125
16	330	X/7343-43	T541X337M016AH(1)20	04052-056(2)	•		528	10	25	3,286	3	125
16	330	X/7343-43	T541X337(5)016(3)(6)(1)20	N/A			528	10	25	3,286	3	125
16	330	X/7343-43	T541X337(5)016(3)(6)(7)20	N/A		•	528	10	25	3,286	3	125
VDC at 105°C	μF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	μA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles −55°C and +85°C, Designates surge current option.
(2) To complete DLA part number, insert Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles −55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert A = N/A ,insert B = 0.1%/1,000 hours, C = 0.01%/1,000 hours, D=0.001%/1,000 hours. Designates Reliability Level.
(4) To complete KEMET part number for non-DLA, insert A = N/A, insert B = 0.1%/1,000 hours or C = 0.01%/1,000 hours. Designates Reliability Level.
(5) To complete DLA or KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(6) To complete KEMET part number insert, H = Solder Plated, T = 100% Tin (Sn). Designates termination finish.
*(7) To complete KEMET part number, insert 85 = 4 cycles at 25°C ±5°C ** + improved humidity capability, 86 = 10 cycles at 25°C ±5°C*** + improved humidity capability, 87= 10 cycles at −55°C +0°C/−5°C and +85°C ±5°C*** + improved humidity capability. Designates surge current option on improved humidity capability.*
(8) = To complete DLA part number, insert A = Life (+125°C, 2000 Hrs), B = Vibration, Surge, Resistance to soldering heat and Life or Z = No additional testing. Designates additional testing option.
(9) = To complete KEMET part number, insert A = No additional testing, L = Life (+125°C, 2000 Hrs) or V = Vibration, Surge, Resistance to soldering heat and Life. Designates additional testing option.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
16	330	X/7343-43	T541X337M016AH(1)10	04052-057(2)	•		528	10	50	2,324	3	125
16	330	X/7343-43	T541X337(5)016(3)(6)(1)10	N/A			528	10	50	2,324	3	125
16	330	X/7343-43	T541X337(5)016(3)(6)(7)10	N/A		•	528	10	50	2,324	3	125
16	470	O/7360-43	T541O477M016(3)(6)(1)20	N/A			752	10	20	3,870	3	125
16	470	O/7360-43	T541O477M016(3)(6)(1)10	N/A			752	10	40	2,740	3	125
20	22	D/7343-31	T540D226(5)020(9)H(1)10	04051-037(5)(8)(2)	•		44	10	75	1,732	3	125
20	22	D/7343-31	T540D226(5)020(3)(6)(1)10	N/A			44	10	75	1,732	3	125
20	22	D/7343-31	T540D226(5)020(3)(6)(7)05	N/A		•	44	10	100	1,500	3	125
20	33	D/7343-31	T540D336(5)020(9)H(1)10	04051-038(5)(8)(2)	•		66	10	75	1,732	3	125
20	33	D/7343-31	T540D336(5)020(3)(6)(1)10	N/A			66	10	75	1,732	3	125
20	33	D/7343-31	T540D336(5)020(3)(6)(7)05	N/A		•	66	10	100	1,500	3	125
20	47	D/7343-31	T540D476(5)020(9)H(1)10	04051-039(5)(8)(2)	•		94	10	75	1,732	3	125
20	47	D/7343-31	T540D476(5)020(3)(6)(1)10	N/A			94	10	75	1,732	3	125
20	47	D/7343-31	T540D476(5)020(3)(6)(7)05	N/A		•	94	10	100	1,500	3	125
20	100	X/7343-43	T541X107M020AH(1)10	04052-058(2)	•		200	10	50	2,324	3	125
20	100	X/7343-43	T541X107(5)020A(6)(1)20	N/A			200	10	30	2,870	3	125
20	100	X/7343-43	T541X107(5)020A(6)(7)20	N/A		•	200	10	30	2,870	3	125
20	100	X/7343-43	T541X107(5)020(3)(6)(1)10	N/A			200	10	50	2,324	3	125
20	100	X/7343-43	T541X107(5)020(3)(6)(7)10	N/A		•	200	10	50	2,324	3	125
25	6.8	C/6032-28	T540C685(5)025(3)(6)(1)10	N/A			17	10	150	1,049	3	125
25	10	C/6032-28	T540C106(5)025(3)(6)(1)10	N/A			25	10	150	1,049	3	125
25	15	D/7343-31	T540D156(5)025(9)H(1)20	04051-040(5)(8)(2)	•		38	10	75	1,732	3	125
25	15	D/7343-31	T540D156(5)025(3)(6)(1)20	N/A			38	10	75	1,732	3	125
25	15	D/7343-31	T540D156(5)025(9)H(1)10	04051-041(5)(8)(2)	•		38	10	100	1,500	3	125
25	15	D/7343-31	T540D156(5)025(3)(6)(1)10	N/A			38	10	100	1,500	3	125
25	15	D/7343-31	T540D156(5)025(3)(6)(7)10	N/A		•	38	10	100	1,500	3	125
25	22	D/7343-31	T540D226(5)025(9)H(1)10	04051-042(5)(8)(2)	•		55	10	75	1,732	3	125
25	22	D/7343-31	T540D226(5)025(3)(6)(1)10	N/A			55	10	75	1,732	3	125
25	22	D/7343-31	T540D226(5)025(3)(6)(7)05	N/A		•	55	10	100	1,500	3	125
25	33	D/7343-31	T540D336(5)025(9)H(1)10	04051-043(5)(8)(2)	•		83	10	75	1,732	3	125
25	33	D/7343-31	T540D336(5)025(3)(6)(1)10	N/A			83	10	75	1,732	3	125
25	33	D/7343-31	T540D336(5)025(3)(6)(7)05	N/A		•	83	10	100	1,500	3	125
25	68	X/7343-43	T541X686M025AH(1)10	04052-059(2)	•		170	10	50	2,324	3	125
25	68	X/7343-43	T541X686(5)025(3)(6)(1)10	N/A			170	10	50	2,324	3	125
25	68	X/7343-43	T541X686(5)025(3)(6)(7)10	N/A		•	170	10	50	2,324	3	125
25	100	X/7343-43	T541X107M025AH(1)10	04052-060(2)	•		250	10	60	2,121	3	125
25	100	X/7343-43	T541X107(5)025(3)(6)(1)10	N/A			250	10	60	2,121	3	125
25	100	X/7343-43	T541X107(5)025(3)(6)(7)10	N/A		•	250	10	60	2,121	3	125
25	100	X/7343-43	T541X107(5)025(3)(6)(1)20	N/A		•	250	10	35	2,777	3	125
25	150	O/7360-43	T541O157M025(3)(6)(1)10	N/A			375	10	45	2,580	3	125
30	22	D/7343-31	T540D226(5)030(4)(6)(1)10	N/A			66	10	75	1,732	3	125
30	22	D/7343-31	T540D226(5)030(4)(6)(7)05	N/A		•	66	10	100	1,500	3	125
30	33	D/7343-31	T540D336(5)030(4)(6)(1)10	N/A			99	10	100	1,500	3	125
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles –55°C and +85°C, Designates surge current option.
(2) To complete DLA part number, insert Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles –55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert A = N/A ,insert B = 0.1%/1,000 hours, C = 0.01%/1,000 hours, D=0.001%/1,000 hours. Designates Reliability Level.
(4) To complete KEMET part number for non-DLA, insert A = N/A, insert B = 0.1%/1,000 hours or C = 0.01%/1,000 hours. Designates Reliability Level.
(5) To complete DLA or KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(6) To complete KEMET part number insert, H = Solder Plated, T = 100% Tin (Sn). Designates termination finish.
*(7) To complete KEMET part number, insert 85 = 4 cycles at 25°C ±5°C ** + improved humidity capability, 86 = 10 cycles at 25°C ±5°C*** + improved humidity capability, 87= 10 cycles at –55°C +0°C/–5°C and +85°C ±5°C*** + improved humidity capability. Designates surge current option on improved humidity capability.*
(8) = To complete DLA part number, insert A = Life (+125°C, 2000 Hrs), B = Vibration, Surge, Resistance to soldering heat and Life or Z = No additional testing. Designates additional testing option.
(9) = To complete KEMET part number, insert A = No additional testing, L = Life (+125°C, 2000 Hrs) or V = Vibration, Surge, Resistance to soldering heat and Life. Designates additional testing option.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Table 1 – Ratings & Part Number Reference cont.

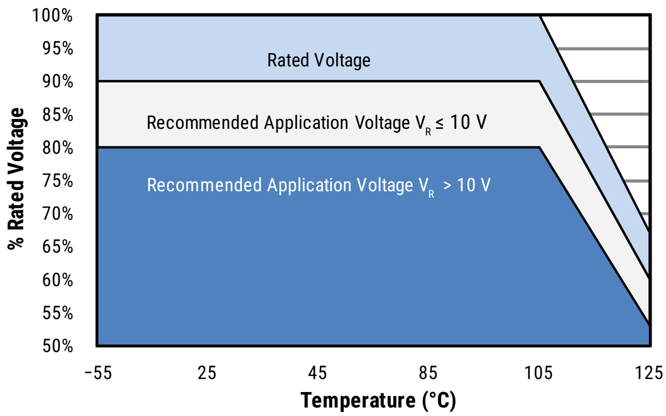
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
30	33	D/7343-31	T540D336(5)030(4)(6)(7)10	N/A		•	99	10	100	1,500	3	125
30	47	X/7343-43	T541X476(5)030(4)(6)(1)10	N/A			141	10	50	2,324	3	125
30	47	X/7343-43	T541X476(5)030(4)(6)(7)10	N/A		•	141	10	50	2,324	3	125
30	68	X/7343-43	T541X686(5)030(4)(6)(1)10	N/A			204	10	50	2,324	3	125
30	68	X/7343-43	T541X686(5)030(4)(6)(7)10	N/A		•	204	10	50	2,324	3	125
30	68	X/7343-43	T541X686(5)030(4)(6)(1)20	N/A			204	10	35	2,777	3	125
30	68	X/7343-43	T541X686(5)030(4)(6)(7)20	N/A		•	204	10	35	2,777	3	125
30	100	X/7343-43	T541X107(5)030(4)(6)(1)10	N/A			300	10	70	1,878	3	125
30	100	X/7343-43	T541X107(5)030(4)(6)(7)10	N/A		•	300	10	70	1,878	3	125
30	100	X/7343-43	T541X107(5)030(4)(6)(1)20	N/A			300	10	35	2,777	3	125
30	100	X/7343-43	T541X107(5)030(4)(6)(7)20	N/A		•	300	10	35	2,777	3	125
30	150	O/7360-43	T541O157M030(4)(6)(1)20	N/A			450	10	30	3,160	3	125
30	150	O/7360-43	T541O157M030(4)(6)(1)10	N/A			450	10	55	2,340	3	125
35	15	D/7343-31	T540D156(5)035(9)H(1)20	04051-044(5)(8)(2)	•		53	10	75	1,732	3	125
35	15	D/7343-31	T540D156(5)035(4)(6)(1)20	N/A			53	10	75	1,732	3	125
35	15	D/7343-31	T540D156(5)035(9)H(1)10	04051-045(5)(8)(2)	•		53	10	100	1,500	3	125
35	15	D/7343-31	T540D156(5)035(4)(6)(1)10	N/A			53	10	100	1,500	3	125
35	15	D/7343-31	T540D156(5)035(4)(6)(7)10	N/A		•	53	10	100	1,500	3	125
35	33	X/7343-43	T541X336M035AH(1)10	04052-061(2)	•		116	10	60	2,121	3	125
35	33	X/7343-43	T541X336(5)035(4)(6)(1)10	N/A			116	10	60	2,121	3	125
35	33	X/7343-43	T541X336(5)035(4)(6)(7)10	N/A		•	116	10	60	2,121	3	125
35	47	X/7343-43	T541X476M035AH(1)10	04052-062(2)	•		165	10	60	2,121	3	125
35	47	X/7343-43	T541X476(5)035(4)(6)(1)10	N/A			165	10	60	2,121	3	125
35	47	X/7343-43	T541X476(5)035(4)(6)(7)10	N/A		•	165	10	60	2,121	3	125
35	68	O/7360-43	T541O686M035(4)(6)(1)10*	N/A			238	10	45	2,580	3	125
50	10	D/7343-31	T540D106(5)050(9)H(1)20	04051-046(5)(8)(2)	•		50	10	100	1,500	3	125
50	10	D/7343-31	T540D106(5)050(4)(6)(1)20	N/A			50	10	100	1,500	3	125
50	10	D/7343-31	T540D106(5)050(9)H(1)10	04051-047(5)(8)(2)	•		50	10	125	1,342	3	125
50	10	D/7343-31	T540D106(5)050(4)(6)(1)10	N/A			50	10	125	1,342	3	125
50	10	D/7343-31	T540D106(5)050(4)(6)(7)10	N/A		•	50	10	125	1,342	3	125
50	22	X/7343-43	T541X226M050AH(1)10	04052-063(2)	•		110	10	75	1,897	3	125
50	22	X/7343-43	T541X226(5)050(4)(6)(1)10	N/A			110	10	75	1,897	3	125
50	33	X/7343-43	T541X336M050AH(1)10	04052-064(2)	•		165	10	75	1,897	3	125
50	33	X/7343-43	T541X336(5)050(4)(6)(1)10	N/A			165	10	75	1,897	3	125
50	47	O/7360-43	T541O476M050(4)(6)(1)10*	N/A			235	10	60	2,240	3	125
63	4.7	D/7343-31	T540D475(5)063(9)H(1)20	04051-048(5)(8)(2)	•		29.6	10	100	1,500	3	125
63	4.7	D/7343-31	T540D475(5)063(4)(6)(1)20	N/A			30	10	100	1,500	3	125
63	4.7	D/7343-31	T540D475(5)063(9)H(1)10	04051-049(5)(8)(2)	•		29.6	10	120	1,369	3	125
63	4.7	D/7343-31	T540D475(5)063(4)(6)(1)10	N/A			30	10	120	1,369	3	125
63	4.7	D/7343-31	T540D475(5)063(4)(6)(7)10	N/A		•	30	10	120	1,369	3	125
63	10	X/7343-43	T541X106M063AH(1)10	04052-067(2)	•		63	10	150	1,342	3	125
63	10	X/7343-43	T541X106(5)063(4)(6)(1)10	N/A			63	10	150	1,342	3	125
63	10	X/7343-43	T541X106M063AH(1)20	04052-066(2)	•		63	10	100	1,643	3	125
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles −55°C and +85°C, Designates surge current option.
(2) To complete DLA part number, insert Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles −55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert A = N/A ,insert B = 0.1%/1,000 hours, C = 0.01%/1,000 hours, D=0.001%/1,000 hours. Designates Reliability Level.
(4) To complete KEMET part number for non-DLA, insert A = N/A, insert B = 0.1%/1,000 hours or C = 0.01%/1,000 hours. Designates Reliability Level.
(5) To complete DLA or KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(6) To complete KEMET part number insert, H = Solder Plated, T = 100% Tin (Sn). Designates termination finish.
*(7) To complete KEMET part number, insert 85 = 4 cycles at 25°C ±5°C ** + improved humidity capability, 86 = 10 cycles at 25°C ±5°C*** + improved humidity capability, 87= 10 cycles at −55°C +0°C/−5°C and +85°C ±5°C*** + improved humidity capability. Designates surge current option on improved humidity capability.*
(8) = To complete DLA part number, insert A = Life (+125°C, 2000 Hrs), B = Vibration, Surge, Resistance to soldering heat and Life or Z = No additional testing. Designates additional testing option.
(9) = To complete KEMET part number, insert A = No additional testing, L = Life (+125°C, 2000 Hrs) or V = Vibration, Surge, Resistance to soldering heat and Life. Designates additional testing option.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
63	10	X/7343-43	T541X106(5)063(4)(6)(1)20	N/A			63	10	100	1,643	3	125
63	10	X/7343-43	T541X106M063AH(1)30	04052-065(2)	•		63	10	75	1,897	3	125
63	10	X/7343-43	T541X106(5)063(4)(6)(1)30	N/A			63	10	75	1,897	3	125
63	15	X/7343-43	T541X156M063AH(1)10	04052-068(2)	•		95	10	50	2,324	3	125
63	15	X/7343-43	T541X156(5)063(4)(6)(1)10	N/A			95	10	50	2,324	3	125
63	22	O/7360-43	T541O226M063(4)(6)(1)10*	N/A			139	10	40	2,740	3	125
VDC at 105°C	µF	KEMET/ EIA	(See below for part options)	Part Number		(85°C/85%) Capable	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(rms) mA at 45°C 100 kHz		°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DLA Drawing Number 04051/04052	ESCC/ EPPL Approved	Improved Humidity	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles −55°C and +85°C, Designates surge current option.
(2) To complete DLA part number, insert Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles −55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert A = N/A ,insert B = 0.1%/1,000 hours, C = 0.01%/1,000 hours, D=0.001%/1,000 hours. Designates Reliability Level.
(4) To complete KEMET part number for non-DLA, insert A = N/A, insert B = 0.1%/1,000 hours or C = 0.01%/1,000 hours. Designates Reliability Level.
(5) To complete DLA or KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(6) To complete KEMET part number insert, H = Solder Plated, T = 100% Tin (Sn). Designates termination finish.
*(7) To complete KEMET part number, insert 85 = 4 cycles at 25°C ±5°C ** + improved humidity capability, 86 = 10 cycles at 25°C ±5°C*** + improved humidity capability, 87= 10 cycles at −55°C +0°C/−5°C and +85°C ±5°C*** + improved humidity capability. Designates surge current option on improved humidity capability.*
(8) = To complete DLA part number, insert A = Life (+125°C, 2000 Hrs), B = Vibration, Surge, Resistance to soldering heat and Life or Z = No additional testing. Designates additional testing option.
(9) = To complete KEMET part number, insert A = No additional testing, L = Life (+125°C, 2000 Hrs) or V = Vibration, Surge, Resistance to soldering heat and Life. Designates additional testing option.
Part Numbers marked in blue font are "Under Development." Engineering samples available upon request.

Derating Guidelines



Recommended Application Voltage

KO-CAPs are solid state capacitors that demonstrate no wearout mechanism when operated within their recommended guidelines. While the KO-CAP can be operated at full rated voltage, most circuit designers seek a minimum level of assurance in long term reliability, which should be demonstrated with data. A voltage derating can provide the desired level of demonstrated reliability based on industry accepted acceleration models. Since most applications do require long term reliability, KEMET recommends that designers consider a voltage derating, according the graphic above, for the maximum steady state voltage.

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Steady State Voltage
	−55°C to 105°C	105°C to 125°C
$2\ V \leq V_R \leq 10\ V$	90% of V_R	60% of V_R,See Chart
$12.5\ V \leq V_R \leq 63\ V$	80% of V_R	54% of V_R,See Chart

V_R = Rated Voltage

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage which may be applied is limited by two criteria:

a. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.

b. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage.

The maximum power dissipation by case size can be determined using the table at right. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Refer to the table below for temperature compensation requirements.

Case Code	EIA Case Code	Maximum Power Dissipation (Pmax) mWatts at 45°C with +30°C Rise
A	3216-18	112
B	3528-20	127
C	6032-28	165
D	7343-31	255
O	7360-43	300
X	7443-43	270
Y	7343-40	263

Temperature Compensation Multipliers for Maximum Ripple Current		
T ≤ 45°C	45° C < T ≤ 85°C	85°C < T ≤ 125°C
1.00	0.70	0.25

T= Environmental Temperature

Using the Pmax of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{Pmax/R}$
$E(max) = Z\sqrt{Pmax/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
Pmax = maximum power dissipation (watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (ohms)

Surge Voltage

Surge voltage is the maximum voltage (peak value) which may be applied to the capacitor.
The surge voltage must not be applied for periodic charging and discharging in the course of normal operation and cannot be part of the application voltage.
Surge voltage capability is demonstrated by application of 1,000cycles at relevant voltage at 105°C and 125°C.
The parts are charged through a 33 Ohm resistor for 30 seconds and then discharged though a 33 Ohm resistor for each cycle.

Rated Voltage (V)	Surge Voltage (V)	Category Voltage (V)	Category Surge Voltage (V)
–55°C to 105°C		up to 125°C	
2.5	3.3	1.7	2.2
6.3	8.2	4.2	5.5
10	13.0	6.7	8.7
16	20.8	10.7	13.9
20	26.0	13.4	17.4
25	32.5	16.8	21.8
35	45.5	23.5	30.5
50	65.0	33.5	43.6

Reverse Voltage

Polymer electrolytic capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a small degree of transient voltage reversal for short periods as shown in the below table.

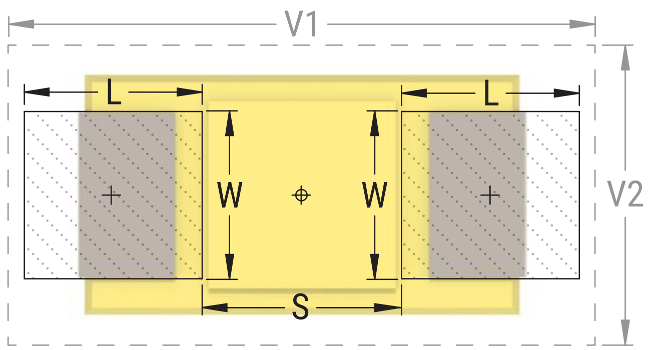
Temperature	Permissible Transient Reverse Voltage
25°C	15% of Rated Voltage
55°C	10% of Rated Voltage
85°C	5% of Rated Voltage
105°C	3% of Rated Voltage
125°C*	1% of Rated Voltage

**For series rated to 125°C*

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
A	3216–18	1.35	2.20	0.62	6.02	2.80	1.23	1.80	0.82	4.92	2.30	1.13	1.42	0.98	4.06	2.04
B	3528–21	2.35	2.21	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
C	6032–25	2.35	2.77	2.37	8.92	4.50	2.23	2.37	2.57	7.82	4.00	2.13	1.99	2.73	6.96	3.74
D	7343–31	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
O	7360-43	4.25	2.77	3.67	10.22	7.30	4.13	2.37	3.87	9.12	6.80	4.03	1.99	4.03	8.26	6.54
X[1]	7343–43	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
Y[1]	7343–40	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] *Height of these chips may create problems in wave soldering.*
[2] *Land pattern geometry is too small for silkscreen outline.*



Grid Placement Courtyard

Soldering Process

KEMET's families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

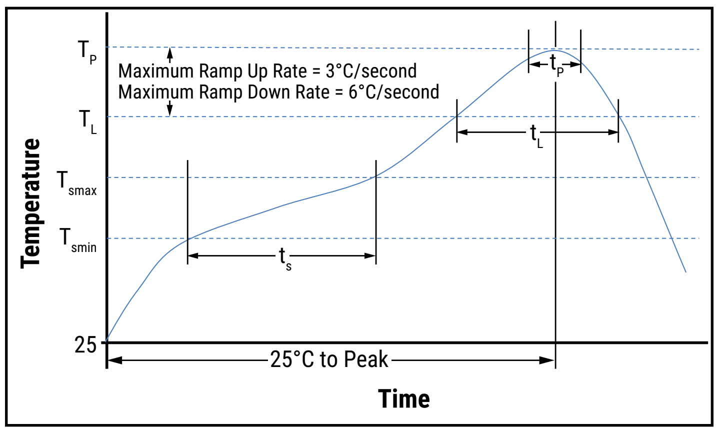
Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/seconds maximum	3°C/seconds maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/seconds maximum	6°C/seconds maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*

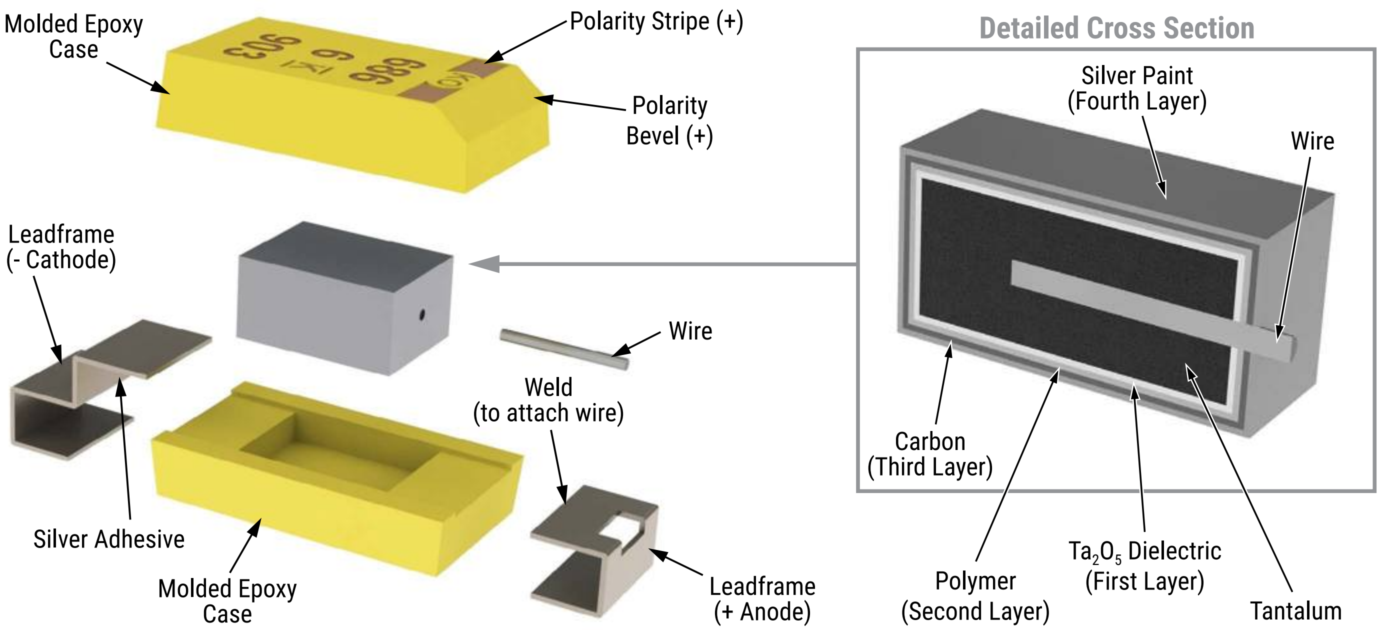


Storage

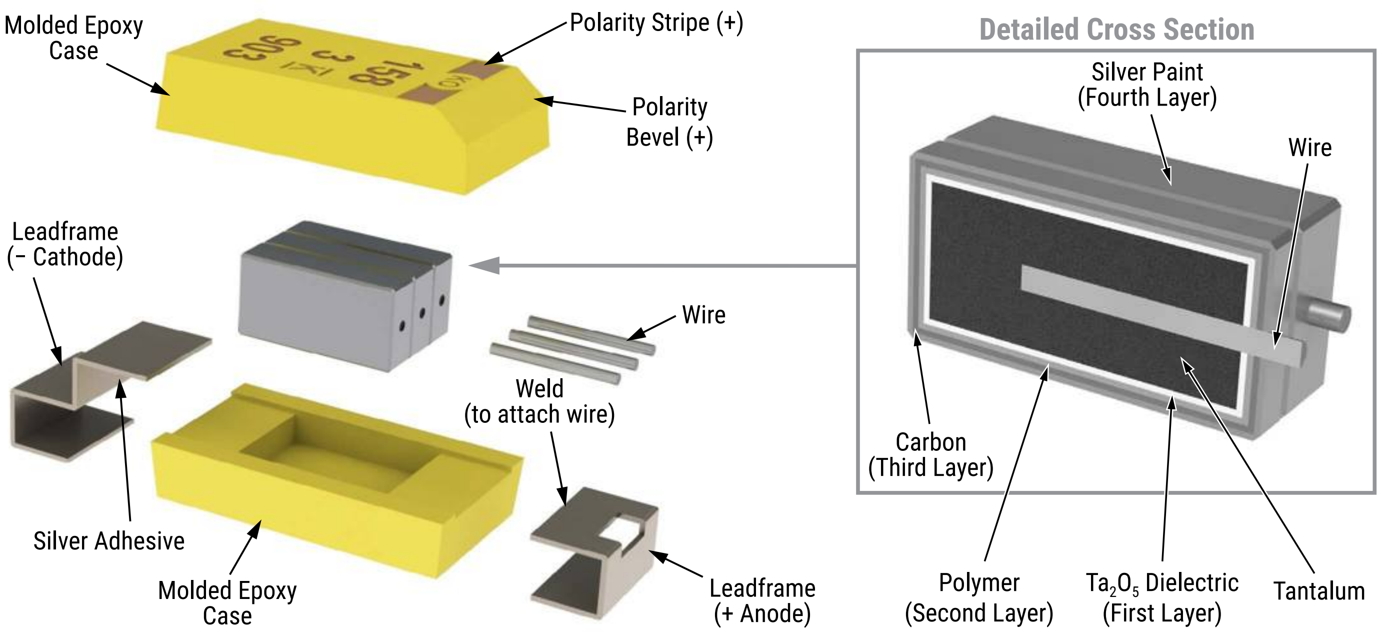
All KO-Cap Series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J-STD-020 and packaged per IPC/JEDEC J-STD-033.
MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity
Unused capacitors should be sealed in a MBB with fresh desiccant.
Calculated shelf life in sealed bag:
– 12 months from bag seal date in a storage environment of < 40°C and humidity < 90% RH
– 24 months from bag seal date in a storage environment of < 30°C and humidity < 70% RH
If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure

Construction

T540

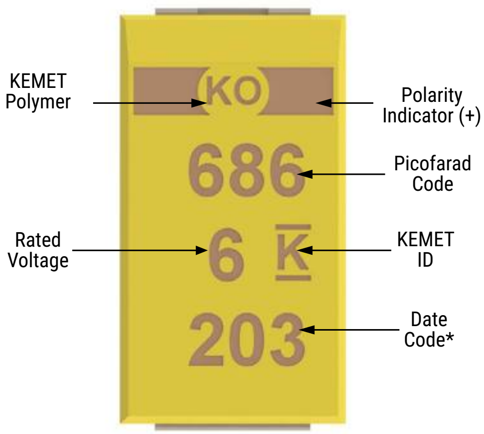


T541 - Multiple Anodes Polymer



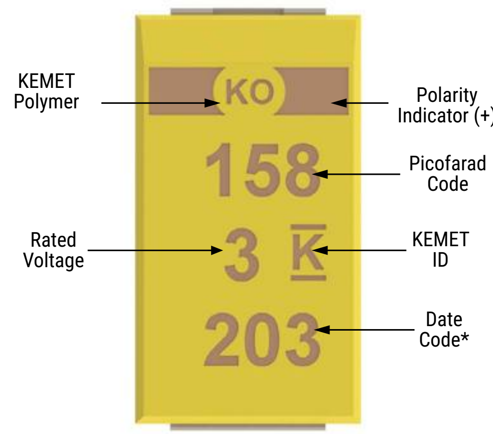
Capacitor Marking

T540



* 203 = 3rd week of 2022

T541



* 203 = 3rd week of 2022

Note: On parts with selected surge codes (8X) the epoxy is black.

Date Code *	
1st digit = Last number of Year	8 = 2018 9 = 2019 0 = 2020 1 = 2021 2 = 2022 3 = 2023
2nd and 3rd digit = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

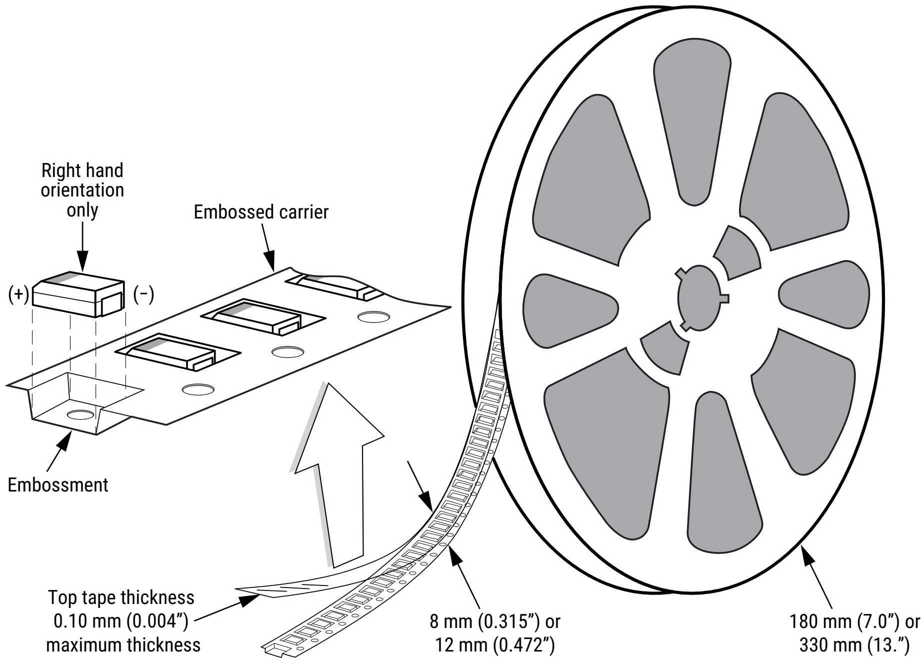


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
P	2012-10	8	3,000	N/A
R	2012-12	8	2,500	10,000
I	3216-10	8	3,000	N/A
S	3216-12	8	2,500	10,000
A	3216-18	8	2,000	N/A
T	3528-12	8	3,000	10,000
M	3528-15	8	2,500	8,000
B	3528-21	8	2,000	8,000
U	6032-15	12	1,000	5,000
L	6032-19	12	1,000	3,000
C	6032-28	12	500	3,000
Q	7343-12	12	1,000	3,000
W	7343-15	12	1,000	3,000
Z	7343-17	12	1,000	3,000
V	7343-19	12	1,000	3,000
D	7343-31	12	500	2,500
Y	7343-40	12	500	2,000
X	7343-43	12	500	2,000
J	7360-15	12	1,000	3,000
H	7360-20	12	1,000	3,000
O	7360-43	12	250	1,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

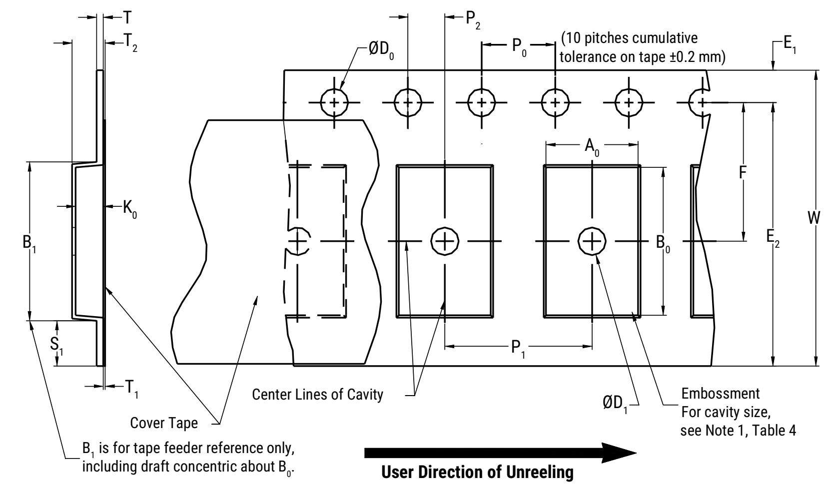


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/−0.0 (0.059 +0.004/−0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0, B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) and Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape, with or without components, shall pass around R without damage (see Figure 4).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
   (e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

Packaging Information Performance Notes

1. Cover tape break force: 1.0 kg minimum.
2. Cover tape peel strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 newton (10 to 100 gf)
12 mm	0.1 to 1.3 newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624*.

Figure 2 – Maximum Component Rotation

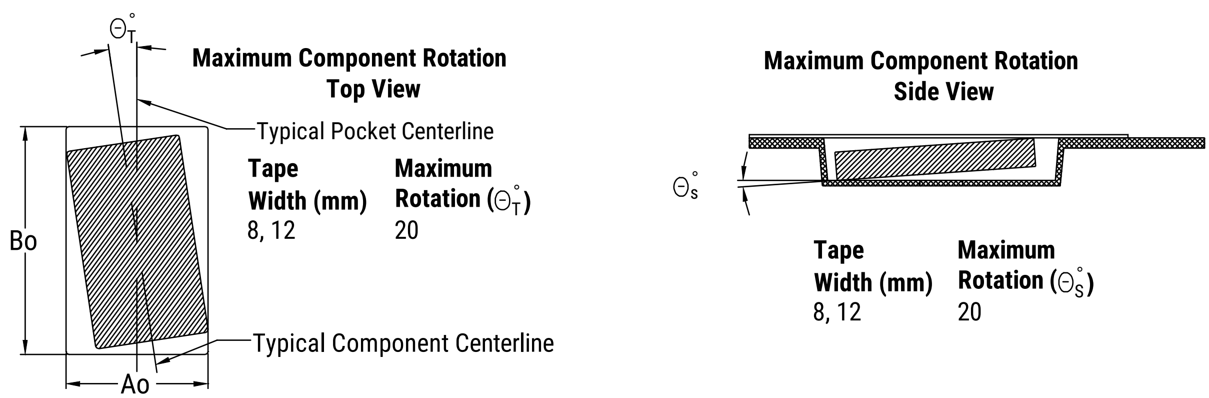


Figure 3 – Maximum Lateral Movement

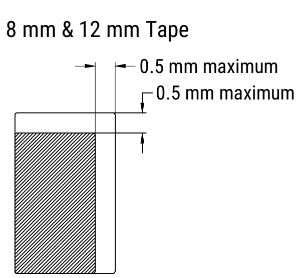


Figure 4 – Bending Radius

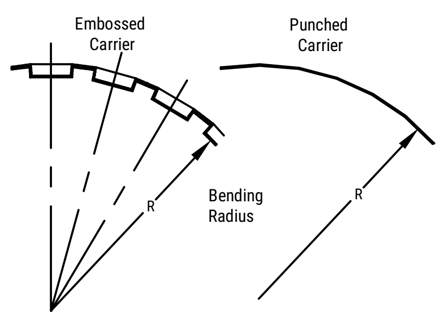
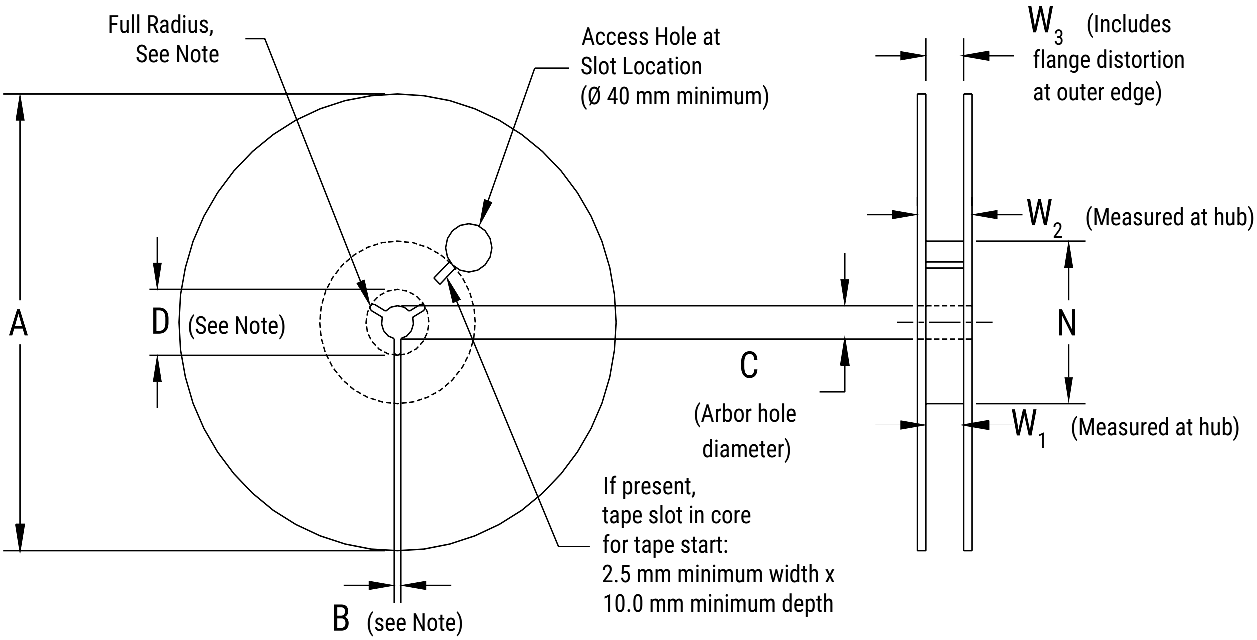


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm 12 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

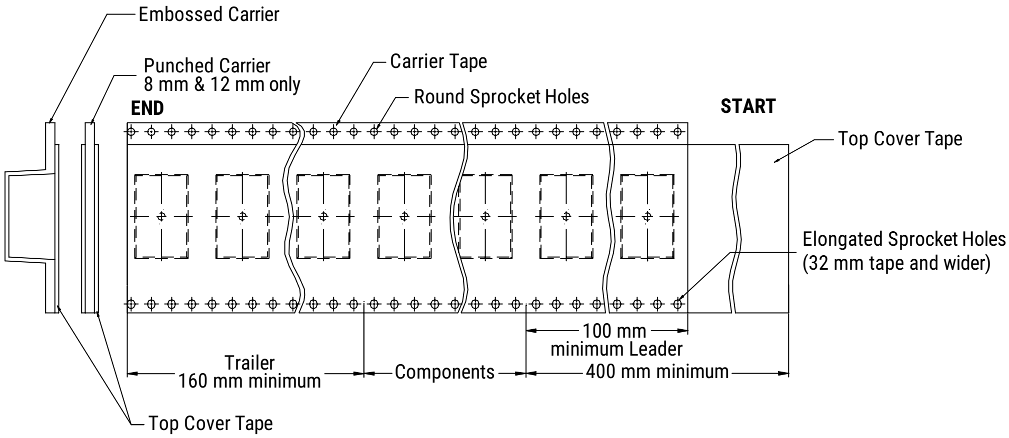
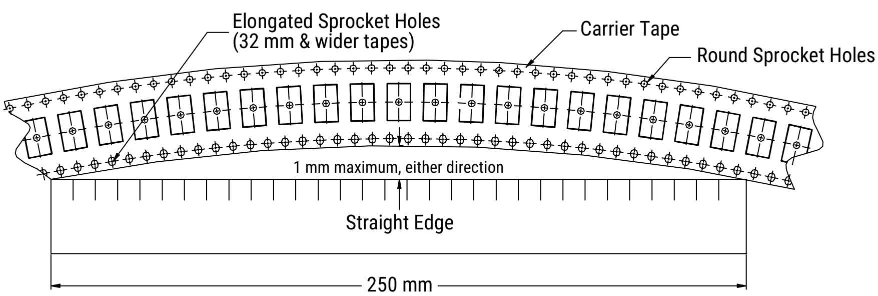


Figure 7 – Maximum Camber



A720 Polymer Aluminum

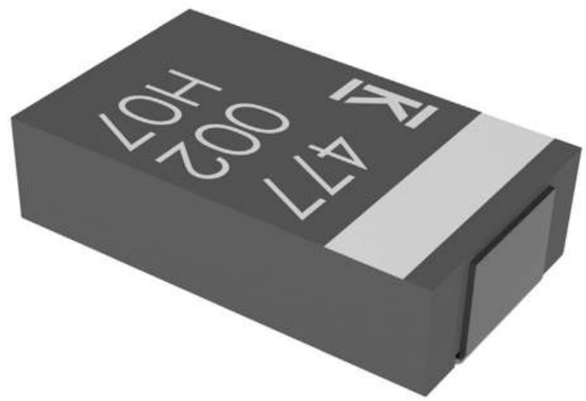
Overview

The KEMET Aluminum Organic Capacitor (AO-CAP) is a solid state aluminum capacitor. The cathode is a conductive organic polymer, which results in very low ESR and improved capacitance retention at a high frequency. AO-CAPs may be operated at steady state voltages up to100% of rated voltage without the need to de-rate.

Since there is no liquid electrolyte, the A720 offers long operational lifetimes, low ESR and high operational temperatures. The inherent low ESR renders the A720 suitable for high ripple current handling. The small package size, high ripple current capability, high operating temperature, low parasistics, and high capacitance make the A720 ideal for high performance microprocessor, FPGA, and ASIC decoupling designs.

Benefits

- Polymer cathode technology
- High frequency capacitance retention
- Non-ignition failure mode
- 100% accelerated steady state aging
- 100% surge current tested
- Volumetric efficiency
- Minimum ESR up to 3 mΩ
- Voltage: 2 – 35 V



Applications

Typical applications include DC/DC converters, notebook PCs, telecommunications, displays, and industrial applications.

Environmental Compliance

- RoHS compliant when ordered with 100% Sn, Ni-Pd-Au or non-magnetic 100% Sn solder
- Halogen-free
- Epoxy compliant with UL94 V-0

Ordering Information

A	720	V	477	M	002	A	P	E003	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR	Packaging (C-Spec)
A = Aluminum	720 = Aluminum Polymer (Gen II)	V	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	002 = 2 2R5 = 2.5 004 = 4 016 = 16 035 = 35	A = N/A	P = Ni-Pd-Au	E = ESR Last three digits specify ESR in mΩ (018 = 18 mΩ)	Blank = 7" Reel 7280 = 13" Reel

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	–55°C to 105°C
Rated Capacitance Range	22 – 560 µF at 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2 – 35 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	Refer to Part Number Electrical Specification Table If there is any concern about leakage current, please perform pre-conditioning to the part following below conditions: * Temperature: 105°C maximum * Voltage: Rated Voltage * Series Resistor: 1,000 Ω * Charge Time: 1 hour minimum * Measuring: Discharge the capacitor(s), store them for 4 to 24 hours at room temperature and RH ≤ 60%

Qualification

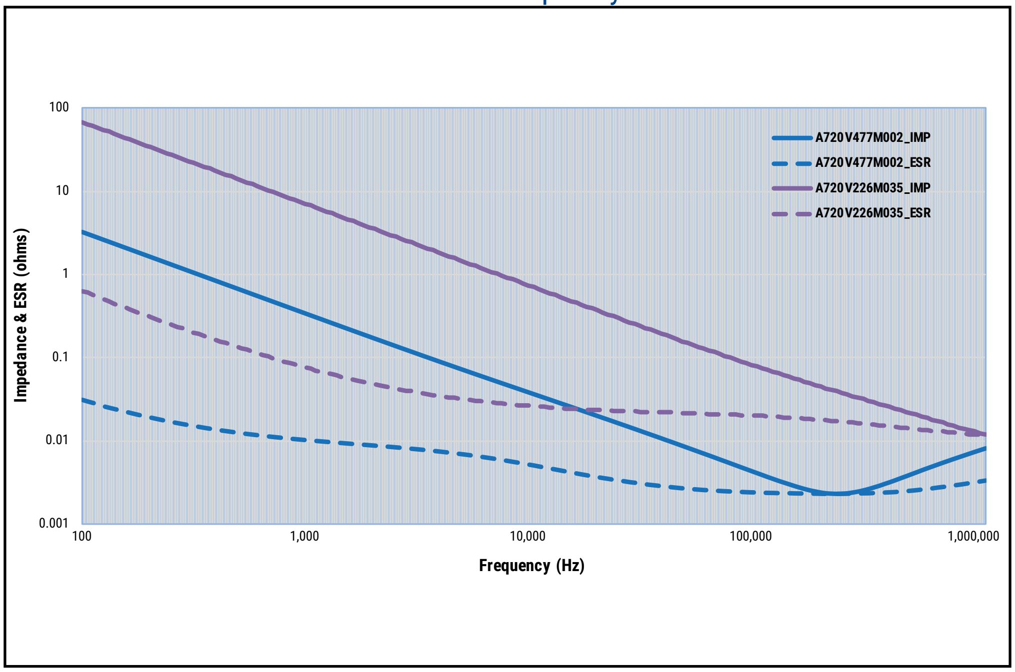
<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">105°C at 1.0 V_R, 2,000 hours</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value (for ≤ 16 V parts)
Within ±20% of initial value (for ≥ 16 V parts)</td></tr>
<tr><td>DF</td><td colspan="3">≤ initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">105°C at 0 volts, 2,000 hours</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value (for ≤ 16 V parts)
Within ±20% of initial value (for ≥ 16 V parts)</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="3">Humidity</td><td colspan="2" rowspan="3">60°C, 90% RH, 500 hours, no load</td><td>Δ C/C</td><td colspan="3">Within −20/+50% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 5.0 x initial limit</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at +25°C, -55°C, +25°C, +85°C, +105°C, +25°C</td><td></td><td>+25°C</td><td>-55°C</td><td>+85°C</td><td>+105°C</td></tr>
<tr><td>Δ C/C</td><td>IL*</td><td>±15%</td><td>±15%</td><td>±20%</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>IL</td><td>IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>2 x IL</td><td>2 x IL</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">105°C, 1.32 x Rated Voltage, 33 Ω resistance, 1,000 cycles</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value (for ≤ 16 V parts)
Within ±20% of initial value (for ≥ 16 V parts)</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within initial limits</td></tr>
<tr><td rowspan="3">Mechanical Shock/ Vibration</td><td colspan="2" rowspan="3">MIL–STD–202, Method 213, Condition I, 100 G Peak
MIL–STD–202, Method 204, Condition D,
10 Hz to 2,000 Hz, 20 G Peak</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value (for ≤ 16 V parts)
Within ±20% of initial value (for ≥ 16 V parts)</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
</table>

Note: the characteristics columns above are shared by the Temperature Stability temperatures (+25°C, -55°C, +85°C, +105°C).

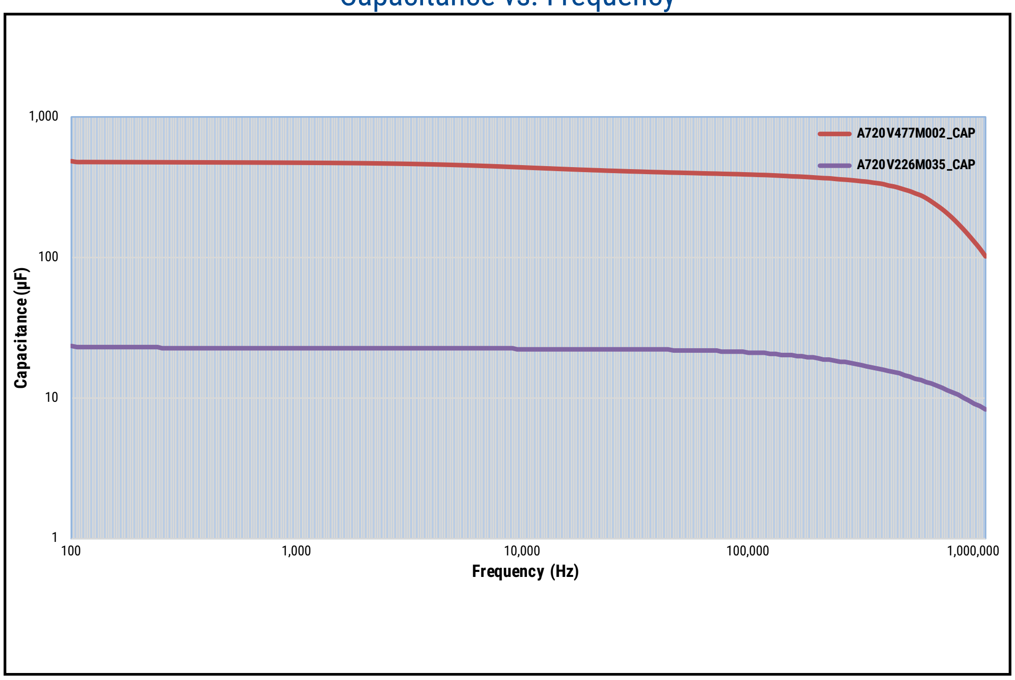
**IL = Initial Limit*

Electrical Characteristics

ESR vs. Frequency

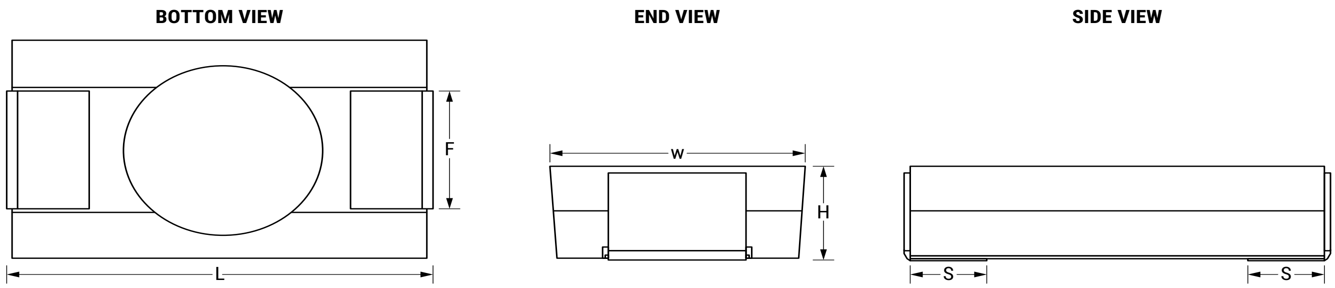


Capacitance vs. Frequency



Dimensions – Millimeters (Inches)

Metric will govern



KEMET	EIA	L	W	H	F ±0.1 ±(0.004)	S ±0.3 ±(0.012)	Weight
V	7343–21	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	1.9±0.2 (0.075±0.008)	2.4 (0.094)	1.3 (0.051)	141.00

Notes: (Ref) – Dimensions provided for reference only.
These weights are provide as reference. If exact weights are needed, please contact your KEMET Sale Representative.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (rms)	MSL	Maximum Operating Temp.
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	µA at +25°C Maximum/5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 100 kHz with/T = +20°C at −55°C to 105°C	Reflow Temp ≤ 260°C	°C
2	470	V/7343-21	A720V477M002APE006	56.4	6	6	8,260	3	105
2	470	V/7343-21	A720V477M002APE4R5	56.4	6	4.5	9,540	3	105
2	470	V/7343-21	A720V477M002APE003	56.4	6	3	11,690	3	105
2	560	V/7343-21	A720V567M002APE003	67.2	6	3	11,690	3	105
2	560	V/7343-21	A720V567M002APE4R5	67.2	6	4.5	9,540	3	105
2	560	V/7343-21	A720V567M002APE006	67.2	6	6	8,260	3	105
2.5	470	V/7343-21	A720V477M2R5APE4R5	70.5	6	4.5	9,540	3	105
2.5	470	V/7343-21	A720V477M2R5APE003	70.5	6	3	11,690	3	105
2.5	560	V/7343-21	A720V567M2R5APE003	84	6	3	11,690	3	105
2.5	560	V/7343-21	A720V567M2R5APE4R5	84	6	4.5	9,540	3	105
2.5	560	V/7343-21	A720V567M2R5APE006	84	6	6	8,260	3	105
4	330	V/7343-21	A720V337M004APE006	79.2	6	6	8,260	3	105
4	330	V/7343-21	A720V337M004APE4R5	79.2	6	4.5	9,540	3	105
4	330	V/7343-21	A720V337M004APE003	79.2	6	3	11,690	3	105
16	100	V/7343-21	A720V107M016APE040	160	6	40	3,200	3	105
16	100	V/7343-21	A720V107M016APE025	160	6	25	4,000	3	105
16	100	V/7343-21	A720V107M016APE015	160	6	15	5,200	3	105
16	100	V/7343-21	A720V107M016APE010	160	6	10	6,400	3	105
35	22	V/7343-21	A720V226M035APE040	77	6	40	3,200	3	105

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option.
Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

Derating Guidelines

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage
	−55°C to 105°C	
2 – 35 V	V_R	V_R

V_R = Rated Voltage

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage, which may be applied, is limited by two criteria:

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage, in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage. See the Reverse Voltage section for allowable limits.

Power capability is determined based on a 20°C temperature rise. A higher temperature rise and therefore higher power capability is allowable as long as the ambient temperature, plus, temperature rise due to ripple current, does not exceed the rated temperature of the part.

The maximum power dissipation by case size can be determined using the below table.

KEMET Series and Case Code	EIA Case Code	Maximum Power Dissipation (Pmax) mWatts at 25°C with +20°C Rise
A720V	7343–21	410

Using the Pmax of the device, the maximum allowable RMS ripple current or voltage may be determined.

$I(max) = \sqrt{Pmax/R}$
$E(max) = Z \sqrt{Pmax/R}$

I = RMS ripple current (amperes)
E = RMS ripple voltage (volts)
Pmax = Maximum power dissipation(watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (Ohms)

Refer to part number listings for permittable Arms limits.

Reverse Voltage

Polymer aluminum capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a certain degree of transient voltage reversal for short periods, as shown in the below table. Please note that these parts may not be operated continuously in reverse, even within these limits.

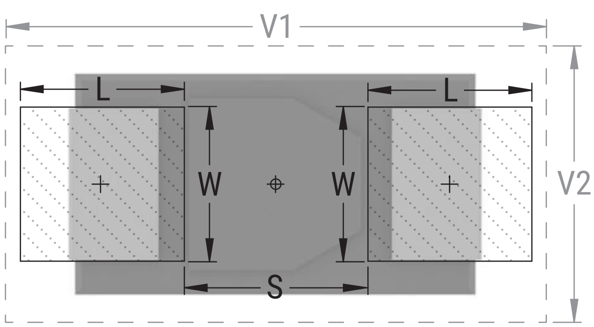
Temperature	Permissible Transient Reverse Voltage
25°C	60% of rated voltage
55°C	50% of rated voltage
85°C	40% of rated voltage
105°C	30% of rated voltage

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
V	7343–21	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*

[1] Height of these chips may create problems in wave soldering.



Grid Placement Courtyard

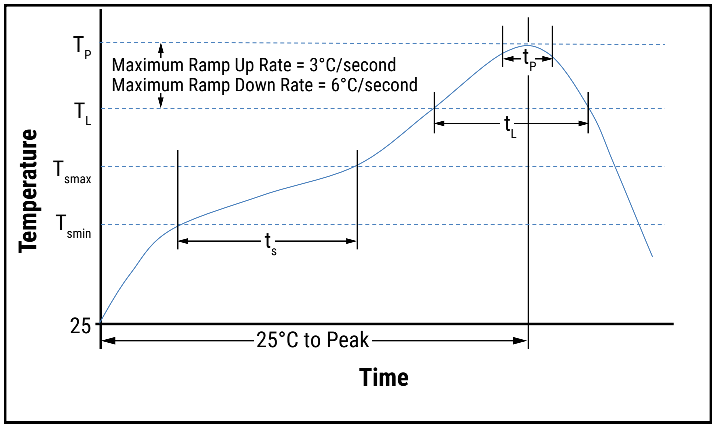
Soldering Process

The KEMET families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J-STD-020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Notes:
Hand soldering leads to risk of damage. If performed use tweezers to hold both capacitors terminals followed by welding procedure. Avoid excessive force and touching capacitor body while soldering. Once the capacitor is removed from the board should not be weld again.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/seconds maximum	3°C/seconds maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/seconds maximum	6°C/seconds maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



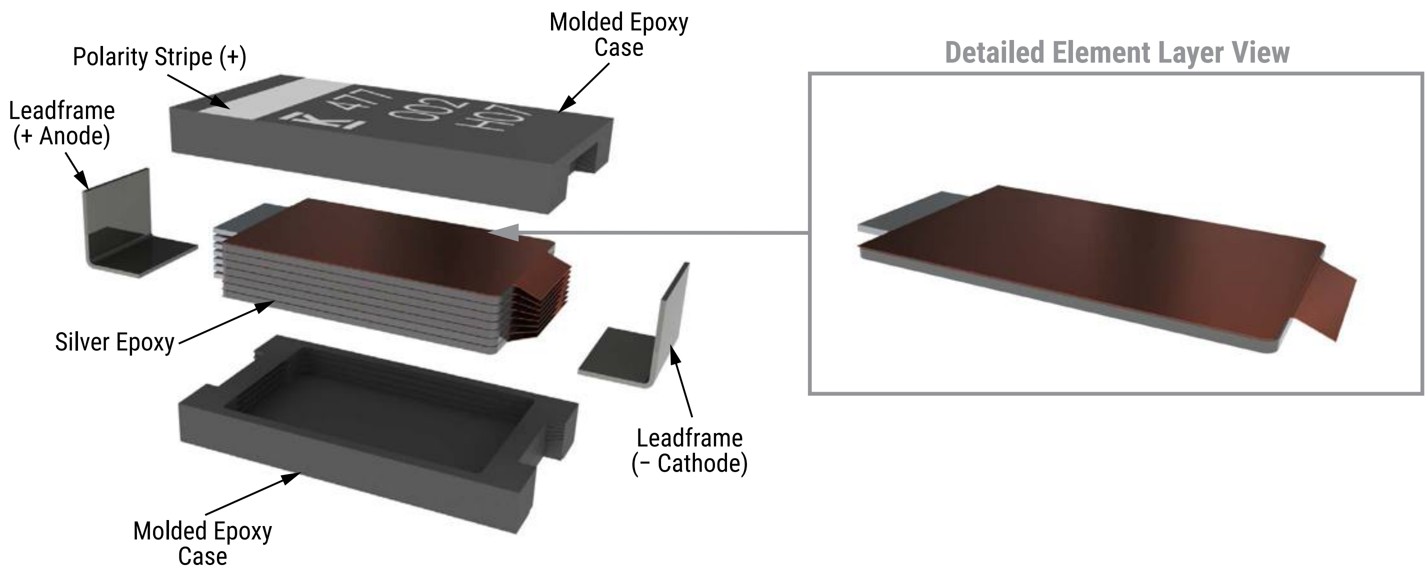
Storage

All AO-CAP Series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J-STD-020 and packaged per IPC/JEDEC J-STD-033. MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

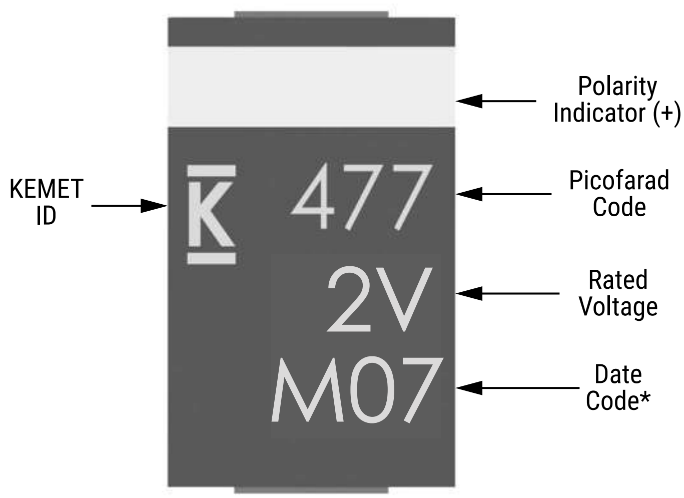
The calculated shelf life in a sealed bag would be 12 months from a bag seal date in a storage environment of < 40°C and humidity < 90% RH. It should be 24 months from a bag seal date in a storage environment of < 30°C and humidity < 70% RH.

If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure..

Construction



Capacitor Marking



* M07 = 7th week of 2022

Date Code *	
Year	Week
K = 2020 L = 2021 M = 2022 N = 2023 O = 2024	01 = 1st week of the year to 52 = 52nd week of the year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

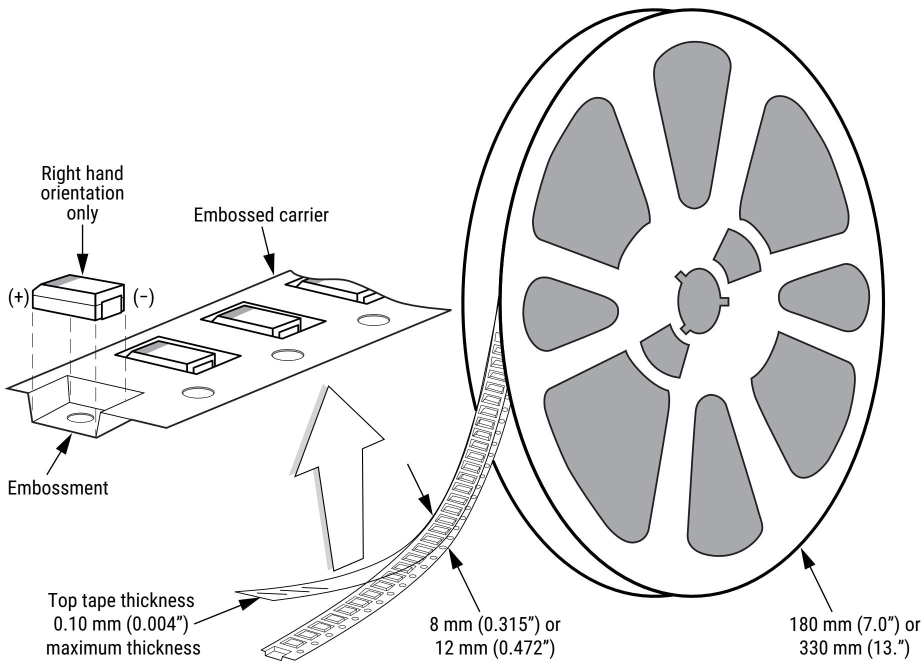


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
V	7343-21	12	1,000	3,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

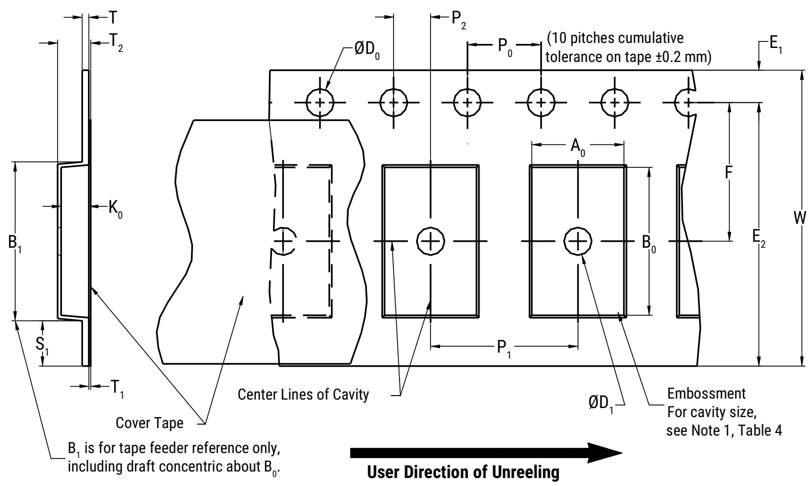


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/−0.0 (0.059 +0.004/−0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0, B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) and Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape, with or without components, shall pass around R without damage (see Figure 4).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
   (e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

Packaging Information Performance Notes

1. Cover tape break force: 1.0 kg minimum.
2. Cover tape peel strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 newton (10 to 100 gf)
12 mm	0.1 to 1.3 newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624*.

Figure 2 – Maximum Component Rotation

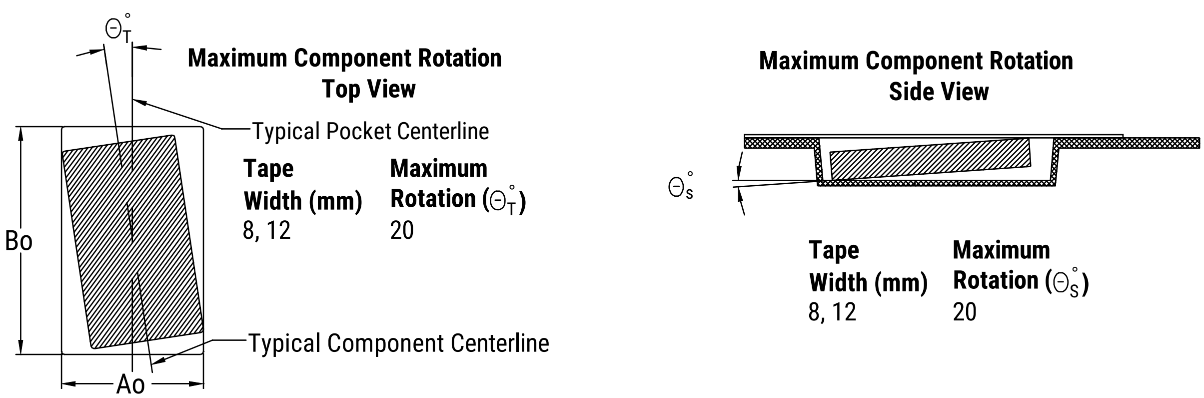


Figure 3 – Maximum Lateral Movement

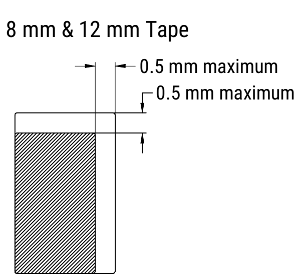


Figure 4 – Bending Radius

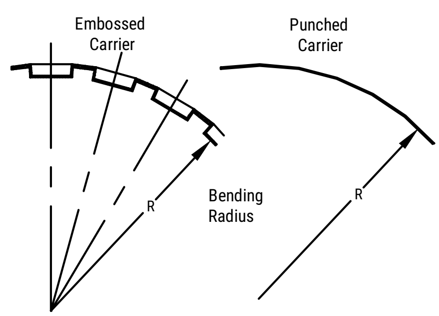
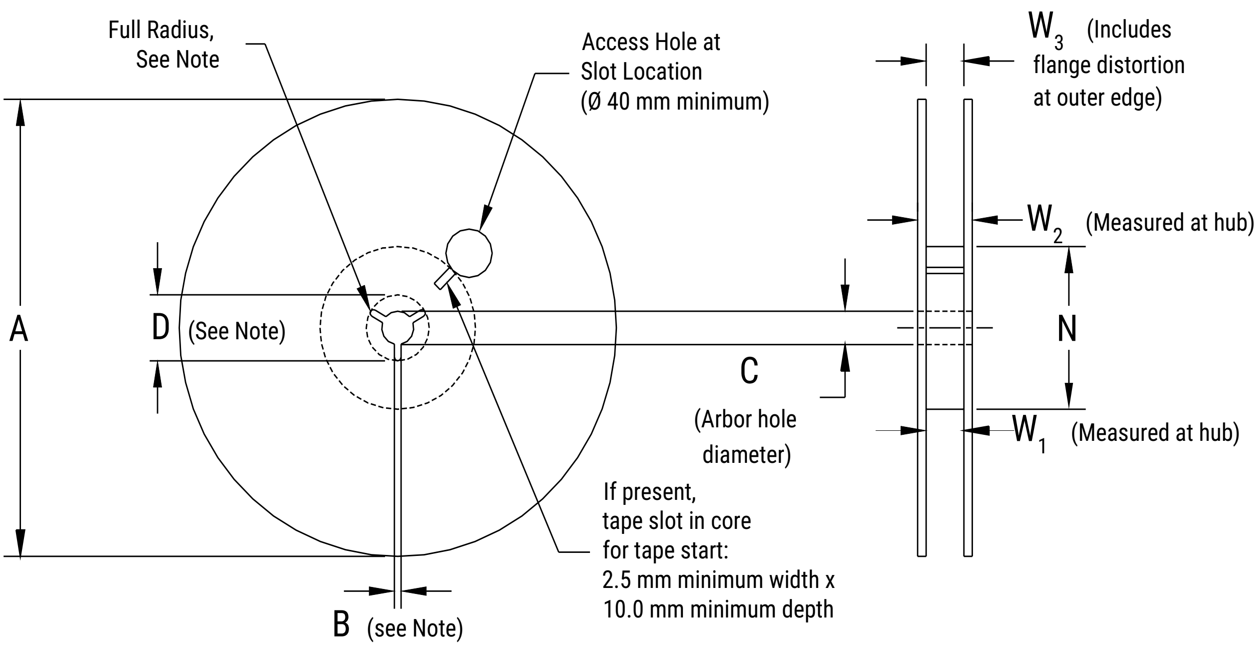


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
12 mm				

Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

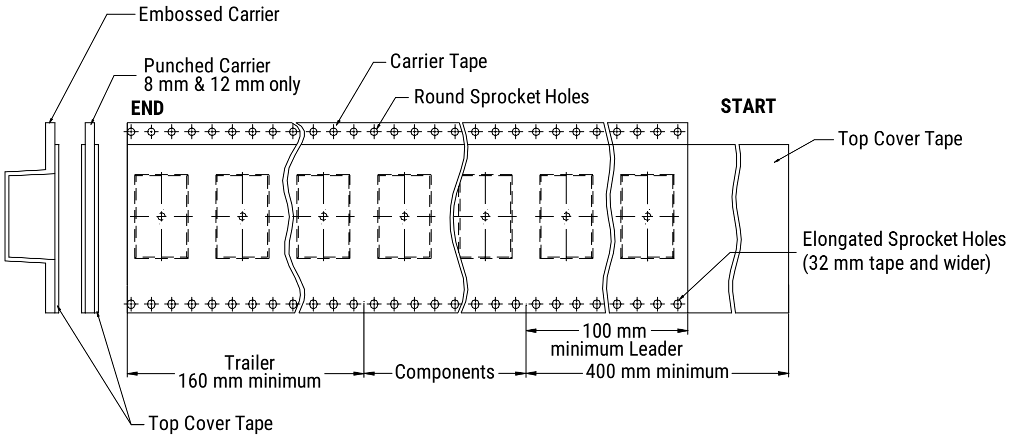
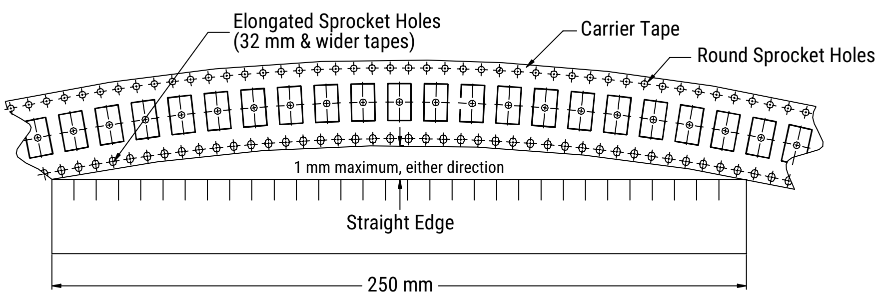


Figure 7 – Maximum Camber



Polymer Electrolytic (KO-CAP®), 6.3 – 35 VDC

Overview

The KEMET Organic Capacitors (KO-CAP) are preferred solutions for applications requiring power loss protection (hold-up) or maximum power efficiency of a circuit when board space is limited. Desired benefits include high energy density, stable capacitance with applied voltage and temperature, and no aging effects. The conductive polymer cathode of these solid electrolytic capacitors provide very low ESR and higher capacitance retention at high frequencies. Unlike liquid electrolyte-based capacitors, KEMET polymer capacitors have a very long operational life and high ripple current capabilities. Capacitors from T520, T521, and T523 series are commonly used in these applications. The T545 and T548 were introduced to meet specific needs for a subsegment of solid state drives.

Benefits

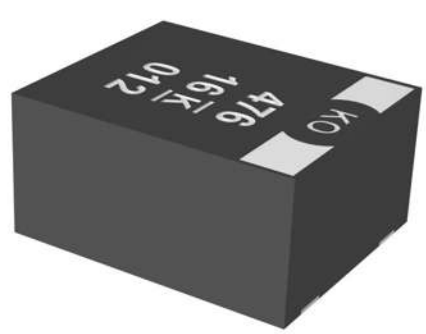
- Highest energy per unit volume
- Stable capacitance across temperature and voltage
- No aging effects
- Low ESR values
- High frequency capacitance retention
- High ripple handling
- 100% accelerated steady state aging
- 100% surge current tested
- Halogen-free epoxy and RoHS compliant

Applications

Typical applications include enterprise storage, networking, server, mobile, client storage, and client computing.

T520 / T521 / T545

T523 / T548



Environmental Compliance

- RoHS compliant when ordered with 100% Sn solder or Ni-Pd-Au
- Halogen-free
- Epoxy compliant with UL94 V–0

Ordering Information

T	548	V	157	M	016	A	T	E050	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR	Packaging (C-Spec)
T = Tantalum	520 = Low voltage 521 = High voltage 523 = Facedown terminal 545 = High energy 548 = High energy, facedown terminal	B, G, H, J, M, O, T, V, W, X, Y	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	006 = 6.3 010 = 10 016 = 16 020 = 20 025 = 25 035 = 35	A = N/A	T = 100% matte tin (Sn)-plated P* = Ni-Pd-Au-plated	ESR in mΩ	Blank = 7" reel 7280 = 13" reel

** P termination only available on T523/T548 part numbers*

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to 85°C/125°C (refer to part number in Table 1 for maximum temperature rating)
Rated Capacitance Range	22 – 1,500 µF at 120 Hz/25°C
Capacitance Tolerance	K tolerance (10%), M tolerance (20%)
Rated Voltage Range	6.3 – 35 VDC
DF (120 Hz)	Refer to part number in Table 1 for electrical specification
ESR (100 kHz)	Refer to part number in Table 1 for electrical specification
Leakage Current	≤ 0.1 CV (µA) at rated voltage after 5 minutes (refer to part number in Table 1 for electrical specification)

Qualification

<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="7">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">85°C or 105°C at rated voltage, 2,000 hours**
125°C at 2/3 rated voltage, 2,000 hours **</td><td>Δ C/C</td><td colspan="6">Within −20/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="6">Within initial limit
Within 2.0 x initial limit [*1]</td></tr>
<tr><td>DCL</td><td colspan="6">Within 1.25 x initial limit
Within 2.0 x initial limit [*1]</td></tr>
<tr><td>ESR</td><td colspan="6">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">85°C/105°C/125°C at 0 volts, 2,000 hours**</td><td>Δ C/C</td><td colspan="6">Within −20%/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="6">Within initial limit
Within 2.0 x initial limit [*1]</td></tr>
<tr><td>DCL</td><td colspan="6">Within 1.25 x initial limit
Within 2.0 x initial limit [*1]</td></tr>
<tr><td>ESR</td><td colspan="6">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Humidity</td><td colspan="2" rowspan="4">60°C, 90% RH, no load, 500 hours</td><td>Δ C/C</td><td colspan="6">Within −5% /+35%</td></tr>
<tr><td>DF</td><td colspan="6">Within initial limit</td></tr>
<tr><td>DCL</td><td colspan="6">Within 5.0 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="6">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at +25°C, −55°C, +25°C, +85°C, +105°C**, +25°C</td><td></td><td>+25°C</td><td>−55°C</td><td>+25°C</td><td>+85°C</td><td>+105°C**</td><td>+25°C</td></tr>
<tr><td>Δ C/C</td><td>IL*</td><td>±20%</td><td>±10%</td><td>±20%</td><td>±30%</td><td>±10%</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>IL</td><td>1.2 x IL</td><td>1.5 x IL</td><td>IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>IL</td><td>10 x IL</td><td>10 x IL</td><td>IL</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">85°C/105°C/125°C, 1.32 x rated voltage[*2], 1,000 cycles **</td><td>Δ C/C</td><td colspan="6">Within −20/+10% of initial value</td></tr>
<tr><td>DF</td><td colspan="6">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="6">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="6">Within initial limits</td></tr>
<tr><td rowspan="3">Mechanical Shock/ Vibration</td><td colspan="2" rowspan="3">MIL–STD–202, Method 213 and 204
Condition I, 100 G peak
Condition D, 20 G for 20 minutes/12 cycles each of 3 orientations. Test from 10 ~ 2,000 Hz</td><td>Δ C/C</td><td colspan="6">Within ±10% of initial value
(Within initial limits for T527 Series)</td></tr>
<tr><td>DF</td><td colspan="6">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="6">Within initial limits</td></tr>
</table>

** IL = Initial limit*

*** Refer to Table 1 - Ratings & Part Number Reference for temperature classification. If temperature classification is 85°C, the 105°C step is not performed for the temperature stability test.*

*[*1] For 125°C rated part numbers*

*[*2] For PN T523W476M035AP/T523V686M035AP test voltage is 1.15 x V_R*

Reliability

KO-CAP capacitors have an average failure rate of 0.5 %/1,000 hours at category voltage, U_C, and category temperature, T_C. These capacitors are qualified using industry test standards at U_C and T_C. The minimum test time (1,000 hours or 2,000 hours) is dependent on the product.

The actual life expectancy of KO-CAP capacitors increases when application voltage, U_A, and application temperature, T_A, are lower than U_C and T_C. As a general guideline, when $U_A < 0.9 * U_C$ and $T_A < 85°C$, the life expectancy will typically exceed the useful lifetime of most hardware (> 10 years).

The lifetime of a KO-CAP capacitor at a specific application voltage and temperature can be modeled using the equations below. A failure is defined as passing enough current to blow a 1-amp fuse. The calculation is an estimation based on empirical results and is not a guarantee.

$$VAF = \left(\frac{U_C}{U_A}\right)^n$$

where:
VAF = acceleration factor due to voltage, unitless
U_C = category voltage, volt
U_A = application voltage, volt
n = exponent, 16

$$TAF = e^{\left[\frac{E_a}{k}\left(\frac{1}{273+T_A} - \frac{1}{273+T_C}\right)\right]}$$

where:
TAF = acceleration factor due to temperature, unitless
E_a = activation energy, 1.4 eV
k = Boltzmann's constant, 8.617E-5 eV/K
T_A = application temperature, °C
T_C = category temperature, °C

$$AF = VAF * TAF$$

where:
AF = acceleration factor, unitless
TAF = accerlation factor due to temperature, unitless
VAF = acceleration factor due to voltage, unitless

$$Life_{U_A,T_A} = Life_{U_C,T_C} * AF$$

where:
$Life_{UA, TA}$ = estimated life application voltage and temperature, years
$Life_{UC, TC}$ = guaranteed life category voltage and temperature, years
AF = acceleration factor, unitless

Terms:
Category voltage, U_C : maximum recommended peak DC operating voltage for continuous operation at the category temperature, T_C
Rated voltage, U_R : maximum recommended peak DC operating voltage for continuous operation up to the rated temperature, T_R
Category temperature, T_C : maximum recommended operating temperature. Voltage derating may be required at T_C
Rated temperature, T_R : maximum recommended operating temperature without voltage derating. T_R is equal to or lower than T_C

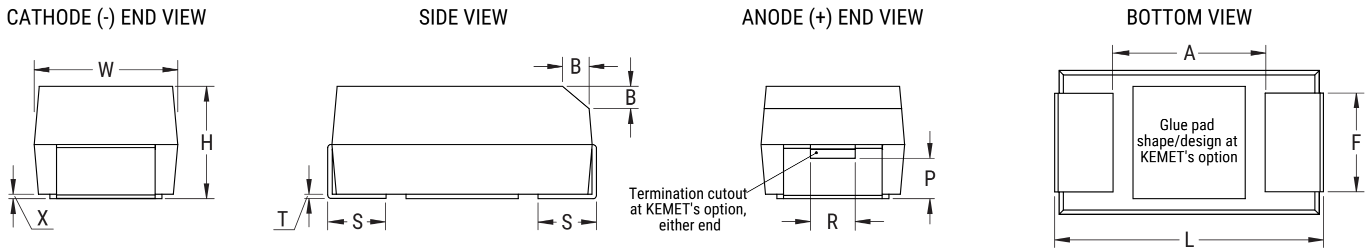
Reliability Table 1 – Common temperature range classifications

85°C (T_R) / 85°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 105°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
105°C (T_R) / 125°C (T_C)	Rated Voltage (U_R)	2.5	4.0	6.3	8.0	10.0	12.5	16.0	20.0	25.0	35.0	50.0	63.0	75.0
	Category Voltage (U_C)	1.7	2.7	4.2	5.4	6.7	8.4	10.7	13.4	16.8	23.5	33.5	42.2	50.3

Dimensions – Millimeters (Inches)

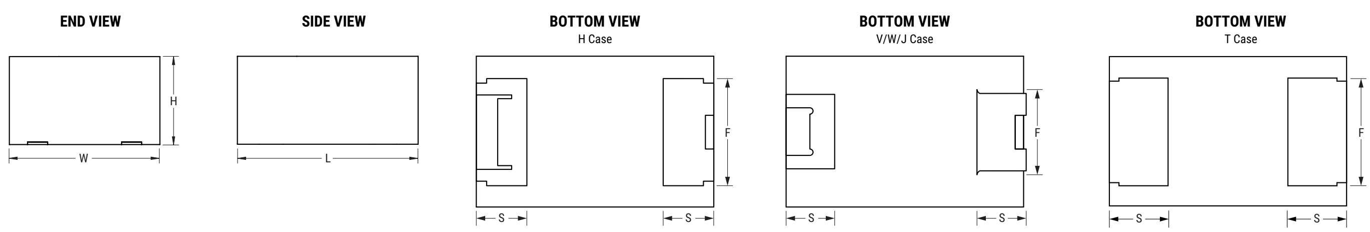
Metric will govern

For T520 / T521 / T545



KEMET	EIA	L	W	H	F ±0.1 (±0.004)	S ±0.3 (±0.012)	B ±0.15 (Ref) ±0.006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Min)	Typical Weight (mg)
T	3528-12	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.1 ±0.1 (0.043 ±0.004)	2.2 (0.087)	0.80 (0.032)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	1.9 (0.075)	55
M	3528-15	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.4 ±0.1 (0.055 ±0.004)	2.2 (0.087)	0.8 (0.031)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	1.1 (0.043)	98
B	3528-21	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.9 ±0.2 (0.075 ±0.008)	2.2 (0.087)	0.80 (0.032)	0.4 (0.016)	0.10 ±0.10 (0.004 ±0.004)	0.5 (0.020)	1.0 (0.039)	0.13 (0.005)	1.9 (0.075)	95
W	7343-15	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.4 ±0.1 (0.055 ±0.004)	2.4 (0.094)	1.30 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	223
V	7343-20	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.9 ±0.1 (0.075 ±0.004)	2.4 (0.094)	1.30 (0.051)	N/A	0.05 (0.002)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	274
Y	7343-40	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	3.8 ±0.2 (0.150 ±0.008)	2.4 (0.094)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	494
X	7343-43	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	4.0 ±0.3 (0.157 ±0.012)	2.4 (0.094)	1.30 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	554
J	7360-15	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	1.4 ±0.1 (0.055 ±0.004)	4.1 (0.161)	1.30 (0.051)	N/A	0.10 ±0.10 (0.004 ±0.004)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	263
H	7360-20	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	1.9 ±0.1 (0.075 ±0.004)	4.1 (0.161)	1.3 (0.051)	N/A	0.10 ±0.10 (0.004 ±0.004)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	385
O	7360-43	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	4.0 ±0.3 (0.157 ±0.012)	4.1 (0.161)	1.3 (0.051)	N/A	0.10 ±0.10 (0.004 ±0.004)	N/A	N/A	0.13 (0.005)	3.8 (0.150)	696

For T523 / T548



KEMET	EIA	L	W	H	F ±0.1 (±0.004)	S ±0.3 (±0.012)	Typical Weight (mg)
T	3528-12	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.1 ±0.1 (0.043 ±0.004)	2.2 (0.087)	0.80 (0.032)	55
W	7343-15	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.4 ±0.1 (0.055 ±0.004)	2.4 (0.094)	1.3 (0.051)	223
G	7360-12	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	1.2 ±0.1 (0.047 ±0.004)	4.45 (0.175)	1.6 (0.063)	–
J	7360-15	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	1.5 ±0.1 (0.059 ±0.004)	4.45 (0.175)	1.6 (0.063)	263
V	7343-20	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.9 ±0.1 (0.075 ±0.004)	2.4 (0.094)	1.3 (0.051)	274
H	7360-20	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	1.9 ±0.1 (0.075 ±0.004)	4.45 (0.175)	1.6 (0.063)	385

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Energy	Maximum DC Leakage at 25°C, V_R, 5 min charge time	Maximum DF at 25°C, 120 Hz	Maximum ESR at 25°C, 100 kHz	Maximum Allowable RMS Ripple Current at 45°C, 100 kHz	MSL	Maximum Operating Temperature
VDC	µF	KEMET/ EIA		mJ	µA	%	mΩ	mA		°C
6.3	100	T/3528-12	T520T107M006APE070	1.2	63.0	10	70	1,230	3	105
6.3	150	T/3528-12	T520T157M006ATE070	1.7	94.5	10	70	1,230	3	105
6.3	150	M/3528-15	T520M157M006ATE070	1.7	94.5	10	70	1,310	3	105
6.3	220	B/3528-21	T520B227M006ATE070	2.5	138.6	10	70	1,350	3	105
6.3	330	V/7343-20	T545V337M006ATE045	3.8	207.9	10	45	2,040	3	105
6.3	470	W/7343-15	T545W477M006ATE035	5.4	296.1	10	35	2,270	3	105
6.3	470	W/7343-15	T545W477M006ATE045	5.4	296.1	10	45	2,000	3	105
6.3	470	W/7343-15	T545W477M006ATE055	5.4	296.1	10	55	1,810	3	105
6.3	470	V/7343-20	T545V477M006ATE055	5.4	296.1	10	55	1,850	3	105
6.3	680	V/7343-20	T520V687M006ATE025	7.9	428.4	10	25	3,100	3	105
6.3	680	V/7343-20	T520V687M006ATE035	7.9	428.4	10	35	2,300	3	105
6.3	680	X/7343-43	T520X687M006ATE025	7.9	428.4	10	25	3,150	3	105
6.3	680	J/7360-15	T523J687M006APE070	7.9	428.0	10	70	2,510	3	85
6.3	1,000	H/7360-20	T545H108M006ATE055	11.6	630.0	20	55	1,850	3	85
6.3	1,500	H/7360-20	T520H158M006ATE055	17.4	945.0	20	55	1,800	3	85
6.3	1,500	H/7360-20	T520H158M006ATE035	17.4	945.0	20	35	2,320	3	85
6.3	**1,500**	**H/7360-20**	**T545H158M006ATE035**	**17.4**	**945.0**	**20**	**35**	**2,320**	**3**	**85**
6.3	**1,500**	**H/7360-20**	**T545H158M006ATE055**	**17.4**	**945.0**	**20**	**55**	**1,850**	**3**	**85**
10	330	Y/7343-40	T545Y337M010ATE035	11.9	330.0	10	35	2,630	3	105
10	220	V/7343-20	T545V227M010ATE045	7.9	220.0	10	45	2,040	3	105
10	330	G/7360-12	T523G337M010APE150	11.0	330.0	10	150	1,410	4	85
10	330	J/7360-15	T523J337M010APE070	11.9	330.0	10	70	2,510	3	85
10	390	G/7360-12	T523G397M010APE150	14.0	390.0	10	150	1,410	4	85
10	470	J/7360-15	T523J477M010APE070	16.9	470.0	10	70	2,510	4	85
10	820	H/7360-20	T520H827M010ATE055	29.5	820.0	10	55	1,910	3	85
10	1,000	H/7360-20	T523H108M010APE070	36.0	1000.0	10	70	2,510	4	85
16	22	B/3528-21	T521B226M016ATE070	1.7	35.2	10	70	1,350	3	105
16	33	T/3528-12	T521T336M016ATE070	2.6	52.8	10	70	1,230	3	105
16	47	T/3528-12	T523T476M016APE090	3.6	75.2	10	90	1,080	4	85
16	47	W/7343-15	T545W476M016ATE045	3.6	75.2	10	45	2,000	3	105
16	47	V/7343-20	T545V476M016ATE045	3.6	75.2	10	45	2,040	3	105
16	47	V/7343-20	T545V476M016ATE070	3.6	75.2	10	70	1,640	3	105
16	68	W/7343-15	T523W686M016APE050	5.3	108.8	10	50	2,820	3	105
16	68	W/7343-15	T523W686M016APE070	5.3	108.8	10	70	2,376	3	105
16	68	W/7343-15	T523W686M016APE100	5.3	108.8	10	100	1,988	3	105
16	100	W/7343-15	T523W107M016APE050	7.7	160.0	10	50	2,820	3	105
16	100	W/7343-15	T523W107M016APE070	7.7	160.0	10	70	2,376	3	105
16	100	W/7343-15	T523W107M016APE100	7.7	160.0	10	100	1,988	3	105
16	100	V/7343-20	T545V107M016ATE050	7.7	160.0	10	50	1,940	3	105
16	150	W/7343-15	T523W157M016APE050	11.6	240.0	10	50	2,820	3	105
16	150	W/7343-15	T523W157M016APE070	11.6	240.0	10	70	2,376	3	105
16	150	W/7343-15	T523W157M016APE100	11.6	240.0	10	100	1,988	3	105
16	**150**	**V/7343-20**	**T523V157M016APE050**	**11.6**	**240.0**	**10**	**50**	**2,870**	**3**	**105**
16	**150**	**V/7343-20**	**T523V157M016APE070**	**11.6**	**240.0**	**10**	**70**	**2,420**	**3**	**105**
16	**150**	**V/7343-20**	**T523V157M016APE100**	**11.6**	**240.0**	**10**	**100**	**2,030**	**3**	**105**
16	150	V/7343-20	T521V157M016ATE040	11.6	240.0	10	40	2,160	3	105
16	150	V/7343-20	T521V157M016ATE050	11.6	240.0	10	50	1,930	3	105
16	150	V/7343-20	T521V157M016ATE070	11.6	240.0	10	70	1,630	3	105
16	150	V/7343-20	T521V157M016ATE100	11.6	240.0	10	100	1,370	3	105
16	150	X/7343-43	T545X157M016ATE040	11.6	240.0	10	40	2,490	3	105
16	150	G/7360-12	T523G157M016APE150	11.6	240.0	10	150	1,410	4	85
16	180	H/7360-20	T545H187M016ATE055	13.9	288.0	20	55	1,910	3	85
16	220	X/7343-43	T545X227M016ATE035	17.0	352.0	10	35	2,660	3	105
16	220	J/7360-15	T523J227M016APE070	17.0	352.0	10	70	2,510	3	85
VDC	µF	KEMET/ EIA		mJ	µA	%	mΩ	mA		°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Energy	Maximum DC Leakage	Maximum DF	Maximum ESR	Maximum Allowable RMS Ripple Current	MSL	Maximum Operating Temperature

Part numbers marked in orange font are not recommended for new designs. KEMET recommends the use of part numbers shown in the above table within same Cap/Volt/Case and ESR in black font text.
(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
Refer to Ordering Information for additional detail.
*Energy (mJ) = 0.5 * Nominal Cap * (Application Voltage^2 - Dropout Voltage^2) / 1,000; Cap = µF*
Application Voltage = 90% of V_R (≤ 10 V) / 80% of V_R (> 10 V)
Dropout Voltage = 3 V was used for the calculation

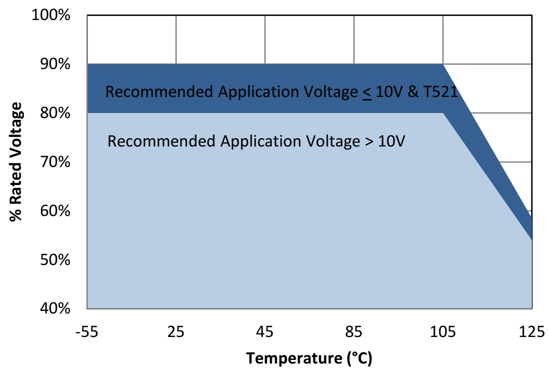
Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Energy	Maximum DC Leakage at 25°C, V_R, 5 min charge time	Maximum DF at 25°C, 120 Hz	Maximum ESR at 25°C, 100 kHz	Maximum Allowable RMS Ripple Current at 45°C, 100 kHz	MSL	Maximum Operating Temperature
VDC	µF	KEMET/ EIA		mJ	µA	%	mΩ	mA		°C
16	220	H/7360-20	T523H227M016APE070	17.0	352.0	10	70	2,510	3	85
16	330	X/7343-43	T545X337(1)016ATE025	25.5	528.0	10	25	3,150	3	105
16	330	H/7360-20	T548H337M016APE070	25.5	528.0	10	70	2,510	4	85
16	330	H/7360-20	T523H337M016APE070	25.5	528.0	10	70	2,510	3	85
16	470	H/7360-20	T523H477M016APE070	36.4	752.0	10	70	2,510	4	85
20	22	B/3528-21	T521B226M020ATE070	2.7	44.0	10	70	1,350	3	105
20	47	W/7343-15	T545W476M020ATE045	5.8	94.0	10	45	2,000	3	105
20	47	W/7343-15	T545W476M020ATE055	5.8	94.0	10	55	1,810	3	105
20	47	V/7343-20	T545V476M020ATE070	5.8	94.0	10	70	1,640	3	105
20	68	W/7343-15	T523W686(1)020APE100	8.4	136.0	10	100	1,988	3	105
20	68	V/7343-20	T523V686M020APE100	8.4	136.0	10	100	2,030	3	105
20	100	W/7343-15	T523W107M020APE050	12.4	200.0	10	50	2,820	3	105
20	100	W/7343-15	T523W107M020APE070	12.4	200.0	10	70	2,376	3	105
20	100	W/7343-15	T523W107M020APE100	12.4	200.0	10	100	1,988	3	105
20	100	V/7343-20	T545V107M020ATE055	12.4	200.0	10	55	1,850	3	125
20	150	V/7343-20	T523V157M020APE050	18.5	300.0	10	50	2,870	3	105
20	150	V/7343-20	T523V157M020APE070	18.5	300.0	10	70	2,420	3	105
20	150	V/7343-20	T523V157M020APE100	18.5	300.0	10	100	2,030	3	105
25	33	W/7343-15	T523W336M025APE100	6.5	82.5	10	100	1,988	3	105
25	47	W/7343-15	T523W476M025APE050	9.2	117.5	10	50	2,820	3	105
25	47	W/7343-15	T523W476M025APE070	9.2	117.5	10	70	2,376	3	105
25	47	W/7343-15	T523W476M025APE100	9.2	117.5	10	100	1,988	3	105
25	47	V/7343-20	T523V476M025APE100	9.2	117.5	10	100	2,030	3	105
25	68	W/7343-15	T523W686M025APE050	13.3	170.0	10	50	2,820	3	105
25	68	W/7343-15	T523W686M025APE070	13.3	170.0	10	70	2,376	3	105
25	68	W/7343-15	T523W686M025APE100	13.3	170.0	10	100	1,988	3	105
25	100	V/7343-20	T523V107M025APE070	19.6	250.0	10	70	2,420	3	105
25	100	V/7343-20	T523V107M025APE100	19.6	250.0	10	100	2,030	3	105
25	150	H/7360-20	T523H157M025APE070	29.3	375.0	10	70	2,510	3	85
25	220	H/7360-20	T523H227M025APE070	43.0	550.0	20	70	2,510	3	85
35	22	W/7343-15	T523W226M035APE100	8.5	77.0	10	100	1,988	3	105
35	33	V/7343-20	T523V336M035APE100	12.8	115.5	10	100	2,030	3	105
35	47	W/7343-15	T523W476M035APE090	18.2	164.5	10	90	2,100	3	105
35	47	W/7343-15	T523W476M035APE100	18.2	164.5	10	100	1,988	3	105
35	47	V/7343-20	T523V476M035APE100	18.2	164.5	10	100	2,030	3	105
35	68	V/7343-20	T523V686M035APE070	26.4	238.0	10	70	2,420	3	105
35	68	V/7343-20	T523V686M035APE100	26.4	238.0	10	100	2,030	3	105
35	100	H/7360-20	T523H107M035APE070	38.8	350.0	10	70	2,510	3	85
VDC	µF	KEMET/ EIA		mJ	µA	%	mΩ	mA		°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Energy	Maximum DC Leakage	Maximum DF	Maximum ESR	Maximum Allowable RMS Ripple Current	MSL	Maximum Operating Temperature

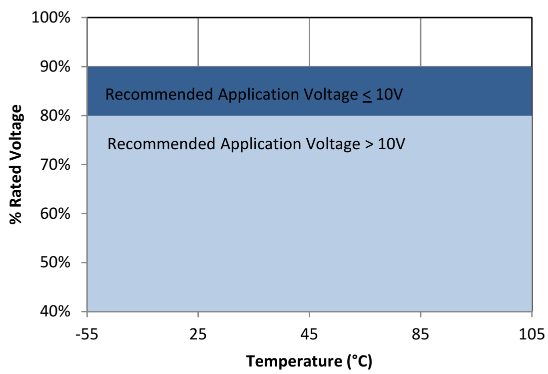
Part numbers marked in orange font are not recommended for new designs. KEMET recommends the use of part numbers shown in the above table within same Cap/Volt/Case and ESR in black font text.
(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
Refer to Ordering Information for additional detail.
*Energy (mJ) = 0.5 * Nominal Cap * (Application Voltage^2 - Dropout Voltage^2) / 1,000; Cap = µF*
Application Voltage = 90% of V_R (≤ 10 V) / 80% of V_R (> 10 V)
Dropout Voltage = 3 V was used for the calculation

Derating Guidelines

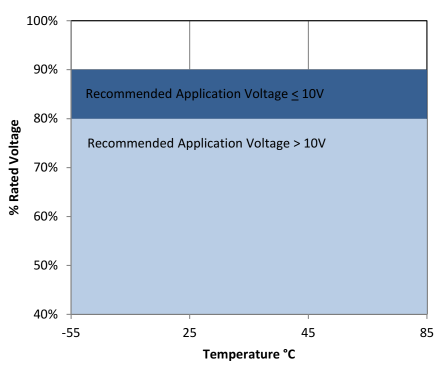
For Parts with Maximum Operational Temperature of 125°C



For Parts with Maximum Operational Temperature of 105°C



For Parts with Maximum Operational Temperature of 85°C



Recommended Application Voltage

KO-CAPs are solid state capacitors that demonstrate no wearout mechanism when operated within their recommended guidelines. While the KO-CAP can be operated at full rated voltage, most circuit designers seek a minimum level of assurance in long term reliability, which should be demonstrated with data. A voltage derating can provide the desired level of demonstrated reliability based on industry accepted acceleration models. Since most applications do require long term reliability, KEMET recommends that designers consider a 10% voltage derating, according to the graphic above, for the maximum steady state voltage.

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device.

Permissible AC ripple voltage which may be applied is limited by two criteria:
a. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
b. The negative peak AC voltage, in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage.

The maximum power dissipation by case size can be determined using the below table.

Temperature Compensation Multipliers for Maximum Ripple Current		
T ≤ 45°C	45° C < T ≤ 85°C	85°C < T ≤ 125°C
1.00	0.70	0.25

T = Environmental temperature

Using the P max of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{P\ max/R}$
$E(max) = Z\ \sqrt{P\ max/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
P max = maximum power dissipation(watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (Ohms)

Refer to part number listings for permittable Arms limits.

Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts at 45°C with +30°C Rise	
		For T520/T521/T545	For T523/T548
T	3528-12	105	N/A
M	3528-15	120	N/A
B	3528-21	127	N/A
W	7343-15	180	395
V	7343-20	187	410
Y	7343-40	241	N/A
X	7343-43	247	N/A
G	7360-12	N/A	300
J	7360-15	200	440
H	7360-20	200	440
O	7360-43	300	N/A

The maximum power dissipation rating must be reduced with increasing environmental operating temperatures. Refer to the Temperature Compensation Multiplier table for details.

Surge Voltage

Surge voltage is the maximum voltage (peak value) which may be applied to the capacitor. The surge voltage must not be applied for periodic charging and discharging in the course of normal operation and cannot be part of the application voltage. Surge voltage capability is demonstrated by application of 1,000 cycles at operating temperature. The parts are charged through a 33 Ohm resistor for 30 seconds and then discharged though a 33 Ohm resistor for each cycle.

Rated Voltage (V)	Surge Voltage (V)	Category Voltage (V)	Category Surge Voltage (V)
−55°C to 105°C		Up to 125°C	
2.5	3.3	–	–
6.3	8.3	–	–
10	13.2	–	–
16	21.1	–	–
20	26.4	13.4	17.4
25	33.0	–	–
35	46.2	–	–

Reverse Voltage

Polymer electrolytic capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a small degree of transient voltage reversal for short periods as shown in the below table.

Temperature	Permissible Transient Reverse Voltage
25°C	15% of Rated Voltage
55°C	10% of Rated Voltage
85°C	5% of Rated Voltage
105°C	3% of Rated Voltage
125°C*	1% of Rated Voltage

**For series rated to 125°C*

Table 2 – Land Dimensions/Courtyard

For T520/T521/T545

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
T	3528–12	2.35	2.21	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
B	3528–21	2.35	2.21	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
M	3528-15	2.35	2.21	0.92	6.32	4.00	2.23	1.80	1.12	5.22	3.50	2.13	1.42	1.28	4.36	3.24
W	7343–15	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
V	7343–20	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
Y[1]	7343–40	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
X[1]	7343–43	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
J	7360-15	4.25	2.77	3.67	10.22	7.30	4.13	2.37	3.87	9.12	6.80	4.03	1.99	4.03	8.26	6.54
H	7360-20	4.25	2.77	3.67	10.22	7.30	4.13	2.37	3.87	9.12	6.80	4.03	1.99	4.03	8.26	6.54
O[1]	7360-43	4.25	2.77	3.67	10.22	7.30	4.13	2.37	3.87	9.12	6.80	4.03	1.99	4.03	8.26	6.54

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*

[1] *Height of these chips may create problems in wave soldering.*

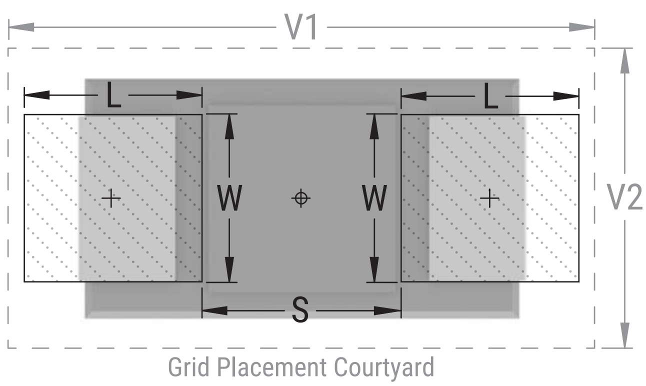
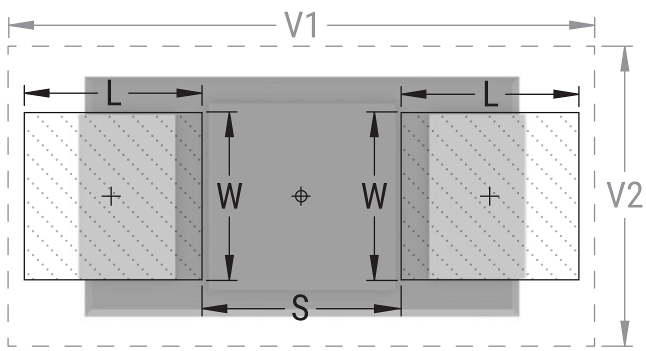


Table 2 – Land Dimensions/Courtyard cont.

For T523/T548

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
W	7343-15	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
V	7343-20	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
G	7360-12	4.60	3.07	3.07	10.22	7.30	4.48	2.67	3.27	9.12	6.80	4.38	2.29	3.43	8.26	6.54
J	7360-15	4.60	3.07	3.07	10.22	7.30	4.48	2.67	3.27	9.12	6.80	4.38	2.29	3.43	8.26	6.54
H	7360-20	4.60	3.07	3.07	10.22	7.30	4.48	2.67	3.27	9.12	6.80	4.38	2.29	3.43	8.26	6.54

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*



Grid Placement Courtyard

Soldering Process

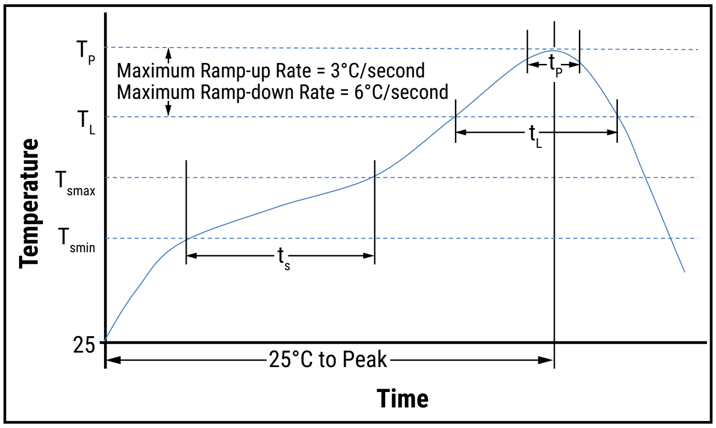
The KEMET families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 and O/7360-43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

Profile Feature	Pb-Free Assembly
Preheat/Soak	
Temperature Minimum (T_{Smin})	150°C
Temperature Maximum (T_{Smax})	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/second maximum
Liquidous Temperature (T_L)	217°C
Time Above Liquidous (t_L)	60 – 150 seconds
Peak Temperature (T_P)	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/second maximum
Time 25°C to Peak Temperature	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



Storage

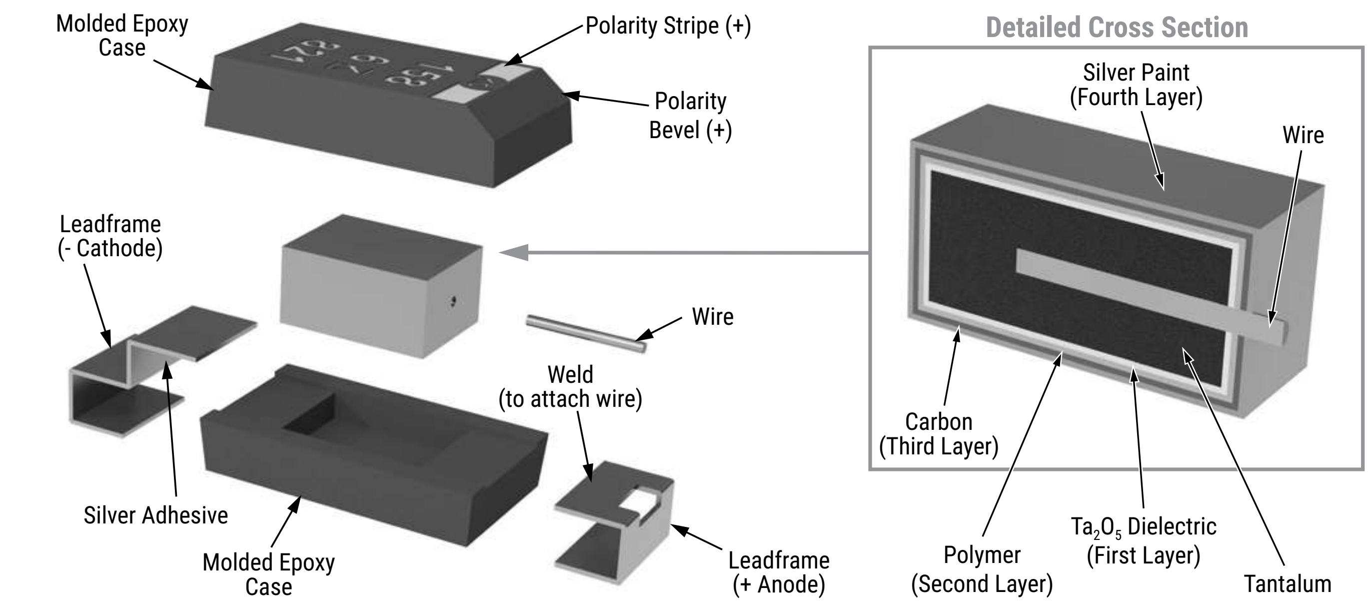
All KO-Cap are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as moisture sensitivity level 3 (MSL3) or moisture sensitivity level 4 (MSL4) per IPC/JEDEC J-STD-020 and packaged per IPC/JEDEC J–STD–033. Refer to Table 1 for part type specification. MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity. MSL4 specifies a floor time of 72H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

Calculated shelf life in sealed bag:
– 12 months from bag seal date in a storage environment of < 40°C and humidity < 90% RH
– 24 months from bag seal date in a storage environment of < 30°C and humidity < 70% RH

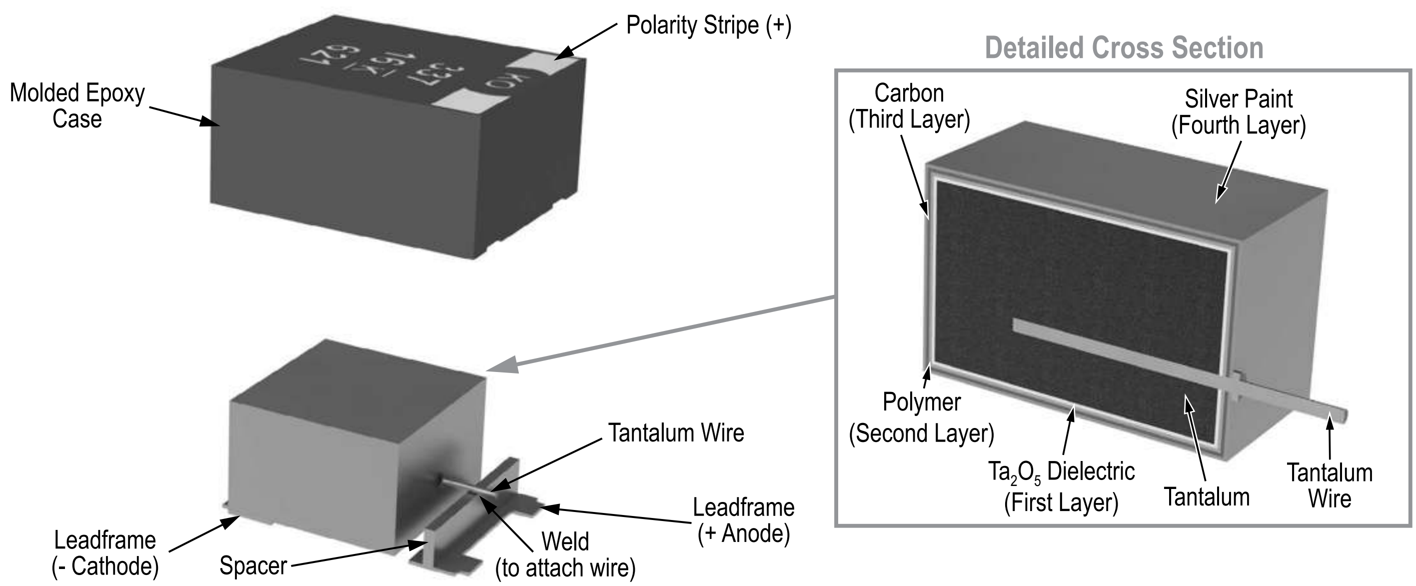
If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure

Construction

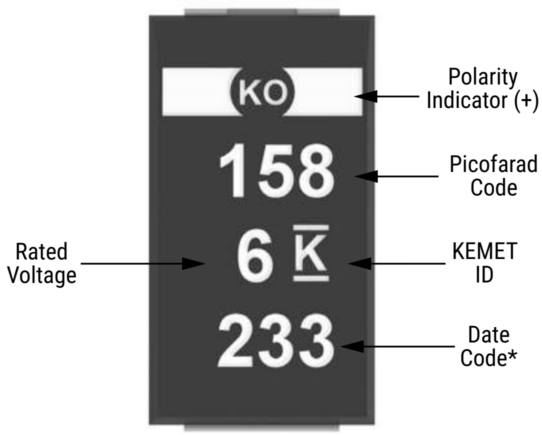
T520/T521/T545



T523/T548



Capacitor Marking



* 233 = 33rd week of 2022

Date Code *	
1st digit = Last number of year	9 = 2019 0 = 2020 1 = 2021 2 = 2022 3 = 2023
2nd and 3rd digit = Week of the year	01 = 1st week of the year to 52 = 52nd week of the year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481:* Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

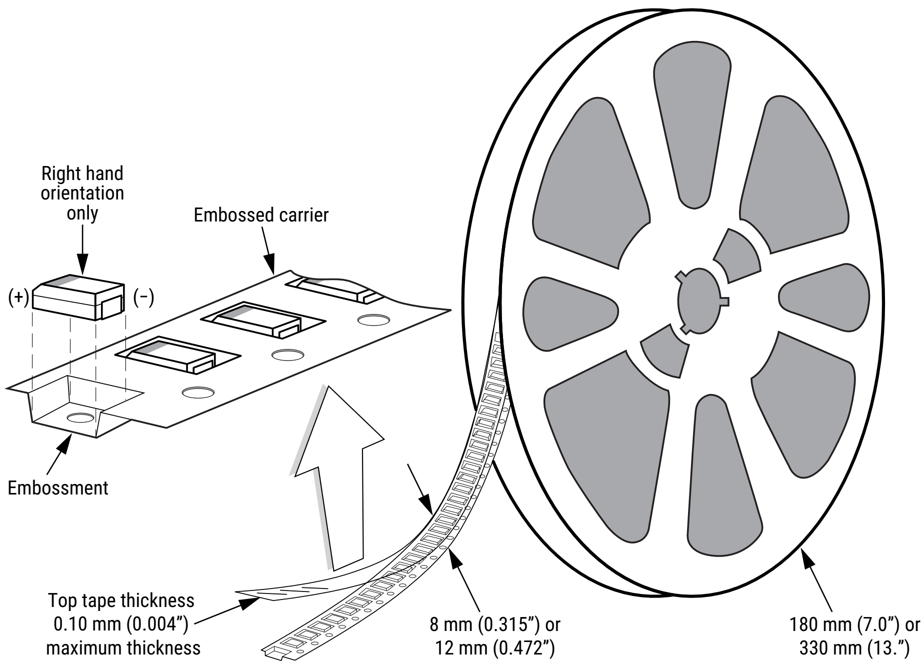


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
T	3528-12	8	2,500	10,000
M	3528-15	8	2,000	8,000
B	3528-21	8	2,000	8,000
W	7343-15	12	1,000	3,000
V	7343-20	12	1,000	3,000
Y	7343-40	12	500	2,000
X	7343-43	12	500	2,000
J	7360-15	12	1,000	3,000
H	7360-20	12	1,000	3,000
O	7360-43	12	500	2,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

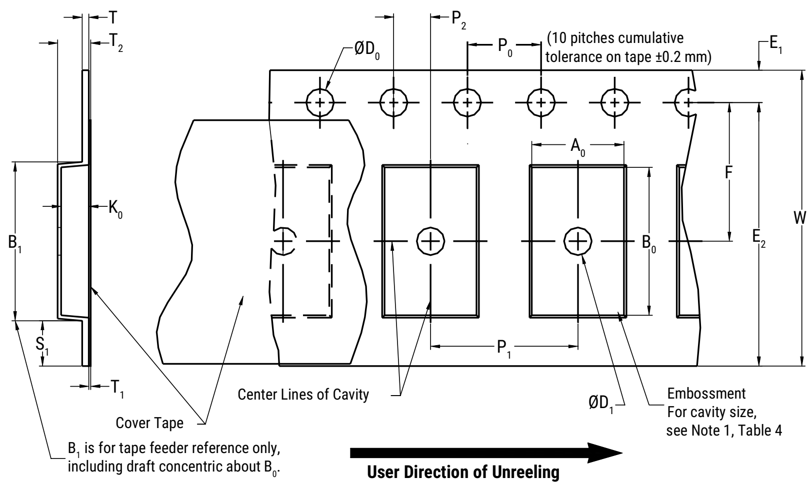


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/−0.0 (0.059 +0.004/−0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0, B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) and Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape, with or without components, shall pass around R without damage (see Figure 4).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
   (e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

Packaging Information Performance Notes

1. Cover Tape Break Force: 1.0 kg minimum.
2. Cover Tape Peel Strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 Newton (10 to 100 gf)
12 and 16 mm	0.1 to 1.3 Newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624.*

Figure 2 – Maximum Component Rotation

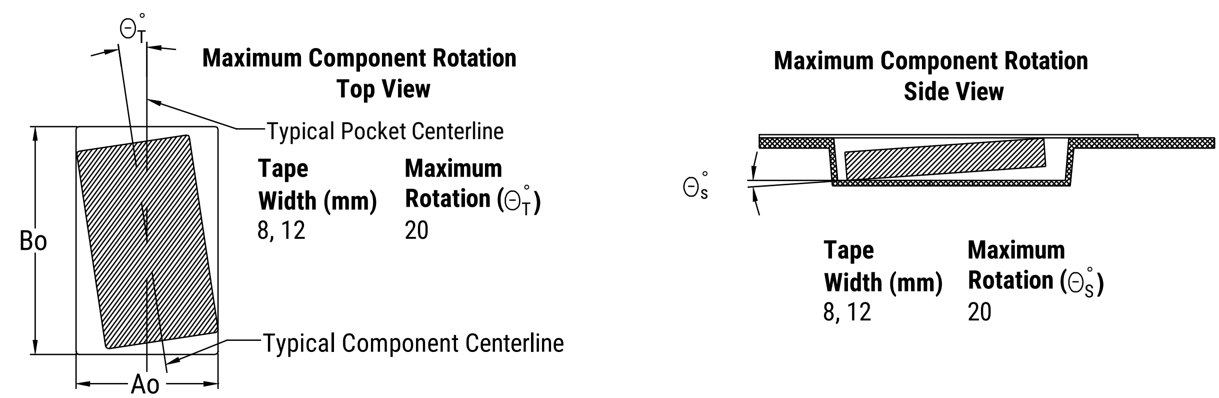


Figure 3 – Maximum Lateral Movement

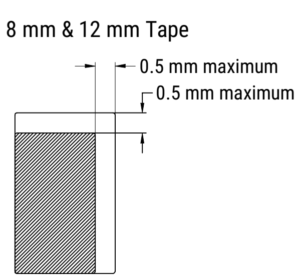


Figure 4 – Bending Radius

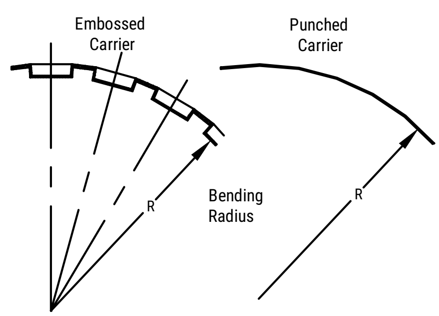
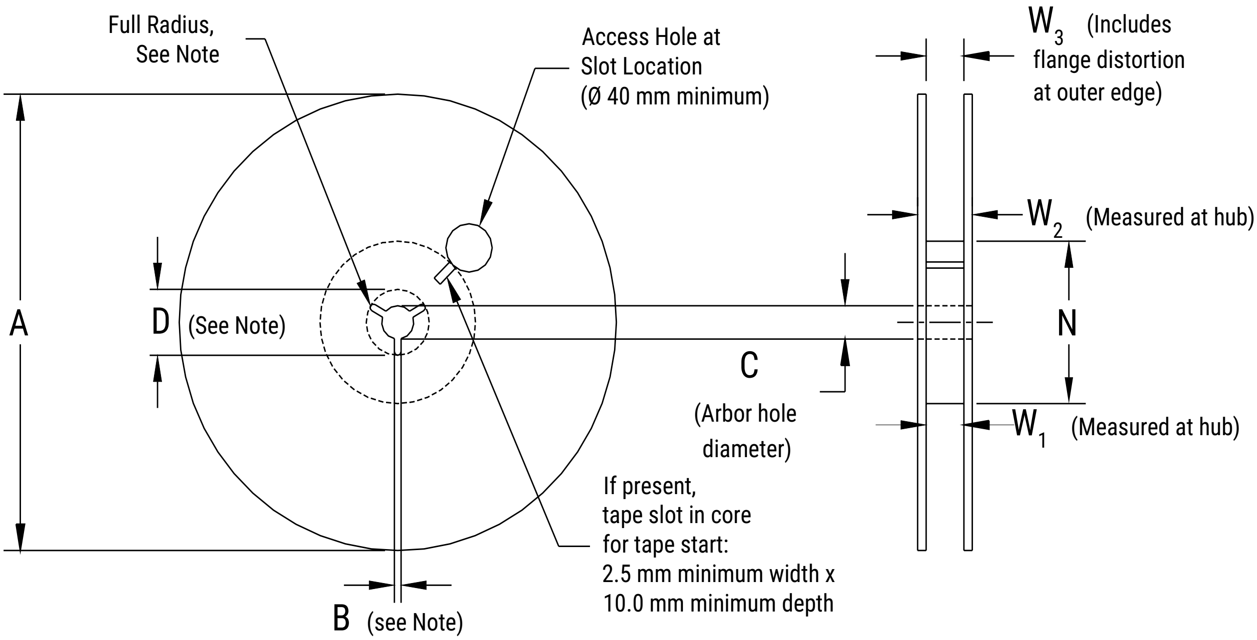


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
12 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

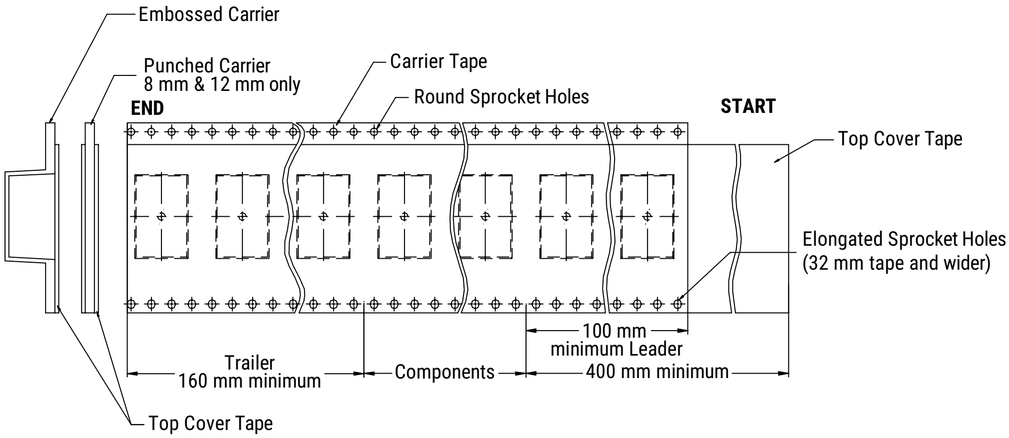
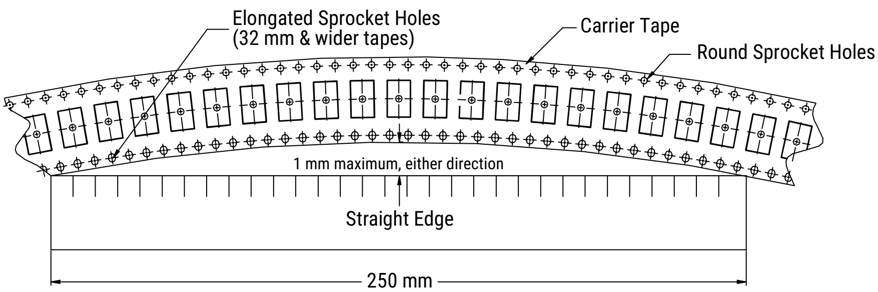


Figure 7 – Maximum Camber



PS/L Standard Small Size Polymer Capacitor

Overview

NeoCapacitor® provides excellent performance for various applications due to high conductivity of the conductive polymer.

TOKIN's devices are classified into the following three quality grades, in accordance with their application: Standard, Special, and Specific. The quality grade of all devices in this document is "standard" and cannot be used for "special" or "specific" quality grade applications. Customers who intend to use the products in this document for applications other than "standard" quality grade must contact KEMET sales representative in advance.

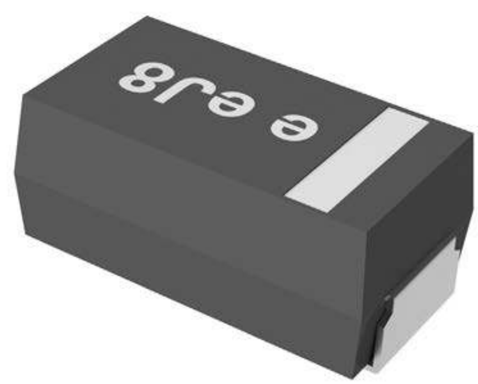
Standard: This quality grade is intended for applications in which failure or malfunction of the device is highly unlikely to cause harm to persons or damage to property, or be the source of any negative effects or problems in the wider community.

Special: This quality grade is intended for special applications that have common requirements, such specific industrial fields. Devices with a "special" quality grade are designed, manufactured, and tested using more a stringent quality assurance program than what is used for "standard" grade devices. There is a high possibility that failure or malfunction of the device when being used for applications in this category will cause harm to persons or damage to property, or bring negative effects or problems in the wider community.

Specific: Devices in this quality grade are designed, manufactured, and tested using a quality assurance program that is designated by the customer or that is created in accordance with the customer's specifications. There is an extremely high possibility that failure or malfunction of the device when being used for applications in this category will cause harm to persons or damage to property, or bring serious problems in the wider community. Customers who use KEMET's products for these "specific" applications must conclude an individual quality agreement and/or development agreement with KEMET. A quality assurance program designated by the customer must also be determined in advance.

Benefits

- Excellent noise absorption performance
- Higher ripple current
- Miniaturized, thinner, higher capacitance and lower ESR
- Lead free (JEITA PHASE3), RoHS2 directive (2011/65/EU + 2015/863/EU) and halogen-free.
- Antimony-free and Red phosphorous-free materials for mold resin.



Applications

Typical applications include voltage smoothing, noise absorption in high speed operation circuit , multi media instruments, PC (voltage smoothing and noise absorption of CPU, memory and various LSI), Smartphone, mobile phone (stabilization of battery voltage, stabilization for display), LCD TV (stabilization of LCD driver and timing controller) and others (tablet, PC, portable audio player, DSC, DVC, HDD, SSD, communication card, portable gaming devices, head-mounted displays, drones, IoT devices).

Ordering Information

TE	PSL	B2	1A	107	M	(45)	8R
Tape & Reel	Series	Case Code	DC Rated Voltage in Volts	Capacitance (pF)	Capacitance Tolerance	ESR Spec	Packing Orientation
φ 180 mm reel	Standard product of NeoCapacitor	A (3216–18) B3 (3528–12) B15 (3528–15) B2 (3528–21)	0E = 2.5 V 0G =4 V 0J = 6.3 V 1A = 10 V 1C = 16 V 1D = 20 V 1E = 25 V	First two digits represents the cap code. Third digit specifies number of zeros to follow	M = ±20%	For example: (45) shows 45 mΩ Blank = Refer to PN in Table 1 for specification	8 = Tape width (8 mm) R = Packaging orientation (Cathode on sprocket hole)

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to +105°C
Rated Voltage Range (V)	2.5 – 25
Surge Voltage (V)	Rated Voltage: 2.5 V, 4 V, 6.3 V, 10 V, 16 V, 20 V, 25 V Surge Voltage: 3.3 V, 5.2 V, 8 V, 13 V, 20 V, 23 V, 29 V
Nominal Capacitance (120 Hz)	3.3 µF ~ 470 µF*
Dissipation Factor (tan δ, 120 Hz)	Refer to Standard Ratings*
Leakage Current (LC, V_R, 5 minutes)	Refer to Standard Ratings
Equivalent Series Resistance (ESR, 100 kHz**)	Refer to Standard Ratings
Permissible Ripple Current (100 kHz**)	Refer to Standard Ratings

Rated Voltage	2.5 V	4 V	6.3 V	10 V	16 V	20 V	25 V
Surge Voltage	3.3 V	5.2 V	8 V	13 V	20 V	23 V	29 V

** For these measurements apply 1.5 VDC*
*** Partially ESR measurements should be taken at 300 k to 500 kHz*

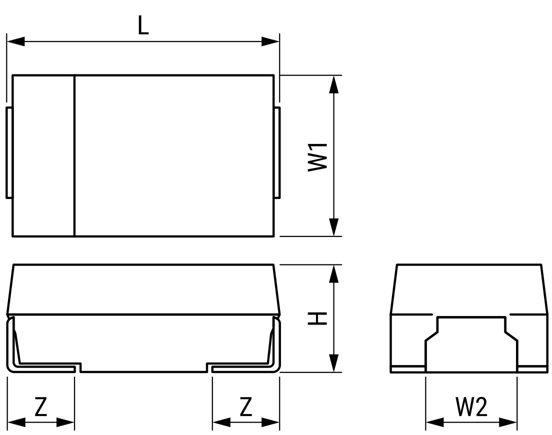
Qualification

Test	Condition	Characteristics			
Surge Voltage	Temperature: 105°C, Surge Voltage apply, 1,000 Ω series resistance, 1,000 cycles	Δ C/C	+20% ~ −20% of the initial value		
		tan δ	Within IL		
		LC	Within IL		
Temperature Stability	Temperature exposure at +25°C, −55°C, +105°C		+25°C	−55°C	+105°C
		Δ C/C	–	0% ~ −20% compare with +25°C	+50% ~0% compare with +25°C
		tan δ	Within IL	Within IL	Within 1.5 × IL
		LC	Within IL	–	Within 10 × IL
Endurance	Temperature: 105°C, Rated voltage apply, 2,000 hours*	Δ C/C	+20% ~ −20% of the initial value		
		tan δ	Within 1.5 × IL		
		LC	Within IL		
Humidity	Temperature: 60°C, Humidity: 90 ~ 95% R.H., 500 hours	Δ C/C	+30% ~ −20% of the initial value		
		tan δ	Within 1.5 × IL		
		LC	Within IL		

IL = Initial limit
** 85°C, Rated voltage apply, 1,000 hours for TEPSLB20E477M(14)8R.*

Dimensions – Millimeters

Metric will govern



Case Size		Component Dimensions				
KEMET	EIA	L ±0.2	W1 ±0.2	W2 ±0.1	H	Z ±0.2
A	3216-18	3.2	1.6	1.2	1.6 ± 0.2	0.8
B3	3528-12	3.5	2.8	2.2	1.1 ± 0.1	0.8
B15	3528-15	3.5	2.8	2.2	1.4 ± 0.1	0.8
B2	3528-21	3.5	2.8	2.2	1.9 ± 0.1	0.8

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA_{rms}, +25°C, 100 kHz) Maximum	°C
2.5	47	A/3216-18	TEPSLA0E476M8R	11.7	6	180	645	105
2.5	100	A/3216-18	TEPSLA0E107M8R	25	8	100	866	105
2.5	100	A/3216-18	TEPSLA0E107M(45)8R	25	8	45	1291	105
2.5	100	A/3216-18	TEPSLA0E107M(35)8R	25	8	35	1464	105
2.5	100	B3/3528-12	TEPSLB30E107M8R	25	8	70	1035	105
2.5	220	A/3216-18	TEPSLA0E227M(70)8R	55	8	70	1035	105
2.5	220	A/3216-18	TEPSLA0E227M(45)8R	55	8	45 *	1291 *	105
2.5	220	A/3216-18	TEPSLA0E227M(35)8R	55	8	35 *	1464 *	105
2.5	220	A/3216-18	TEPSLA0E227M(25)8R	55	8	25 *	1732 *	105
2.5	220	B2/3528-21	TEPSLB20E227M8R	55	8	45	1374	105
2.5	220	B2/3528-21	TEPSLB20E227M(35)8R	55	8	35	1558	105
2.5	220	B2/3528-21	TEPSLB20E227M(25)8R	55	8	25	1844	105
2.5	220	B2/3528-21	TEPSLB20E227M(21)8R	55	8	21	2012	105
2.5	220	B2/3528-21	TEPSLB20E227M(15)8R	55	8	15 *	2380 *	105
2.5	220	B3/3528-12	TEPSLB30E227M8R	55	8	70	1035	105
2.5	220	B3/3528-12	TEPSLB30E227M(35)8R	55	8	35	1464	105
2.5	330	B2/3528-21	TEPSLB20E337M(45)8R	82.5	8	45	1374	105
2.5	330	B2/3528-21	TEPSLB20E337M(35)8R	82.5	8	35	1558	105
2.5	330	B2/3528-21	TEPSLB20E337M(21)8R	82.5	8	21	2012	105
2.5	330	B2/3528-21	TEPSLB20E337M(15)8R	82.5	8	15 *	2380 *	105
2.5	470	B2/3528-21	TEPSLB20E477M(14)8R	188	8	14 *	2464 *	85
4	47	A/3216-18	TEPSLA0G476M8R	18.8	6	180	645	105
4	47	A/3216-18	TEPSLA0G476M(70)8R	18.8	6	70	1035	105
4	68	A/3216-18	TEPSLA0G686M8R	27.2	6	180	645	105
4	100	A/3216-18	TEPSLA0G107M8R	40	8	100	866	105
4	100	A/3216-18	TEPSLA0G107M(45)8R	40	8	45	1291	105
4	100	A/3216-18	TEPSLA0G107M(35)8R	40	8	35	1464	105
4	100	A/3216-18	TEPSLA0G107M(25)8R	40	8	25	1732	105
4	100	B2/3528-21	TEPSLB20G107M8R	40	8	70	1102	105
4	100	B2/3528-21	TEPSLB20G107M(45)8R	40	8	45	1374	105
4	100	B2/3528-21	TEPSLB20G107M(35)8R	40	8	35	1558	105
4	100	B3/3528-12	TEPSLB30G107M8R	40	8	70	1035	105
4	150	B2/3528-21	TEPSLB20G157M8R	60	8	45	1374	105
4	150	B2/3528-21	TEPSLB20G157M(35)8R	60	8	35	1558	105
4	150	B2/3528-21	TEPSLB20G157M(30)8R	60	8	30	1683	105
4	150	B2/3528-21	TEPSLB20G157M(25)8R	60	8	25	1844	105
4	220	B2/3528-21	TEPSLB20G227M8R	88	8	45	1374	105
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA_{rms}, +25°C, 100 kHz) Maximum	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature

** ESR and Ripple measurement condition is 300 to 500kHz*
◊ Ripple current condition is at 105°C, 100kHz

Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA_{rms}, +25°C, 100 kHz) Maximum	°C
4	220	B2/3528-21	TEPSLB20G227M(35)8R	88	8	35	1558	105
4	220	B2/3528-21	TEPSLB20G227M(15)8R	88	8	15	2380	105
6.3	6.8	A/3216-18	TEPSLA0J685M8R	4.2	6	300	500	105
6.3	10	A/3216-18	TEPSLA0J106M8R	6.3	6	200	612	105
6.3	15	A/3216-18	TEPSLA0J156M8R	9.4	6	200	612	105
6.3	22	A/3216-18	TEPSLA0J226M8R	13.8	6	180	645	105
6.3	22	B2/3528-21	TEPSLB20J226M8R	13.8	8	150	753	105
6.3	22	B3/3528-12	TEPSLB30J226M8R	13.8	8	70	1035	105
6.3	33	A/3216-18	TEPSLA0J336M8R	20.7	6	180	645	105
6.3	33	B2/3528-21	TEPSLB20J336M8R	20.7	8	150	753	105
6.3	33	B3/3528-12	TEPSLB30J336M8R	20.7	8	70	1035	105
6.3	47	A/3216-18	TEPSLA0J476M8R	29.6	6	150	645	105
6.3	47	A/3216-18	TEPSLA0J476M(70)8R	29.6	6	70	1035	105
6.3	47	B2/3528-21	TEPSLB20J476M8R	29.6	8	150	753	105
6.3	47	B2/3528-21	TEPSLB20J476M(70)8R	29.6	8	70	1102	105
6.3	47	B3/3528-12	TEPSLB30J476M8R	29.6	8	70	1035	105
6.3	47	B3/3528-12	TEPSLB30J476M(55)8R	29.6	8	55	1168	105
6.3	68	A/3216-18	TEPSLA0J686M(70)8R	43	8	70	1035	105
6.3	68	B2/3528-21	TEPSLB20J686M8R	42.8	8	70	1102	105
6.3	68	B2/3528-21	TEPSLB20J686M(55)8R	42.8	8	55	1243	105
6.3	68	B3/3528-12	TEPSLB30J686M8R	42.8	8	70	1035	105
6.3	100	A/3216-18	TEPSLA0J107M8R	63	8	70	1035	105
6.3	100	A/3216-18	TEPSLA0J107M(45)8R	63	8	45	1291	105
6.3	100	A/3216-18	TEPSLA0J107M(35)8R	63	8	35	1464	105
6.3	100	A/3216-18	TEPSLA0J107M(25)8R	63	8	25	1735	105
6.3	100	B2/3528-21	TEPSLB20J107M8R	63	8	70	1102	105
6.3	100	B2/3528-21	TEPSLB20J107M(45)8R	63	8	45	1374	105
6.3	100	B2/3528-21	TEPSLB20J107M(35)8R	63	8	35	1558	105
6.3	100	B2/3528-21	TEPSLB20J107M(25)8R	63	8	25	1844	105
6.3	100	B3/3528-12	TEPSLB30J107M8R	63	8	70	1035	105
6.3	100	B3/3528-12	TEPSLB30J107M(45)8R	63	8	45	1291	105
6.3	150	B15/3528-15	TEPSLB150J157M(70)8R	94.5	10	70	1069	105
6.3	150	B15/3528-15	TEPSLB150J157M(35)8R	94.5	10	35	1512	105
6.3	150	B2/3528-21	TEPSLB20J157M(45)8R	94.5	8	45	1374	105
6.3	150	B2/3528-21	TEPSLB20J157M(35)8R	94.5	8	35	1558	105
6.3	150	B2/3528-21	TEPSLB20J157M(25)8R	94.5	8	25	1844	105
6.3	150	B3/3528-12	TEPSLB30J157M(35)8R	94.5	8	35	1464	105
6.3	220	B15/3528-15	TEPSLB150J227M(35)8R	138.6	10	35	1512	105
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA_{rms}, +25°C, 100 kHz) Maximum	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature

** ESR and Ripple measurement condition is 300 to 500kHz*
◊ Ripple current condition is at 105°C, 100kHz

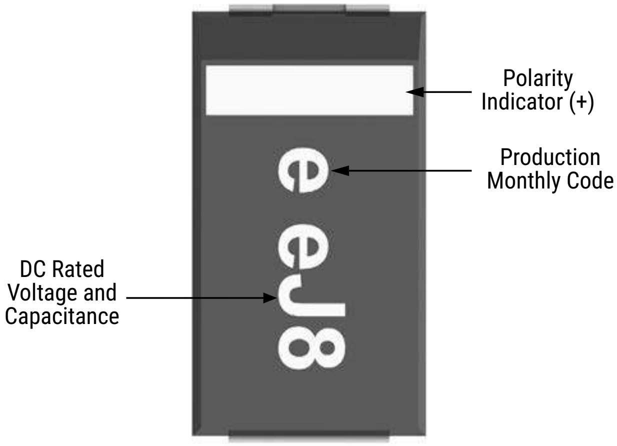
Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA_{rms}, +25°C, 100 kHz) Maximum	°C
6.3	220	B2/3528-21	TEPSLB20J227M(45)8R	138.6	8	45	1374	105
6.3	220	B2/3528-21	TEPSLB20J227M(35)8R	138.6	8	35	1558	105
6.3	220	B2/3528-21	TEPSLB20J227M(25)8R	138.6	8	25	1844	105
6.3	220	B2/3528-21	TEPSLB20J227M(18)8R	138.6	8	18	2173	105
6.3	220	B2/3528-21	TEPSLB20J227M(15)8R	138.6	8	15	2380	105
6.3	330	B2/3528-21	TEPSLB20J337M(45)8R	415.8	8	45	1374	105
10	4.7	A/3216-18	TEPSLA1A475M8R	4.7	6	300	500	105
10	6.8	A/3216-18	TEPSLA1A685M8R	6.8	6	300	500	105
10	10	A/3216-18	TEPSLA1A106M8R	10	6	200	612	105
10	10	B2/3528-21	TEPSLB21A106M8R	10	8	200	652	105
10	15	A/3216-18	TEPSLA1A156M8R	15	6	180	645	105
10	15	B2/3528-21	TEPSLB21A156M8R	15	8	150	753	105
10	22	A/3216-18	TEPSLA1A226M8R	22	6	180	645	105
10	22	B2/3528-21	TEPSLB21A226M8R	22	8	150	753	105
10	22	B3/3528-12	TEPSLB31A226M8R	22	8	70	1035	105
10	33	A/3216-18	TEPSLA1A336M8R	33	8	200	612	105
10	33	B2/3528-21	TEPSLB21A336M8R	33	8	150	753	105
10	33	B3/3528-12	TEPSLB31A336M8R	33	8	70	1035	105
10	47	A/3216-18	TEPSLA1A476M(180)8R	47	8	180	645	105
10	47	A/3216-18	TEPSLA1A476M(45)8R	47	8	45	1291	105
10	47	B2/3528-21	TEPSLB21A476M8R	47	8	70	1102	105
10	47	B2/3528-21	TEPSLB21A476M(35)8R	47	8	35	1558	105
10	47	B3/3528-12	TEPSLB31A476M8R	47	8	70	1035	105
10	47	B3/3528-12	TEPSLB31A476M(45)8R	47	8	45	1291	105
10	100	B2/3528-21	TEPSLB21A107M(45)8R	100	10	45	1374	105
16	3.3	A/3216-18	TEPSLA1C335M8R	5.2	6	800	306 ◊	105
16	4.7	B2/3528-21	TEPSLB21C475M8R	7.5	8	200	652 ◊	105
16	6.8	B2/3528-21	TEPSLB21C685M8R	10.8	8	200	652 ◊	105
16	10	A/3216-18	TEPSLA1C106M8R	16	8	200	612	105
16	10	B2/3528-21	TEPSLB21C106M8R	16	8	100	922 ◊	105
16	15	B2/3528-21	TEPSLB21C156M(90)8R	16	10	90	972 ◊	105
16	33	B2/3528-21	TEPSLB21C336M8R	52.8	8	70	1102 ◊	105
16	33	B3/3528-12	TEPSLB31C336M8R	105.6	8	70	1035 ◊	105
16	33	B3/3528-12	TEPSLB31C336M(55)8R	105.6	8	55	1168 ◊	105
16	33	B3/3528-12	TEPSLB31C336M(45)8R	105.6	8	45	1291 ◊	105
20	33	B2/3528-21	TEPSLB21D336M8R	132	10	90	972 ◊	105
25	6.8	B2/3528-21	TEPSLB21E685M8R	17	8	100	922 ◊	105
25	6.8	B3/3528-12	TEPSLB31E685M8R	34	8	100	866 ◊	105
25	10	B15/3528-15	TEPSLB151E106M8R	50	10	100	894 ◊	105
25	15	B2/3528-21	TEPSLB21E156M8R	75	10	100	922 ◊	105
25	22	B2/3528-21	TEPSLB21E226M8R	55	10	90	972 ◊	105
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA_{rms}, +25°C, 100 kHz) Maximum	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature

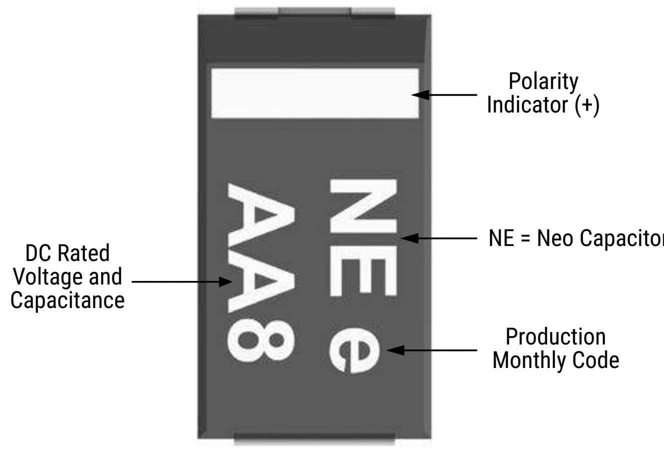
** ESR and Ripple measurement condition is 300 to 500kHz*
◊ Ripple current condition is at 105°C, 100kHz

Capacitor Marking

A Case



B15, B2 & B3 Case



DC Rated Voltage and Capacitance Code

Capacitance (µF)		Voltage						
		2.5 e	4 g	6.3 j	10 A	16 C	20 D	25 E
3.3	N6					CN6		
4.7	S6				AS6	CS6		
6.8	W6			jW6	AW6	CW6		EW6
10	A7			jA7	AA7	CA7		EA7
15	E7			jE7	AE7	CE7		EE7
22	J7			jJ7	AJ7			EJ7
33	N7			jN7	AN7	CN7	DN7	
47	S7	eS7	gS7	jS7	AS7			
68	W7		gW7	jW7				
100	A8	eA8	gA8	jA8	AA8			
150	E8		gE8	jE8				
220	J8	eJ8	gJ8	jJ8				
330	N8	eN8		jN8				
470	S8	eS8						

Production Monthly Code

Year	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2021	A	B	C	D	E	F	G	H	J	K	L	M
2022	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	a	b	c	d	e	f	g	h	j	k	l	m
2024	n	p	q	r	s	t	u	v	w	x	y	z

Production monthly code will resume beginning in 2025.

PS/G Ultra Low ESR Polymer Capacitor

KEMET
a YAGEO company

Overview

NeoCapacitor® provides excellent performance for various applications due to high conductivity of the conductive polymer.

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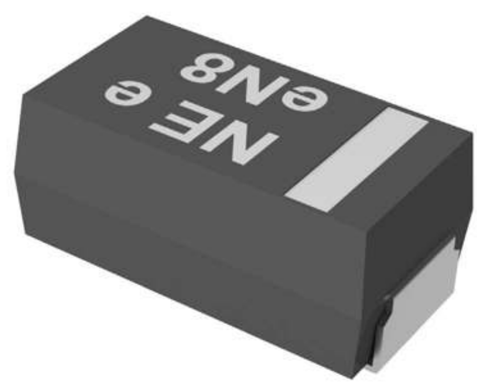
Benefits

- Excellent noise absorption performance
- Higher ripple current
- Miniaturized, thinner, higher capacitance and lower ESR
- Lead free (JEITA PHASE3), RoHS2 directive (2011/65/EU + 2015/863/EU) and halogen-free.
- Antimony-free and Red phosphorous-free materials for mold resin.



Applications

Typical applications include voltage smoothing, noise absorption in high speed operation circuit , multi media instruments, PC (voltage smoothing and noise absorption of CPU, memory and various LSI), Smartphone, mobile phone (stabilization of battery voltage, stabilization for display), LCD TV (stabilization of LCD driver and timing controller) and others (tablet, PC, portable audio player, DSC, DVC, HDD, SSD, communication card, portable gaming devices, head-mounted displays, drones, IoT devices).

Ordering Information

TE	PSG	B2	0E	337	M	9	8R
Tape & Reel	Series	Case Code	DC Rated Voltage in Volts	Capacitance (pF)	Capacitance Tolerance	ESR Spec	Packing Orientation
φ 180 mm reel	Lower ESR of NeoCapacitor	B2 (3528–21)	0E = 2.5 V	First two digits represents the cap code. Third digit specifies number of zeros to follow	M = ±20%	For example: 9 shows 9 mΩ	8 = tape width (8 mm) R = packaging orientation (cathode on sprocket hole)

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	–55°C to +105°C
Rated Voltage Range (V)	2.5
Surge Voltage (V)	1.3 x rated voltage
Nominal Capacitance (120 Hz)	330 µF*
Dissipation Factor (tan δ, 120 Hz)	Refer to Standard Ratings*
Leakage Current (LC, V_R, 5 minutes)	Refer to Standard Ratings
Equivalent Series Resistance (ESR, 300 k ~ 500 kHz)	Refer to Standard Ratings
Permissible Ripple Current (300 k ~ 500 kHz)	Refer to Standard Ratings

** For these measurements apply 1.5 VDC*

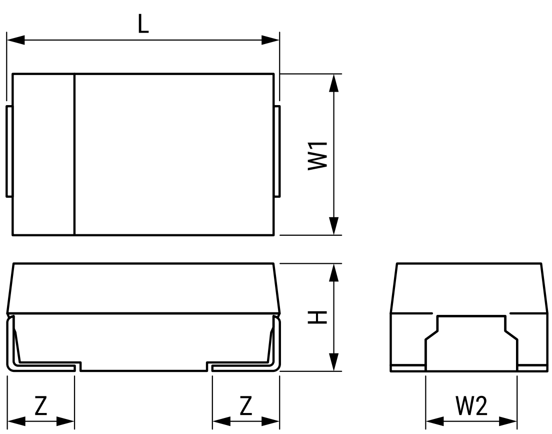
Qualification

Test	Condition	Characteristics			
Surge Voltage	Temperature: 85°C, Surge Voltage apply, 1,000 Ω series resistance, 1,000 cycles	Δ C/C	+20% ~ −20% of the initial value		
		tan δ	Within IL		
		LC	Within IL		
Temperature Stability	Temperature exposure at +25°C, −55°C, +105°C		+25°C	-55°C	+105°C
		Δ C/C	–	0% ~ −20% compare with +25°C	+50% ~0% compare with +25°C
		tan δ	Within IL	Within IL	Within 1.5 × IL
		LC	Within IL	–	Within 10 × IL
Endurance	Temperature: 105°C, Rated voltage apply, 1,000 hours	Δ C/C	+20% ~ −20% of the initial value		
		tan δ	Within 1.5 × IL		
		LC	Within IL		
Humidity	Temperature: 60°C, Humidity: 90 ~ 95% R.H., 500 hours	Δ C/C	+30% ~ −20% of the initial value		
		tan δ	Within 1.5 × IL		
		LC	Within IL		

IL = Initial limit

Dimensions – Millimeters

Metric will govern

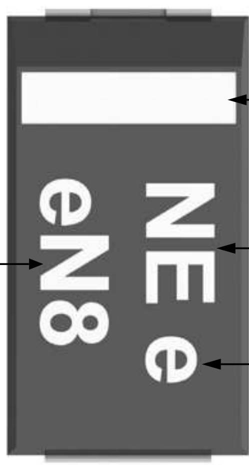


Case Size		Component Dimensions				
KEMET	EIA	L ±0.2	W1 ±0.2	W2 ±0.1	H	Z ±0.2
B2	3528−21	3.5	2.8	2.2	1.9±0.1	0.8

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 300 ~ 500 kHz Maximum	(mA_{rms}, +25°C, 300 ~ 500 kHz) Maximum	°C
2.5	330	B2/3528-21	TEPSGB20E337M9-8R	82.5	8	9 *	3073 *	105

Capacitor Marking



DC Rated Voltage and Capacitance Code

Capacitance (µF)		Voltage
		2.5 e
330	N8	eN8

Production Monthly Code

Year	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2021	A	B	C	D	E	F	G	H	J	K	L	M
2022	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	a	b	c	d	e	f	g	h	j	k	l	m
2024	n	p	q	r	s	t	u	v	w	x	y	z

Production monthly code will resume beginning in 2025.

TOKIN NeoCapacitor

PS/K Standard Big Size Polymer Capacitor

Overview

NeoCapacitor® provides excellent performance for various applications due to high conductivity of the conductive polymer.

TOKIN's devices are classified into the following three quality grades, in accordance with their application: Standard, Special, and Specific. The quality grade of all devices in this document is "standard" and cannot be used for "special" or "specific" quality grade applications. Customers who intend to use the products in this document for applications other than "standard" quality grade must contact KEMET sales representative in advance.

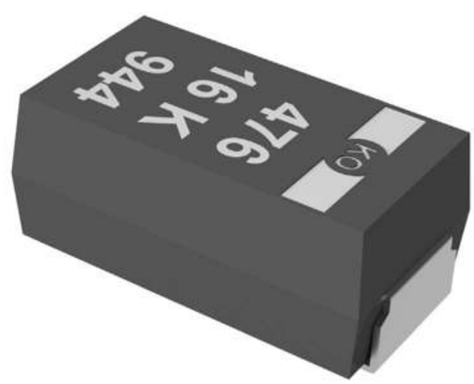
Standard: This quality grade is intended for applications in which failure or malfunction of the device is highly unlikely to cause harm to persons or damage to property, or be the source of any negative effects or problems in the wider community.

Special: This quality grade is intended for special applications that have common requirements, such specific industrial fields. Devices with a "special" quality grade are designed, manufactured, and tested using more a stringent quality assurance program than what is used for "standard" grade devices. There is a high possibility that failure or malfunction of the device when being used for applications in this category will cause harm to persons or damage to property, or bring negative effects or problems in the wider community.

Specific: Devices in this quality grade are designed, manufactured, and tested using a quality assurance program that is designated by the customer or that is created in accordance with the customer's specifications. There is an extremely high possibility that failure or malfunction of the device when being used for applications in this category will cause harm to persons or damage to property, or bring serious problems in the wider community. Customers who use KEMET's products for these "specific" applications must conclude an individual quality agreement and/or development agreement with KEMET. A quality assurance program designated by the customer must also be determined in advance.

Benefits

- Excellent noise absorption performance
- Higher ripple current
- Miniaturized, thinner, higher capacitance and lower ESR
- Lead free (JEITA PHASE3), RoHS2 directive (2011/65/EU + 2015/863/EU) and halogen-free.
- Antimony-free and Red phosphorous-free materials for mold resin.



Applications

Typical applications include voltage smoothing, noise absorption in high speed operation circuit , multi media instruments, PC (voltage smoothing and noise absorption of CPU, memory and various LSI), Smartphone, mobile phone (stabilization of battery voltage, stabilization for display), LCD TV (stabilization of LCD driver and timing controller) and others (tablet, PC, portable audio player, DSC, DVC, HDD, SSD, communication card, portable gaming devices, head-mounted displays, drones, IoT devices).

Ordering Information

PSK	V	0J	477	M	055	C
Series	Case Code	DC Rated Voltage in Volts	Capacitance (pF)	Capacitance tolerance	ESR Spec	Reel Diameter
Larger case size	V (7343–19) V15 (7343–15) D (7343–31)	0E = 2.5 V 0G = 4 V 0J = 6.3 V 1A = 10 V 1C = 16 V 1D = 20 V 1E = 25 V	First two digits represents the cap code. Third digit specifies number of zeros to follow	M = ±20%	055 = 55 mΩ	B = 180 mm C = 330 mm

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to +105°C
Rated Voltage Range (V)	2.5 – 25
Surge Voltage (V)	1.3 x rated voltage
Nominal Capacitance (120 Hz)	15 µF ~ 1,000 µF*
Dissipation Factor (tan δ, 120 Hz)	Refer to Standard Ratings*
Leakage Current (LC, V_R, 5 minutes)	Refer to Standard Ratings
Equivalent Series Resistance (ESR, 100 kHz)	Refer to Standard Ratings
Permissible Ripple Current (100 kHz)	Refer to Standard Ratings

** For these measurements apply 1.5 VDC*

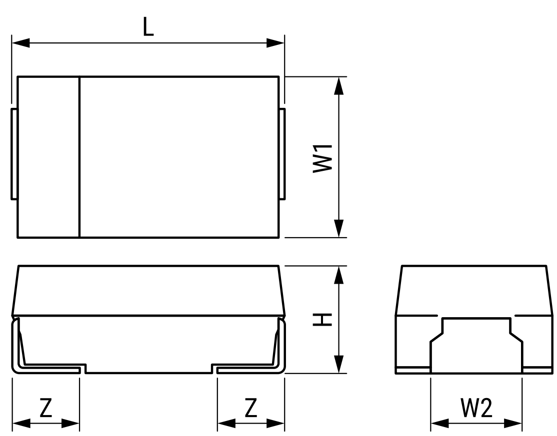
Qualification

Test	Condition	Characteristics			
Surge Voltage	Temperature: 105°C, Surge Voltage apply, 1,000 cycles	Δ C/C	Within −20%/+10% of the initial value		
		tan δ	Within IL		
		LC	Within IL		
Temperature Stability	Temperature exposure at +25°C, −55°C, +105°C		+25°C	−55°C	+105°C
		Δ C/C	–	Within −20%/+20% compare with +25°C	Within -30%/+30% compare with +25°C
		tan δ	Within IL	Within IL	Within 1.5 × IL
		LC	Within IL	–	Within 10 × IL
Endurance	Temperature: 105°C, Rated voltage apply, 2,000 hours	Δ C/C	Within −20%/+10% of the initial value		
		tan δ	Within IL		
		LC	Within 1.25 × IL		
Humidity	Temperature: 60°C, Humidity: 90% R.H., 500 hours	Δ C/C	Within −5%/+35% of the initial value		
		tan δ	Within IL		
		LC	Within 3 x IL		

IL = Initial limit

Dimensions – Millimeters

Metric will govern



Case Size		Component Dimensions				
KEMET	EIA	L ±0.3	W1 ±0.3	W2 ±0.1	H	Z ±0.2
D	7343−31	7.3	4.3	2.4	2.8±0.3	1.3
V	7343−19	7.3	4.3	2.4	1.9±0.1	1.3
V15	7343−15	7.3	4.3	2.4	1.4±0.1	1.3

TOKIN NeoCapacitor

F/PS Low Profile High Capacitance Polymer Capacitor

Overview

NeoCapacitor® provides excellent performance for various applications due to high conductivity of the conductive polymer.

TOKIN's devices are classified into the following three quality grades, in accordance with their application: Standard, Special, and Specific. The quality grade of all devices in this document is "standard" and cannot be used for "special" or "specific" quality grade applications. Customers who intend to use the products in this document for applications other than "standard" quality grade must contact KEMET sales representative in advance.

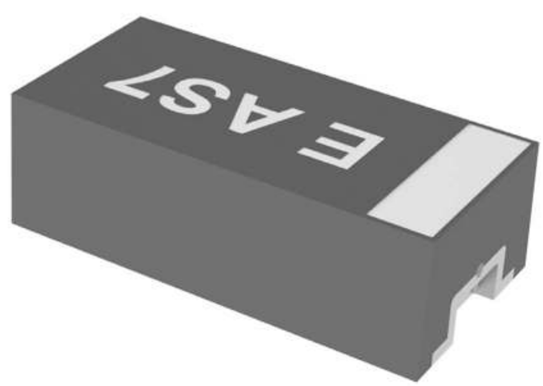
Standard: This quality grade is intended for applications in which failure or malfunction of the device is highly unlikely to cause harm to persons or damage to property, or be the source of any negative effects or problems in the wider community.

Special: This quality grade is intended for special applications that have common requirements, such specific industrial fields. Devices with a "special" quality grade are designed, manufactured, and tested using more a stringent quality assurance program than what is used for "standard" grade devices. There is a high possibility that failure or malfunction of the device when being used for applications in this category will cause harm to persons or damage to property, or bring negative effects or problems in the wider community.

Specific: Devices in this quality grade are designed, manufactured, and tested using a quality assurance program that is designated by the customer or that is created in accordance with the customer's specifications. There is an extremely high possibility that failure or malfunction of the device when being used for applications in this category will cause harm to persons or damage to property, or bring serious problems in the wider community. Customers who use KEMET's products for these "specific" applications must conclude an individual quality agreement and/or development agreement with KEMET. A quality assurance program designated by the customer must also be determined in advance.

Benefits

- Excellent noise absorption performance
- Higher ripple current
- Miniaturized, thinner, higher capacitance and lower ESR
- Lead free (JEITA PHASE3), RoHS2 directive (2011/65/EU + 2015/863/EU) and halogen-free.
- Antimony-free and Red phosphorous-free materials for mold resin.



Applications

Typical applications include voltage smoothing, noise absorption in high speed operation circuit , multi media instruments, PC (voltage smoothing and noise absorption of CPU, memory and various LSI), Smartphone, mobile phone (stabilization of battery voltage, stabilization for display), LCD TV (stabilization of LCD driver and timing controller) and others (tablet, PC, portable audio player, DSC, DVC, HDD, SSD, communication card, portable gaming devices, head-mounted displays, drones, IoT devices).

Ordering Information

TE	FPS	A3	0J	107	M	(100)	8R
Tape & Reel	Series	Case Code	DC Rated Voltage in Volts	Capacitance (pF)	Capacitance tolerance	ESR Spec	Packing Orientation
TE = φ 180 mm reel	Face down structure	A2 (3216–12) A3 (3216–10) B10 (3528–10) B3 (3528–12)	0G = 4 V 0J = 6.3 V 1A = 10 V 1C = 16 V 1D = 20 V 1E = 25 V 1V = 35 V	First two digits represents the cap code. Third digit specifies number of zeros to follow	M = ±20%	(100) shows 100 mΩ Blank = Refer to PN in Table 1 for specification	8 = Tape width (8 mm) R = Packaging orientation (cathode on sprocket hole)

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	–55°C to +105°C
Rated Voltage Range (V)	4 – 35
Surge Voltage (V)	Rated Voltage: 4 V, 6.3 V, 10 V, 16 V, 20 V, 25 V, 35 V Surge Voltage: 5.2 V, 8 V, 13 V, 20.7 V, 23 V, 29 V, 41 V
Nominal Capacitance (120 Hz)	6.8 µF ~ 220 µF*
Dissipation Factor (tan δ, 120 Hz)	Refer to Standard Ratings*
Leakage Current (LC, V_R, 5 minutes)	Refer to Standard Ratings
Equivalent Series Resistance (ESR, 100 kHz)	Refer to Standard Ratings
Permissible Ripple Current (100 kHz)	Refer to Standard Ratings

** For these measurements apply 1.5 VDC*

Qualification

A2/A3/B3 case

Test	Condition	Characteristics			
Surge Voltage	Temperature: 85°C, Surge Voltage apply, 1,000 Ω series resistance, 1,000 cycles	Δ C/C	Within −20%/+20% of the initial value		
		tan δ	Within IL		
		LC	Within IL		
Temperature Stability	Temperature exposure at +25°C, −55°C, +105°C		+25°C	-55°C	+105°C
		Δ C/C	–	0% ~ −20% compare with +25°C	+50% ~ 0% compare with +25°C
		tan δ	Within IL	Within IL	Within 1.5 × IL
		LC	Within IL	–	Within 10 × IL
Endurance	Temperature: 105°C, Rated voltage apply, Time: 1,000 hours 2,000 hours*1	Δ C/C	Within -20%/+20% of the initial value		
		tan δ	Within 1.5 × IL		
		LC*2	Within IL		
Humidity	Temperature: 60°C, Humidity: 90 ~ 95% R.H., 500 hours	Δ C/C*3	+30% ~ −20% of the initial value		
		tan δ	Within 1.5 × IL		
		LC*4	Within IL		

IL = Initial limit
**1 For TEFPSB31E156M8R, TEFPSB31E226M8R test time is 2,000 hours*
**2 For FPSB31E226M8R LC post testing is within 3 X IL*

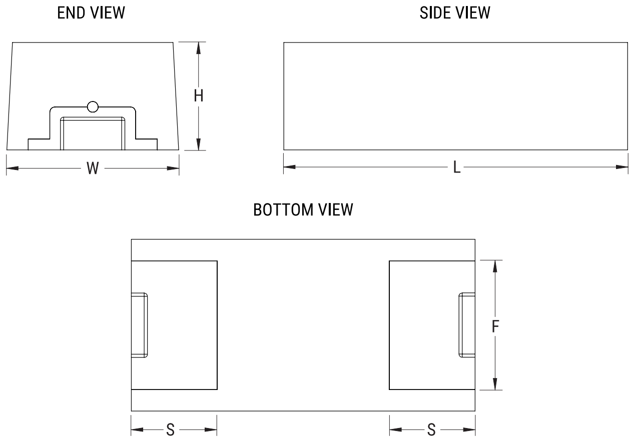
B10 case

Test	Condition	Characteristics			
Surge Voltage	Temperature: 105°C, Surge Voltage apply, 1,000 Ω series resistance, 1,000 cycles	Δ C/C	Within −20%/+20% of the initial value		
		tan δ	Within IL		
		LC	Within IL		
Temperature Stability	Temperature exposure at +25°C, −55°C, +105°C		+25°C	-55°C	+105°C
		Δ C/C	–	0% ~ −20% compare with +25°C	+50% ~ 0% compare with +25°C
		tan δ	Within IL	Within IL	Within 1.5 × IL
		LC	Within IL	–	Within 10 × IL
Endurance	Temperature: 105°C, Rated voltage apply, Time: 1,000 hours 2,000 hours*1	Δ C/C	Within -20%/+20% of the initial value		
		tan δ	Within 1.5 × IL		
		LC*2	Within 1.25 × IL		
Humidity	Temperature: 60°C, Humidity: 90 ~ 95% R.H., 500 hours	Δ C/C*3	+30% ~ −20% of the initial value		
		tan δ	Within 1.5 × IL		
		LC*4	Within 5 × IL		

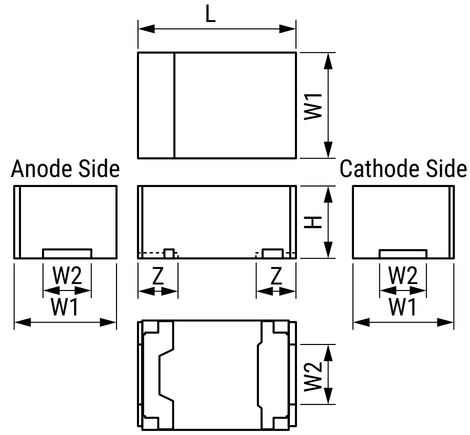
Dimensions – Millimeters (Inches)

Metric will govern

A2 & A3 Case



B3 & B10 Case



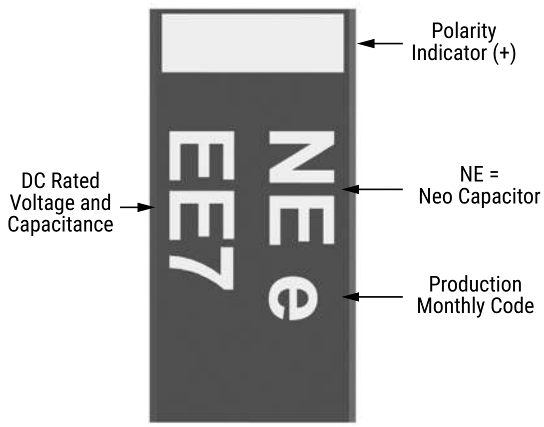
Case Size		Component Dimensions				
KEMET	EIA	L ±0.2	W1 ±0.2	W2 ±0.1	H ±0.1	Z ±0.2
A2	3216–12	3.2	1.6	1.2	1.1	0.8
A3	3216–10	3.2	1.6	1.2	0.9	0.8
B10	3528–10	3.5	2.8	2.2	1.0 max	0.7
B3	3528–12	3.5	2.8	2.2	1.1	0.7

Table 1 – Ratings & Part Number Reference

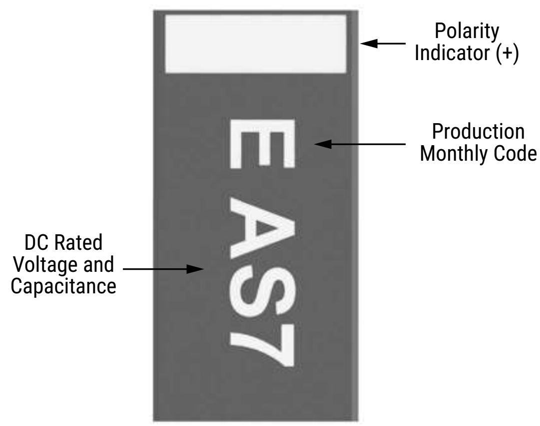
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +25°C 100 kHz Maximum	°C
4	100	A3/3216-10	TEFPSA30G107M8R	40	8	200	548	105
4	220	B10/3528-10	TEFPSB100G227M(25)	88	10	25	1732	105
4	220	B10/3528-10	TEFPSB100G227M(30)	88	10	30	1581	105
6.3	47	A3/3216-10	TEFPSA30J476M8R	29.6	6	200	548	105
6.3	47	A3/3216-10	TEFPSA30J476M(70)8R	29.6	6	70	925	105
6.3	100	A3/3216-10	TEFPSA30J107M8R	63	8	200	548	105
6.3	100	A3/3216-10	TEFPSA30J107M(100)8R	63	8	100	774	105
6.3	100	A3/3216-10	TEFPSA30J107M(70)8R	63	8	70	925	105
6.3	100	A3/3216-10	TEFPSA30J107M(55)8R	63	8	55	1044	105
10	22	A3/3216-10	TEFPSA31A226M8R	22	8	200	548	105
10	33	A3/3216-10	TEFPSA31A336M8R	33	6	200	548	105
10	33	A3/3216-10	TEFPSA31A336M(150)8R	33	6	150	632	105
10	47	A3/3216-10	TEFPSA31A476M8R	47	6	200	548	105
10	47	A3/3216-10	TEFPSA31A476M(150)8R	47	6	150	632	105
16	33	A2/3216-12	TEFPSA21C336M8R	54	10	200	548	105
20	15	B10/3528-10	TEFPSB101D156M8R	30	10	150	707	105
25	10	A2/3216-12	TEFPSA21E106M(150)8R	25	10	150	632	105
25	15	B10/3528-10	TEFPSB101E156M8R	75	10	150	707	105
25	15	B3/3528-12	TEFPSB31E156M8R	112.5	10	100	866	105
25	22	B3/3528-12	TEFPSB31E226M8R	165	10	100	866	105
35	6.8	B3/3528-12	TEFPSB31V685M8R	47.6	10	100	866	105
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +25°C 100 kHz Maximum	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature

Capacitor Marking

B3/B10 Case



A2/A3 Case



DC Rated Voltage and Capacitance Code

Capacitance (µF)		Voltage						
		4 g	**6 j**	**10 A**	**16 C**	**20 D**	**25 E**	**35 V**
6.8	W6							VW6
15	E7					DE7	EE7	
22	J7			AJ7			EJ7	
33	N7			AN7	CN7			
47	S7		jS7	AS7				
100	A8	gA8	jA8					
220	J8	gJ8						

Production Monthly Code

Year	Month											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2021	A	B	C	D	E	F	G	H	J	K	L	M
2022	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	a	b	c	d	e	f	g	h	j	k	l	m
2024	n	p	q	r	s	t	u	v	w	x	y	z

Production monthly code will resume beginning in 2025.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA_{rms}, +45°C, 100 kHz) Maximum	°C
2.5	330	V/7343-19	PSKV0E337M025C	82.5	10	25	2700	105
2.5	330	V/7343-19	PSKV0E337M015C	82.5	10	15	3500	105
2.5	330	V/7343-19	PSKV0E337M012C	82.5	10	12	3900	105
2.5	470	V/7343-19	PSKV0E477M009C	118	10	9	4600	105
2.5	470	V/7343-19	PSKV0E477M012C	118	10	12	3900	105
2.5	470	V/7343-19	PSKV0E477M015C	118	10	15	3500	105
2.5	680	D/7343-31	PSKD0E687M040B	170	10	40	2400	105
2.5	680	D/7343-31	PSKD0E687M015B	170	10	15	3900	105
2.5	1000	D/7343-31	PSKD0E108M015B	250	10	15	3900	105
4	220	D/7343-31	PSKD0G227M012B	88	10	12	4300	105
4	220	V/7343-19	PSKV0G227M045C	88	10	45	2000	105
4	220	V/7343-19	PSKV0G227M025C	88	10	25	2700	105
4	220	V/7343-19	PSKV0G227M018C	88	10	18	3200	105
4	220	V/7343-19	PSKV0G227M015C	88	10	15	3500	105
4	220	V/7343-19	PSKV0G227M012C	88	10	12	3900	105
4	220	V/7343-19	PSKV0G227M009C	88	10	9	4600	105
4	330	D/7343-31	PSKD0G337M040B	132	10	40	2400	105
4	330	D/7343-31	PSKD0G337M015B	132	10	15	3900	105
4	330	V/7343-19	PSKV0G337M025C	132	10	25	2700	105
4	470	D/7343-31	PSKD0G477M025B	188	10	25	3000	105
4	470	D/7343-31	PSKD0G477M018B	188	10	18	3500	105
4	470	D/7343-31	PSKD0G477M015B	188	10	15	3900	105
4	470	D/7343-31	PSKD0G477M012B	188	10	12	4300	105
4	470	D/7343-31	PSKD0G477M010B	188	10	10	4700	105
4	680	D/7343-31	PSKD0G687M025B	272	10	25	3000	105
4	680	D/7343-31	PSKD0G687M015B	272	10	15	3900	105
4	680	D/7343-31	PSKD0G687M012B	272	10	12	4300	105
6.3	100	V/7343-19	PSKV0J107M015C	63	10	15	3500	105
6.3	150	D/7343-31	PSKD0J157M055B	95	10	55	2000	105
6.3	150	D/7343-31	PSKD0J157M025B	95	10	25	3000	105
6.3	150	V/7343-19	PSKV0J157M045C	95	10	45	2000	105
6.3	150	V/7343-19	PSKV0J157M025C	95	10	25	2700	105
6.3	150	V/7343-19	PSKV0J157M018C	95	10	18	3200	105
6.3	150	V/7343-19	PSKV0J157M015C	95	10	15	3500	105
6.3	150	V/7343-19	PSKV0J157M012C	95	10	12	3900	105
6.3	220	D/7343-31	PSKD0J227M050B	139	10	50	2100	105
6.3	220	D/7343-31	PSKD0J227M040B	139	10	40	2400	105
6.3	220	D/7343-31	PSKD0J227M025B	139	10	25	3000	105
6.3	220	V/7343-19	PSKV0J227M040C	139	10	40	2200	105
6.3	220	V/7343-19	PSKV0J227M025C	139	10	25	2700	105
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA_{rms}, +45°C, 100 kHz) Maximum	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature

** ESR and Ripple measurement condition is 300 to 500kHz*
◊ Ripple current condition is at 105°C, 100kHz

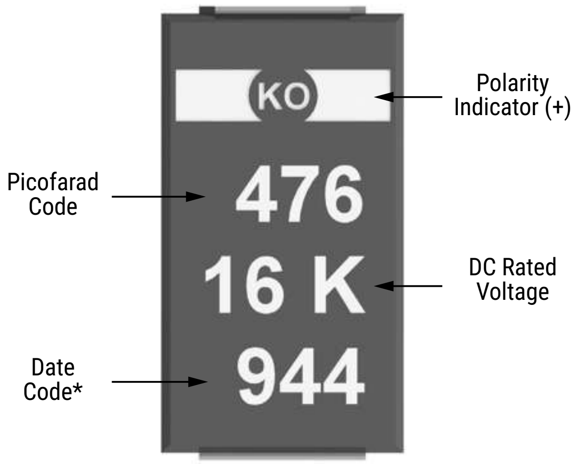
Table 1 – Ratings & Part Number Reference cont.

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA_{rms}, +45°C, 100 kHz) Maximum	°C
6.3	220	V/7343-19	PSKV0J227M015C	139	10	15	3500	105
6.3	220	V/7343-19	PSKV0J227M012C	139	10	12	3900	105
6.3	330	D/7343-31	PSKD0J337M040B	208	10	40	2400	105
6.3	330	D/7343-31	PSKD0J337M025B	208	10	25	3000	105
6.3	330	D/7343-31	PSKD0J337M018B	208	10	18	3500	105
6.3	330	D/7343-31	PSKD0J337M015B	208	10	15	3900	105
6.3	330	D/7343-31	PSKD0J337M010B	208	10	10	4700	105
6.3	330	D/7343-31	PSKD0J337M009B	208	10	9	5000	105
6.3	330	V/7343-19	PSKV0J337M045C	208	10	45	2000	105
6.3	330	V/7343-19	PSKV0J337M025C	208	10	25	2700	105
6.3	330	V/7343-19	PSKV0J337M015C	208	10	15	3500	105
6.3	470	D/7343-31	PSKD0J477M015B	296	10	15	3900	105
6.3	470	V/7343-19	PSKV0J477M055C	296	10	55	1800	105
10	68	D/7343-31	PSKD1A686M100B	68	10	100	1500	105
10	68	V/7343-19	PSKV1A686M060C	68	10	60	1800	105
10	68	V/7343-19	PSKV1A686M045C	68	10	45	2000	105
10	100	D/7343-31	PSKD1A107M055B	100	10	55	2000	105
10	100	V/7343-19	PSKV1A107M045C	100	10	45	2000	105
10	100	V/7343-19	PSKV1A107M025C	100	10	25	2700	105
10	150	D/7343-31	PSKD1A157M055B	150	10	55	2000	105
10	150	D/7343-31	PSKD1A157M040B	150	10	40	2400	105
10	150	D/7343-31	PSKD1A157M025B	150	10	25	3000	105
10	150	V/7343-19	PSKV1A157M040C	150	10	40	2200	105
10	220	D/7343-31	PSKD1A227M040B	220	10	40	2400	105
10	220	D/7343-31	PSKD1A227M025B	220	10	25	3000	105
10	220	V/7343-19	PSKV1A227M025C	220	10	25	2700	105
16	47	D/7343-31	PSKD1C476M070B	75.2	10	70	1800	105
16	47	V/7343-19	PSKV1C476M070C	75.2	10	70	1600	105
16	68	V/7343-19	PSKV1C686M050C	108.8	10	50	1900	105
16	100	V/7343-19	PSKV1C107M050C	160	10	50	1900	105
16	150	D/7343-31	PSKD1C157M050B	240	10	50	2100	105
20	22	V/7343-19	PSKV1D226M090C	44	10	90	1400	105
20	47	D/7343-31	PSKD1D476M055B	94	10	55	2000	105
20	47	V/7343-19	PSKV1D476M070C	94	10	70	1600	105
20	47	V15/7343-15	PSKV151D476M045C	94	9	45	2000	105
25	15	V/7343-19	PSKV1E156M090C	37.5	10	90	1400	105
25	22	V/7343-19	PSKV1E226M090C	55	10	90	1400	105
25	22	V/7343-19	PSKV1E226M060C	55	10	60	1800	105
25	33	D/7343-31	PSKD1E336M060B	82.5	10	60	1900	105
25	33	V/7343-19	PSKV1E336M060C	82.5	10	60	1800	105
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA_{rms}, +45°C, 100 kHz) Maximum	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature

** ESR and Ripple measurement condition is 300 to 500kHz*

◊ Ripple current condition is at 105°C, 100kHz

Capacitor Marking



** 944 = 44th week of 2019*

Date Code *	
1st digit = Last number of Year	1 = 2021 2 = 2022 3 = 2023 4 = 2024
2nd and 3rd digit = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year

G/PS Low Profile Ultra High Capacitance Polymer Capacitor

Overview

NeoCapacitor® provides excellent performance for various applications due to high conductivity of the conductive polymer.

TOKIN's devices are classified into the following three quality grades, in accordance with their application: Standard, Special, and Specific. The quality grade of all devices in this document is "standard" and cannot be used for "special" or "specific" quality grade applications. Customers who intend to use the products in this document for applications other than "standard" quality grade must contact KEMET sales representative in advance.

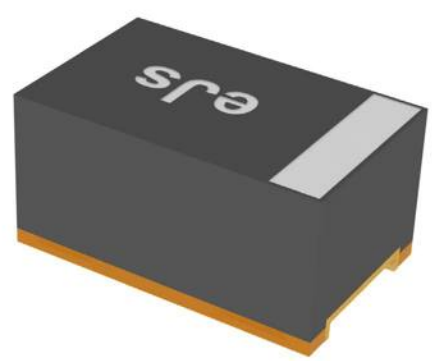
Standard: This quality grade is intended for applications in which failure or malfunction of the device is highly unlikely to cause harm to persons or damage to property, or be the source of any negative effects or problems in the wider community.

Special: This quality grade is intended for special applications that have common requirements, such specific industrial fields. Devices with a "special" quality grade are designed, manufactured, and tested using more a stringent quality assurance program than what is used for "standard" grade devices. There is a high possibility that failure or malfunction of the device when being used for applications in this category will cause harm to persons or damage to property, or bring negative effects or problems in the wider community.

Specific: Devices in this quality grade are designed, manufactured, and tested using a quality assurance program that is designated by the customer or that is created in accordance with the customer's specifications. There is an extremely high possibility that failure or malfunction of the device when being used for applications in this category will cause harm to persons or damage to property, or bring serious problems in the wider community. Customers who use KEMET's products for these "specific" applications must conclude an individual quality agreement and/or development agreement with KEMET. A quality assurance program designated by the customer must also be determined in advance.

Benefits

- Excellent noise absorption performance
- Higher ripple current
- Miniaturized, thinner, higher capacitance and lower ESR
- Lead free (JEITA PHASE3), RoHS2 directive (2011/65/EU + 2015/863/EU) and halogen-free.
- Antimony-free and Red phosphorous-free materials for mold resin.



Applications

Typical applications include voltage smoothing, noise absorption in high speed operation circuit , multi media instruments, PC (voltage smoothing and noise absorption of CPU, memory and various LSI), Smartphone, mobile phone (stabilization of battery voltage, stabilization for display), LCD TV (stabilization of LCD driver and timing controller) and others (tablet, PC, portable audio player, DSC, DVC, HDD, SSD, communication card, portable gaming devices, head-mounted displays, drones, IoT devices).

Ordering Information

TE	GPS	P2	0J	476	M	(150)	8R
Tape & Reel	Series	Case Code	DC Rated Voltage in Volts	Capacitance (pF)	Capacitance tolerance	ESR Spec	Packaging
TE = φ 180 mm reel	Substrate terminal structure	P2 (2012–10)	0J = 6.3 V 1A = 10 V 1C = 16 V 1E = 25 V	First two digits represents the cap code. Third digit specifies number of zeros to follow	M = ±20%	(150) shows 150 mΩ Blank = Refer to PN in Table 1 for specification	8 = Tape width (8 mm) R = Packaging orientation (cathode on sprocket hole)

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	–55°C to +105°C
Rated Voltage Range (V)	6.3 – 25
Surge Voltage (V)	Rated Voltage: 10 V, 16 V, 25 V Surge Voltage: 13 V, 20 V, 29 V
Nominal Capacitance (120 Hz)	4.7 µF ~ 47 µF*
Dissipation Factor (tan δ, 120 Hz)	Refer to Standard Ratings*
Leakage Current (LC, V_R, 5 minutes)	Refer to Standard Ratings
Equivalent Series Resistance (ESR, 100 kHz)	Refer to Standard Ratings
Permissible Ripple Current (100 kHz)	Refer to Standard Ratings

** For these measurements apply 1.5 VDC*

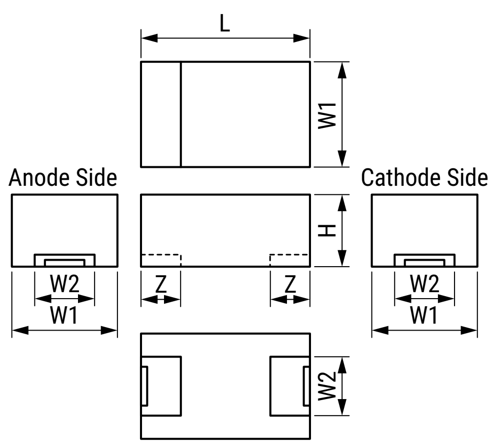
Qualification

Test	Condition	Characteristics			
Surge Voltage	Temperature: 85°C, Surge Voltage apply, 1,000 Ω series resistance, 1,000 cycles	Δ C/C	Within −20%/+20% of the initial value		
		tan δ	Within IL		
		LC	Within IL		
Temperature Stability	Temperature exposure at +25°C, −55°C, +105°C		+25°C	−55°C	+105°C
		Δ C/C	–	0% ~ −20% compare with +25°C	+50% ~ 0% compare with +25°C
		tan δ	Within IL	Within IL	Within 1.5 × IL
		LC	Within IL	–	Within 10 × IL
Endurance	Temperature: 105°C, Rated voltage apply, 1,000 hours	Δ C/C	Within −20%/+20% of the initial value		
		tan δ	Within 1.5 × IL		
		LC	Within IL		
Humidity	Temperature: 60°C, Humidity: 90 ~ 95% R.H., 500 hours	Δ C/C	+30% ~ −20% of the initial value		
		tan δ	Within 1.5 × IL		
		LC	Within IL		

IL = Initial limit

Dimensions – Millimeters (Inches)

Metric will govern

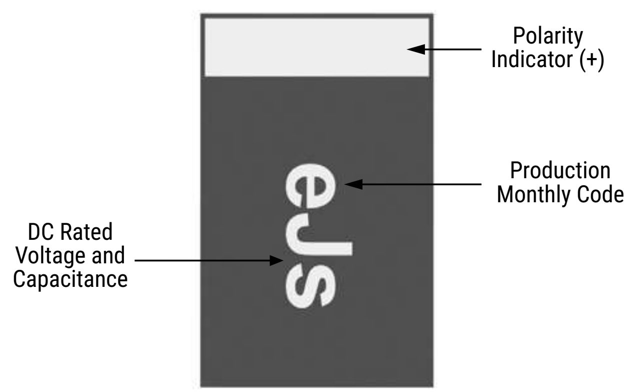


Case Size		Component Dimensions				
KEMET	EIA	L ±0.1	W1 ±0.1	W2 ±0.1	H ±0.1	Z ±0.1
P2	2012−10	2.0	1.25	0.9	0.9	0.55

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current	Rated and Maximum Operating Temperature
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +25°C 100 kHz Maximum	°C
6.3	10	P2/2012-10	TEGPSP20J106M8R	18.9	6	200	354	105
6.3	22	P2/2012-10	TEGPSP20J226M(150)8R	22	6	150	408	105
6.3	47	P2/2012-10	TEGPSP20J476M8R	29.6	6	150	408	105
10	10	P2/2012-10	TEGPSP21A106M8R	30	6	200	354	105
10	22	P2/2012-10	TEGPSP21A226M8R	66	6	200	354	105
10	22	P2/2012-10	TEGPSP21A226M(150)8R	66	6	150	408	105
16	10	P2/2012-10	TEGPSP21C106M8R	80	6	150	408	105
25	4.7	P2/2012-10	TEGPSP21E475M8R	35.3	10	300	288	105

Capacitor Marking



DC Rated Voltage and Capacitance Code

Capacitance (µF)	Voltage			
	6.3 J	10 A	16 C	25 E
4.7				ES
10	Ja	Aa	Ca	
22	Jj	Aj		
47	Js			

Production Monthly Code

Year	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2021	A	B	C	D	E	F	G	H	J	K	L	M
2022	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	a	b	c	d	e	f	g	h	j	k	l	m
2024	n	p	q	r	s	t	u	v	w	x	y	z

Production monthly code will resume beginning in 2025.

PS/H High Operation Temperature Small Size Polymer Capacitor

Overview

NeoCapacitor® provides excellent performance for various applications due to high conductivity of the conductive polymer.

TOKIN's devices are classified into the following three quality grades, in accordance with their application: Standard, Special, and Specific. The quality grade of all devices in this document is "standard" and cannot be used for "special" or "specific" quality grade applications. Customers who intend to use the products in this document for applications other than "standard" quality grade must contact KEMET sales representative in advance.

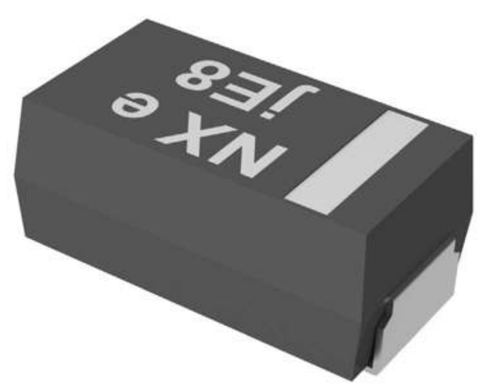
Standard: This quality grade is intended for applications in which failure or malfunction of the device is highly unlikely to cause harm to persons or damage to property, or be the source of any negative effects or problems in the wider community.

Special: This quality grade is intended for special applications that have common requirements, such specific industrial fields. Devices with a "special" quality grade are designed, manufactured, and tested using more a stringent quality assurance program than what is used for "standard" grade devices. There is a high possibility that failure or malfunction of the device when being used for applications in this category will cause harm to persons or damage to property, or bring negative effects or problems in the wider community.

Specific: Devices in this quality grade are designed, manufactured, and tested using a quality assurance program that is designated by the customer or that is created in accordance with the customer's specifications. There is an extremely high possibility that failure or malfunction of the device when being used for applications in this category will cause harm to persons or damage to property, or bring serious problems in the wider community. Customers who use KEMET's products for these "specific" applications must conclude an individual quality agreement and/or development agreement with KEMET. A quality assurance program designated by the customer must also be determined in advance.

Benefits

- Excellent noise absorption performance
- Higher ripple current
- Miniaturized, thinner, higher capacitance and lower ESR
- Lead free (JEITA PHASE3), RoHS2 directive (2011/65/EU + 2015/863/EU) and halogen-free.
- Antimony-free and Red phosphorous-free materials for mold resin.



Applications

Typical applications include voltage smoothing, noise absorption in high speed operation circuit , multi media instruments, PC (voltage smoothing and noise absorption of CPU, memory and various LSI), Smartphone, mobile phone (stabilization of battery voltage, stabilization for display), LCD TV (stabilization of LCD driver and timing controller) and others (tablet, PC, portable audio player, DSC, DVC, HDD, SSD, communication card, portable gaming devices, head-mounted displays, drones, IoT devices).

Ordering Information

PSH	B2	0E	337	M	025	B	LL
Series	Case Code	DC Rated Voltage in Volts	Capacitance (pF)	Capacitance Tolerance	ESR Spec	Tape & Reel	
High operation temperature	B2 (3528–21)	0E = 2.5 V 0J = 6.3 V 1C = 16 V 1E = 25 V	First two digits represents the cap code. Third digit specifies number of zeros to follow	M = ±20%	025 = 25 mΩ	Tape width 8 mm, φ 180 mm reel	Supplier internal control code

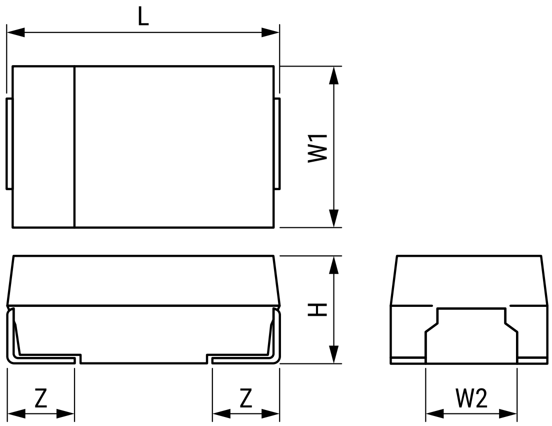
Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to +125°C
Rated Voltage Range (V)	2.5 – 25
Category Voltage Range (V, 125°C)	2/3 x rated voltage
Surge Voltage (V)	Rated Voltage: 2.5 V, 6.3 V, 16 V, 25 V Surge Voltage: 3.3 V, 8 V, 20 V, 29 V
Nominal Capacitance (120 Hz)	15 µF ~ 330 µF*
Dissipation Factor (tan δ, 120 Hz)	Refer to Standard Ratings*
Leakage Current (LC, Vr, 5 minutes)	Refer to Standard Ratings
Equivalent Series Resistance (ESR, 100 kHz)	Refer to Standard Ratings
Permissible Ripple Current (100 kHz)	Refer to Standard Ratings

** For these measurements apply 1.5 VDC*

Dimensions – Millimeters

Metric will govern



Case Size		Component Dimensions				
KEMET	EIA	L ±0.2	W1 ±0.2	W2 ±0.1	H ±0.1	Z ±0.2
B2	3528−21	3.5	2.8	2.2	1.9	0.8

Qualification

For "LL" code Part Numbers

Test	Condition	Characteristics			
Surge Voltage	Temperature: 85°C, Surge Voltage apply, 1,000 Ω series resistance, 1,000 cycles	Δ C/C	Within −20%/+20% of the initial value		
		tan δ	Within IL		
		LC	Within IL		
Temperature Stability	Temperature exposure at +25°C, −55°C, +125°C		+25°C	−55°C	+125°C
		Δ C/C	–	0% ~ −20% compare with +25°C	+50% ~ 0% compare with +25°C
		tan δ	Within IL	Within IL	Within 1.5 × IL
		LC	Within IL	–	Within 10 × IL
Endurance	125°C, 2/3* Rated voltage apply, 1,000 hours 105°C, Rated voltage apply, 2,000 hours	Δ C/C	Within −20%/+20% of the initial value		
		tan δ	Within 1.5 x IL		
		LC	125°C: No short (< 2 mA) 105°C: Within IL		
Humidity	Temperature: 60°C, Humidity: 90 ~ 95% R.H., 500 hours	Δ C/C	+40% ~ −20% of the initial value		
		tan δ	Within 1.5 x IL		
		LC	Within IL		

IL = Initial limit

Qualification cont.

For Part Numbers without code

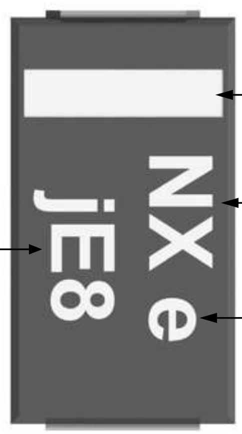
Test	Condition	Characteristics				
Endurance	125°C, 2/3 Rated voltage apply, 2,000 hours	Δ C/C	Within −20%/+10% of the initial value			
		tan δ	Within initial limits			
		LC	Within 2.0 x initial limit			
		ESR	Within 2.0 x initial limit			
Storage Life	125°C , 0 voltage, 2,000 hours	Δ C/C	Within −20%/+10% of the initial value			
		tan δ	Within initial limits			
		LC	Within 2.0 x initial limit			
		ESR	Within 2.0 x initial limit			
Humidity	Temperature: 60°C, Humidity: 90 ~ 95% R.H., No Load, 500 hours	Δ C/C	Within −5%/+35% of the initial value			
		tan δ	Within initial limits			
		LC	Within 3.0 x initial limit			
		ESR	N/A			
Temperature Stability	Extreme temperature exposure at a succession of continuous steps at +25°C, −55°C, +25°C, +85°C, +125°C, +25°C		+25°C	−55°C	+85°C	+105°C
		Δ C/C	–	±20%	±20%	±20%
		tan δ	IL	IL	1.2 x IL	1.5 × IL
		LC	IL	–	10 × IL	10 × IL
Surge Voltage	Temperature: 125°C, Voltage: 1.32 x Rated voltage, 1,000 cycles	Δ C/C	Within −20%/+10% of the initial value			
		tan δ	Within initial limits			
		LC	Within initial limits			
		ESR	Within initial limits			
Mechanical Shock/Vibration	MIL–STD–202, Method 213, Condition I, 100 G Peak. MIL–STD–202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak	Δ C/C	Within ±10% of the initial value			
		tan δ	Within initial limits			
		LC	Within initial limits			

IL = Initial limit

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	Leakage Current	tan δ	ESR	Permissible Ripple Current
V	µF	KEMET/EIA		µA at +25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at +25°C 100 kHz Maximum
2.5	220	B2/3528-21	PSHB20E227M025BLL	110	10	25	1844
2.5	330	B2/3528-21	PSHB20E337M025BLL	165	10	25	1844
6.3	150	B2/3528-21	PSHB20J157M045BLL	189	10	45	1374
6.3	220	B2/3528-21	PSHB20J227M045BLL	277.2	10	45	1374
16	22	B2/3528-21	PSHB21C226M100BLL	70.4	10	100	922
16	33	B2/3528-21	PSHB21C336M070BLL	105.6	10	70	1102
25	15	B2/3528-21	PSHB21E156M090B	112.5	10	90	972

Capacitor Marking



DC Rated Voltage and Capacitance Code

Capacitance (µF)		Voltage 2.5 e	6.3 j	16 C	25 E
15	E7				EE7
22	J7			CJ7	
33	N7			CN7	
150	E8		jE8		
220	J8	eJ8	jJ8		
330	N8	eN8			

Production Monthly Code

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2021	A	B	C	D	E	F	G	H	J	K	L	M
2022	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	a	b	c	d	e	f	g	h	j	k	l	m
2024	n	p	q	r	s	t	u	v	w	x	y	z

Production monthly code will resume beginning in 2025.

A798 High Humidity and High Temperature Polymer Aluminum

Overview

The KEMET A798 Aluminum Organic Capacitor (AO-CAP) is a solid state aluminum capacitor. The cathode is a conductive organic polymer, which results in very low ESR and improved capacitance retention at high frequency. AO-CAPs may be operated at steady state voltages up to 100% of rated voltage without the need to de-rate.

Since there is no liquid electrolyte, the A798 offers long operational lifetimes, low ESR, and high operational temperatures. The inherent low ESR renders the A798 suitable for high ripple current handling. The small package size, high ripple current capability, high operating temperature, low parasistics, and capacitance stability over life span makes the A798 ideal for demand applications.

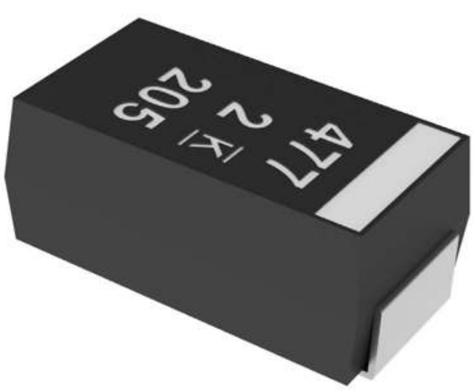
The A798 High Humidity and High Temperature Aluminium Polymer capacitors deliver higher capacitance and ESR stability under harsh environmental conditions. Enhancements to the design and selected material upgrades were introduced to deliver 1,000 hours at 85°C/85% RH rated voltage and 125°C Endurance Life and Storage.

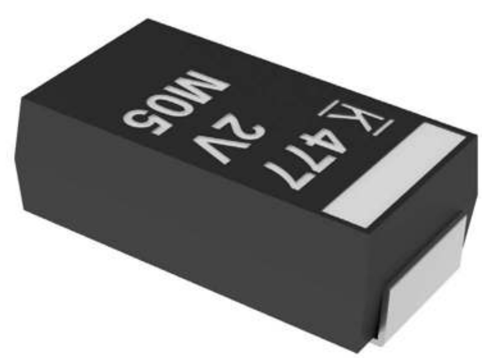
Benefits

- Minimum ESR up to 3 mΩ
- Polymer cathode technology
- High frequency capacitance retention
- Non-ignition failure mode
- 100% accelerated steady state aging
- 100% surge current tested
- Volumetric efficiency
- Self-healing mechanism
- EIA standard case sizes

Applications

Typical applications include DC/DC converters, notebook PCs, telecommunications, displays, and industrial applications with harsh humidity and temperature requirements..





Environmental Compliance

RoHS compliant when ordered with 100% Sn solder.

- Halogen-free
- Epoxy compliant with UL94 V–0
- Molded Epoxy complies for outgassing testing under ASTM E 595.

Ordering Information

A	798	D	477	M	002	A	T	E009	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR	Packaging (C-Spec)
A = Aluminum	798 = High Humidity/ High Temperature Aluminum Polymer	D V	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	002 = 2 2R5 = 2.5	A = N/A	T = 100% Matte Tin (Sn)-plated P = Ni-Pd-Au	E = ESR Last three digits specify ESR in mΩ (009 = 9 mΩ)	Blank = 7" Reel 7280 = 13" Reel

Ordering Information cont.

A798 Plus Performance

A	798	D	477	M	002	P	T	E009	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	ESR	Packaging (C-Spec)
A = Aluminum	798 = High Humidity/ High Temperature Aluminum Polymer	D V	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	002 = 2 2R5 = 2.5	P = Plus Performance (Extended Life 3,000 hours/125°C	T = 100% Matte Tin (Sn)-plated	E = ESR Last three digits specify ESR in mΩ (009 = 9 mΩ)	Blank = 7" Reel 7280 = 13" Reel

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to 125°C
Rated Capacitance Range	470 µF at 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2 – 2.5 V
DF (120 Hz)	6%
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 2.5 V Rating: ≤ 0.1 CV (µA) at rated voltage after 5 minutes If there is any concern about leakage current, please perform pre-conditioning to the part following below conditions: * Temperature: 105°C maximum * Voltage: Rated Voltage * Series Resistor: 1,000 Ω * Charge Time: 1 hour minimum * Measuring: Discharge the capacitor(s), store them for 4 to 24 hours at room temperature and RH ≤ 60%

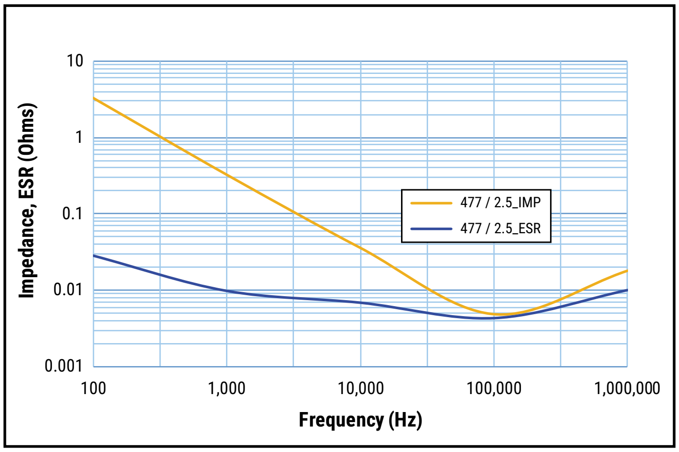
Qualification

<table>
<tr><th>Test</th><th colspan="2">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="4">Endurance</td><td colspan="2" rowspan="4">125°C at rated voltage, 1,000 hours *3</td><td>Δ C/C</td><td colspan="3">Within ±20% *4 of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Storage Life</td><td colspan="2" rowspan="4">125°C at 0 Volts, 1,000 hours</td><td>Δ C/C</td><td colspan="3">Within ±20% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Endurance Extended</td><td colspan="2" rowspan="4">A798 Plus Performance
125°C at rated voltage, 3,000 hours</td><td>Δ C/C</td><td colspan="3">Within ±30% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x *2 initial limit</td></tr>
<tr><td rowspan="4">Storage Life Extended</td><td colspan="2" rowspan="4">A798 Plus Performance
125°C at 0 Volts, 3,000 hours</td><td>Δ C/C</td><td colspan="3">Within ±30% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">≤ initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 1.25 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x *2 initial limit</td></tr>
<tr><td rowspan="4">Humidity</td><td colspan="2" rowspan="4">85°C, 85% RH, load, 1,000 hours</td><td>Δ C/C</td><td colspan="3">Within −20/+70% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td>DCL</td><td colspan="3">Within 5.0 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">Within 2.0 x initial limit</td></tr>
<tr><td rowspan="4">Temperature Stability</td><td rowspan="4">Extreme temperature exposure at a succession of continuous steps at −55°C, +25°C, +85°C, +125°C</td><td></td><td>+25°C</td><td>−55°C</td><td>+85°C</td><td>+125°C</td></tr>
<tr><td>Δ C/C</td><td>IL*1</td><td>±15%</td><td>±15%</td><td>±20%</td></tr>
<tr><td>DF</td><td>IL</td><td>IL</td><td>1.2 x IL</td><td>1.5 x IL</td></tr>
<tr><td>DCL</td><td>IL</td><td>N/A</td><td>10 x IL</td><td>10 x IL</td></tr>
<tr><td rowspan="4">Surge Voltage</td><td colspan="2" rowspan="4">125°C, 1.32 x rated voltage, 33 Ω resistance, 1,000 cycles</td><td>Δ C/C</td><td colspan="3">Within ±20% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
<tr><td>ESR</td><td colspan="3">Within initial limits</td></tr>
<tr><td rowspan="3">Mechanical Shock/ Vibration</td><td colspan="2" rowspan="3">MIL–STD–202, Method 213, Condition I, 100 G peak
MIL–STD–202, Method 204, Condition D,
10 Hz to 2,000 Hz, 20 G peak</td><td>Δ C/C</td><td colspan="3">Within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">Within initial limits</td></tr>
<tr><td>DCL</td><td colspan="3">Within initial limits</td></tr>
</table>

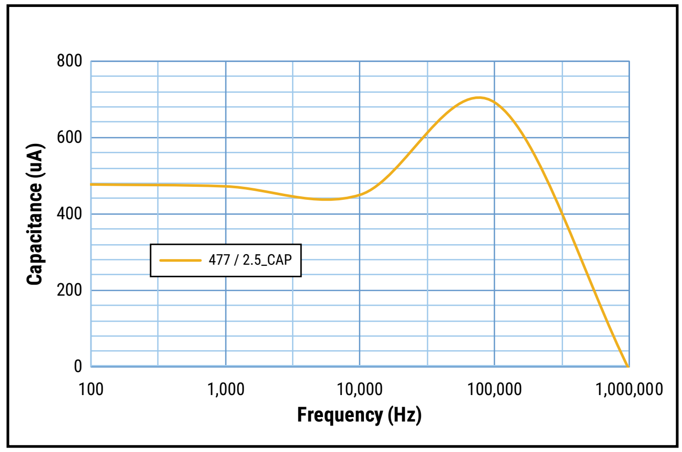
**1 IL = Initial Limit*
**2 For PN's: A798D477M2R5PTE006 and A798D477M002PTE006 the ESR post test is 3.0 x of initial limit*
**3 For PN's: A798D477M002ATE006, A798D477M002ATE009, A798D477M2R5ATE006 and A798D477M2R5ATE009 test condition specification goes up to 2,000 hours*
**4 For PN's: A798D477M002ATE006, A798D477M002ATE009, A798D477M2R5ATE006 and A798D477M2R5ATE009 capacitance change is within ± 30 of intial value*

Electrical Characteristics

ESR vs. Frequency

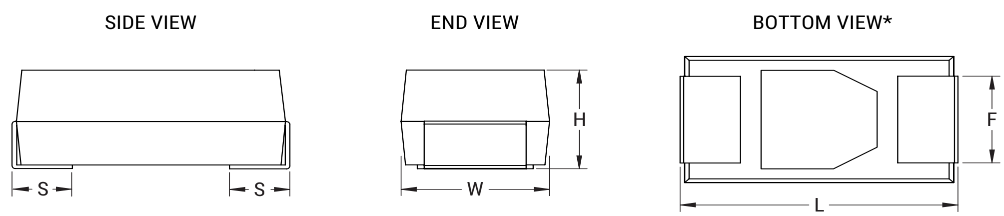


Capacitance vs. Frequency



Dimensions – Millimeters (Inches)

Metric will govern



**Glue pad shape is at KEMET's option*

Case Size		Component					Typical Weight
KEMET	EIA	L	W	H	F ±0.1 ±(0.004)	S ±0.3 ±(0.012)	(mg)
V	7343-21	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	1.9±0.2 (0.075±0.008)	2.4 (0.094)	1.3 (0.051)	132.72
D	7343–31	7.3±0.3 (0.287±0.012)	4.3±0.3 (0.169±0.012)	2.8±0.3 (0.110±0.012)	2.4 (0.094)	1.3 (0.051)	196.58

Notes: (Ref) – Dimensions provided for reference only.

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Allowable Ripple Current	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp.
(V) at 125°C	µF	KEMET/EIA		µA at +25°C Maximum/ 5 Minutes	% at +25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	(mA 85°C 100 kHz)	(mA 105°C 100 kHz)	(mA 125°C 100 kHz)	Reflow Temp ≤ 260°C	°C
2	470	V/7343-21	A798V477M002APE003	56.4	6	3	11,690	8,180	2,920	3	125
2	470	V/7343-21	A798V477M002APE4R5	56.4	6	4.5	9,540	6,680	2,390	3	125
2	470	V/7343-21	A798V477M002PTE009	56.4	6	9	6,750	4,725	1,690	3	125
2	470	D/7343-31	A798D477M002PTE006	56.4	6	6	6,460	4,522	1,615	3	125
2	470	D/7343-31	A798D477M002PTE009	56.4	6	9	5,270	3,690	1,320	3	125
2	470	D/7343-31	A798D477M002ATE006	94	6	6	6,460	4,522	1,615	3	125
2	470	D/7343-31	A798D477M002ATE009	94	6	9	5,270	3,690	1,320	3	125
2.5	470	V/7343-21	A798V477M2R5APE003	70.5	6	3	11,690	8,180	2,920	3	125
2.5	470	V/7343-21	A798V477M2R5APE4R5	70.5	6	4.5	9,540	6,680	2,390	3	125
2.5	470	D/7343-31	A798D477M2R5PTE006	70.5	6	6	6,460	4,522	1,615	3	125
2.5	470	D/7343-31	A798D477M2R5PTE009	70.5	6	9	5,270	3,690	1,320	3	125
2.5	470	D/7343-31	A798D477M2R5ATE006	117.5	6	6	6,460	4,522	1,615	3	125
2.5	470	D/7343-31	A798D477M2R5ATE009	117.5	6	9	5,270	3,690	1,320	3	125
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current (mA 85°C)	Ripple Current (mA 105°C)	Ripple Current (mA 125°C)	MSL	Maximum Operating Temp.

Derating Guidelines

Voltage Rating	Rated Voltage	Maximum Recommended Application Voltage
	−55°C to 125°C	
2 – 2.5 V	V_R	V_R

V_R = Rated Voltage

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage which may be applied is limited by two criteria

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage, in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage. See the Reverse Voltage section for allowable limits

Power capability is determined based on a 20°C temperature rise. A higher temperature rise and therefore higher power capability is allowable as long as the ambient temperature, plus, temperature rise due to ripple current, does not exceed the rated temperature of the part.

The maximum power dissipation by case size can be determined using the below table.

KEMET Series and Case Code	EIA Case Code	Maximum Power Dissipation (Pmax) mWatts at 25°C with +20°C Rise
D	7343-31	250
V	7343-21	410

Using the Pmax of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{Pmax/R}$
$E(max) = Z\sqrt{Pmax/R}$

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
Pmax = maximum power dissipation(watts)
R = ESR at specified frequency (ohms)
Z = Impedance at specified frequency (Ohms)

Refer to part number listings for permittable Arms limits.

Temperature Compensation Multipliers for Maximum Ripple Current		
T ≤ 85°C	85°C < T ≤ 105°C	105°C < T ≤ 125°C
1.00	0.70	0.25

T = Environmental Temperature

Reverse Voltage

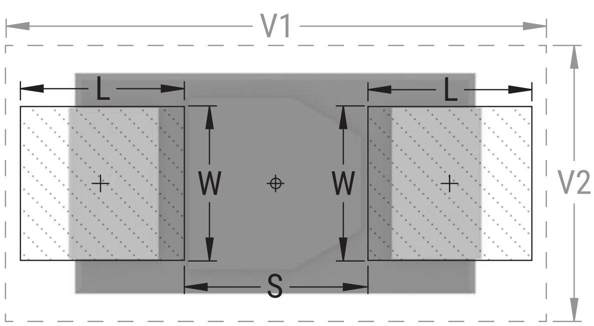
Polymer aluminum capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a certain degree of transient voltage reversal for short periods as shown in the below table. Please note that these parts may not be operated continuously in reverse, even within these limits.

Temperature	Permissible Transient Reverse Voltage
25°C	60% of Rated Voltage
55°C	50% of Rated Voltage
85°C	40% of Rated Voltage
125°C	30% of Rated Voltage

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
D	7343–31	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
V	7343–31	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84

Density Level A: *For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*
Density Level B: *For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*
Density Level C: *For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] *Height of these chips may create problems in wave soldering.*



Grid Placement Courtyard

Soldering Process

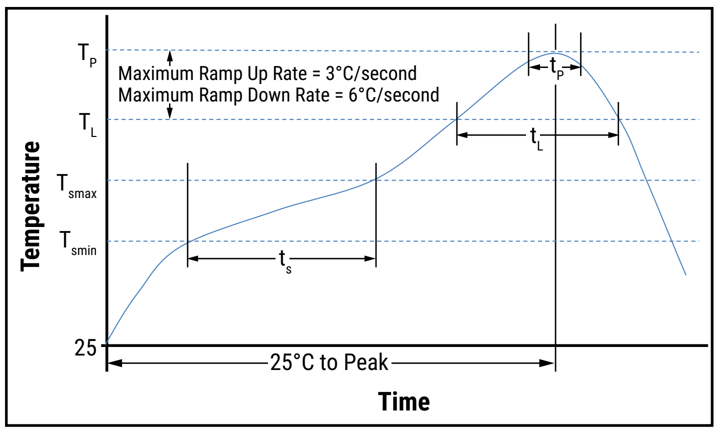
KEMET’s families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. “Wiping” the edges of a chip and heating the top surface is not recommended.

Profile Feature	SnPb Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax})	60 – 120 seconds	60 – 120 seconds
Ramp-up Rate (T_L to T_P)	3°C/seconds maximum	3°C/seconds maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	220°C* 235°C**	250°C* 260°C**
Time within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-down Rate (T_P to T_L)	6°C/seconds maximum	6°C/seconds maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
** For Case Size height > 2.5 mm*
*** For Case Size height ≤ 2.5 mm*



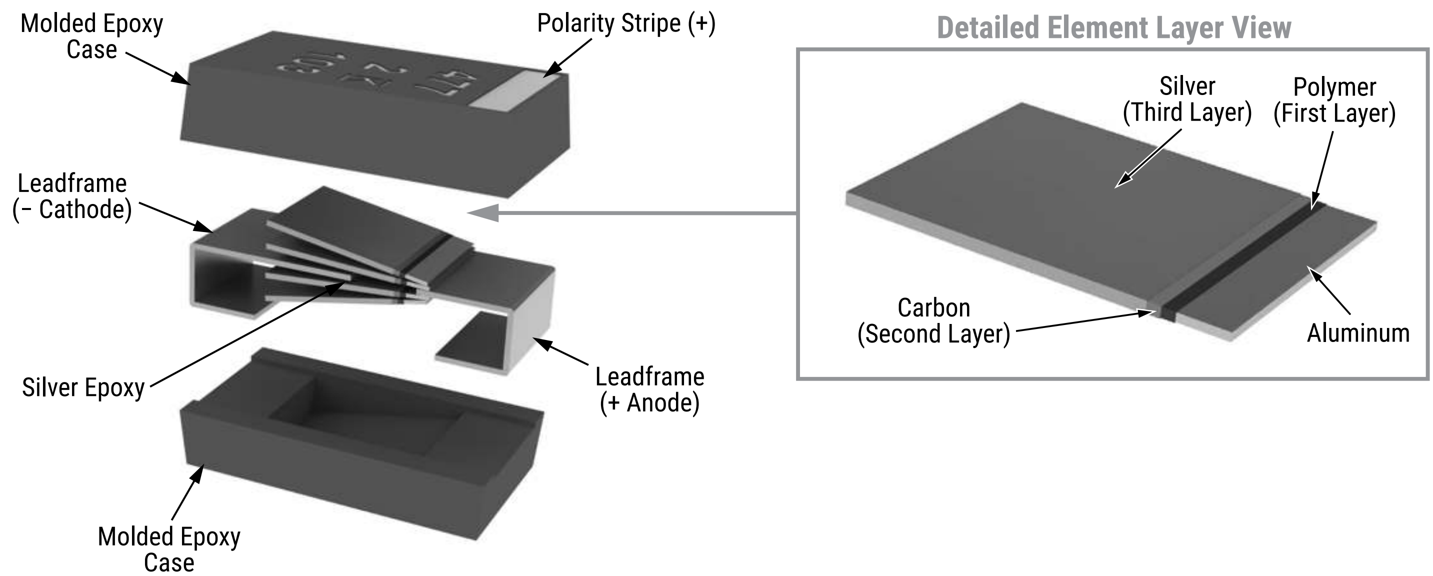
Storage

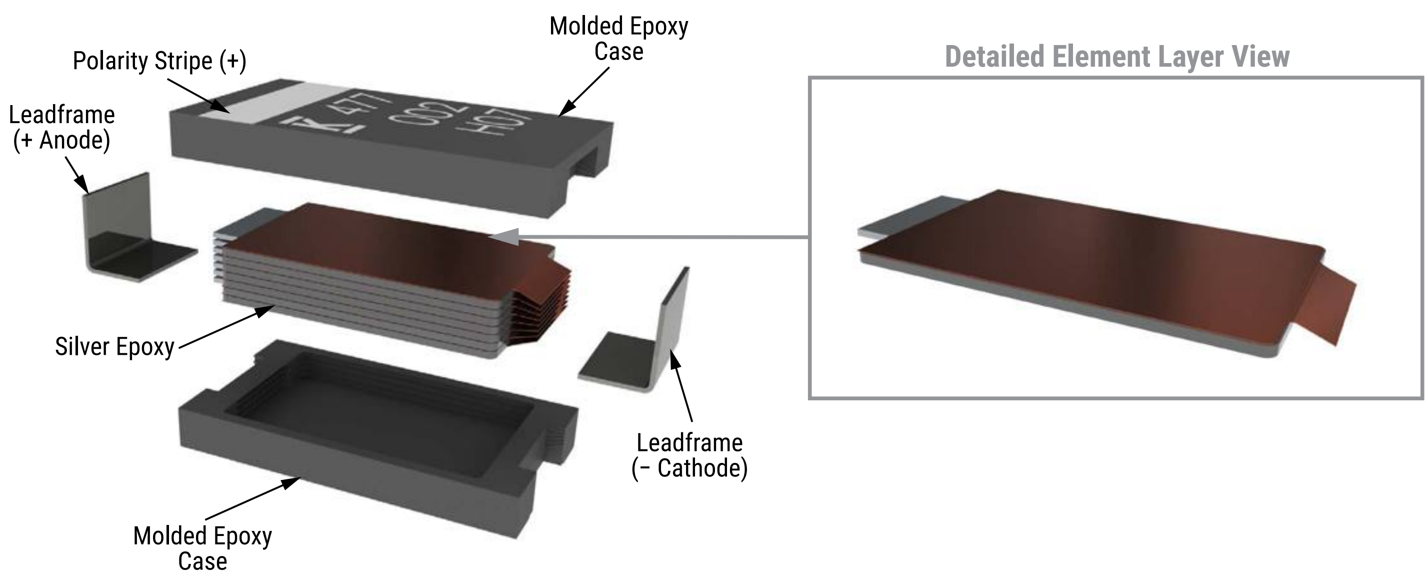
All AO-CAP Series are shipped in moisture barrier bags (MBBs) with desiccant and humidity indicator card (HIC). These parts are classified as MSL3 (Moisture Sensitivity Level 3) per IPC/JEDEC J–STD–020 and packaged per IPC/JEDEC J–STD–033. MSL3 specifies a floor time of 168H at 30°C maximum temperature and 60% relative humidity. Unused capacitors should be sealed in a MBB with fresh desiccant.

The calculated shelf life in a sealed bag would be 12 months from a bag seal date in a storage environment of < 40°C and humidity < 90% RH. It should be 24 months from a bag seal date in a storage environment of < 30°C and humidity < 70% RH.

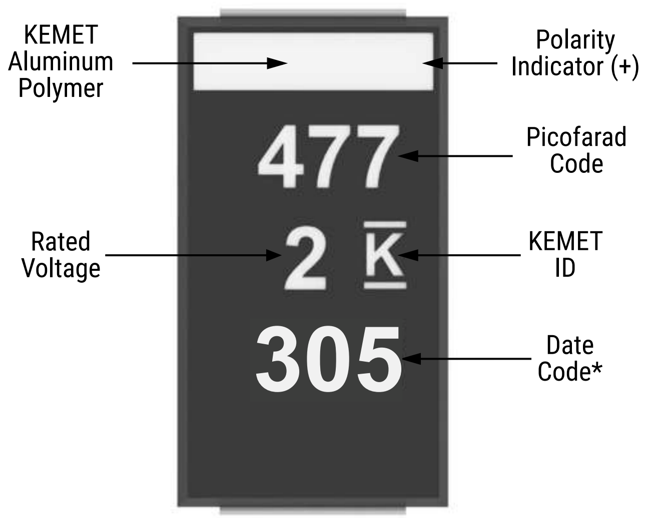
If baking is required, refer to IPC/JEDEC J–STD–033 for bake procedure.

Construction



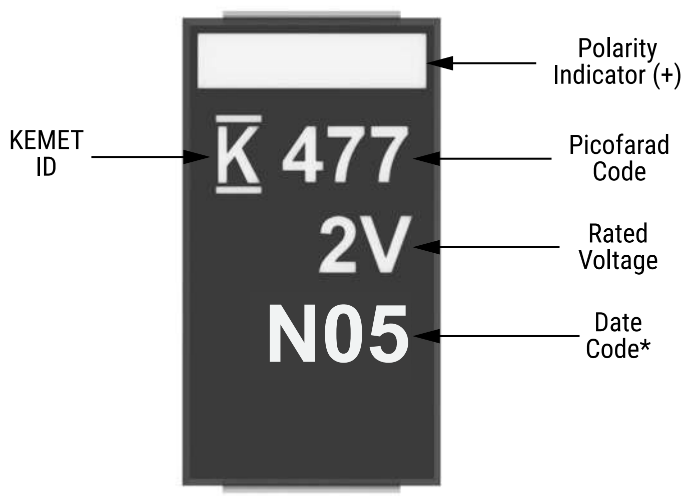


Capacitor Marking



* 305 = 5th week of 2023

Date Code *	
1st digit = Last number of Year	0 = 2020 1 = 2021 2 = 2022 3 = 2023
2nd and 3rd digit = Week of the Year	01 = 1st week of the Year to 52 = 52nd week of the Year



* N05 = 5th week of 2023

Date Code *	
Year	Week
K = 2020 L = 2021 M = 2022 N = 2023	01 = 1st week of the year to 52 = 52nd week of the year

Tape & Reel Packaging Information

KEMET's molded chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481*: Embossed Carrier Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

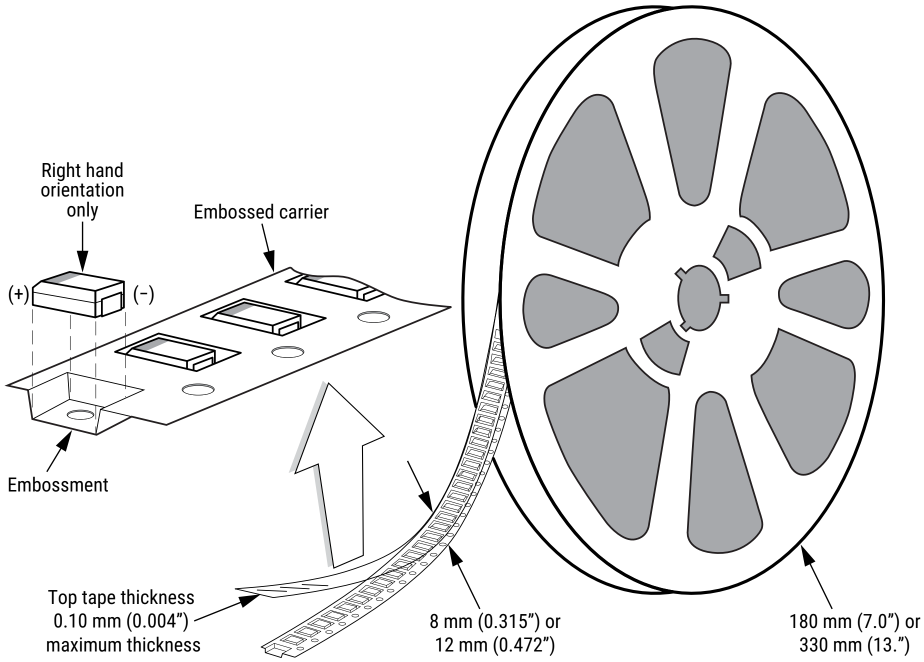


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
D	7343-31	12	500	2,500
V	7343-21	12	1,000	3,000

** No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

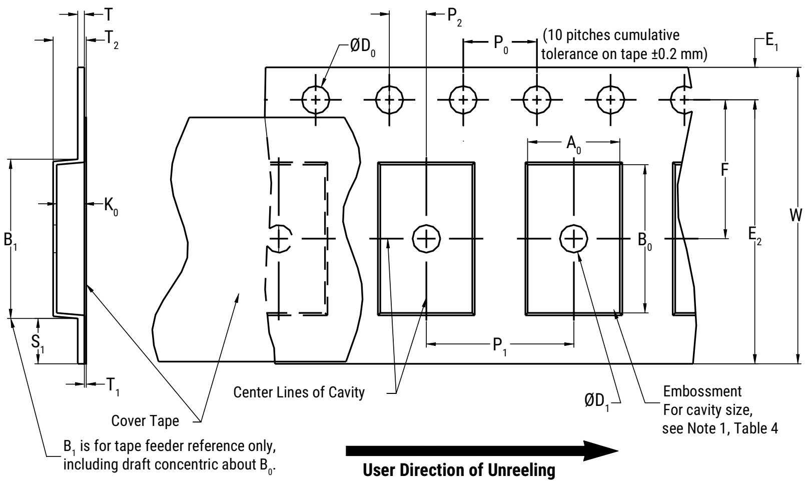


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

<table>
<tr><th colspan="10">Constant Dimensions — Millimeters (Inches)</th></tr>
<tr><th>Tape Size</th><th>D_0</th><th>D_1 Minimum Note 1</th><th>E_1</th><th>P_0</th><th>P_2</th><th>R Reference Note 2</th><th>S_1 Minimum Note 3</th><th>T Maximum</th><th>T_1 Maximum</th></tr>
<tr><td>8 mm</td><td rowspan="2">1.5 +0.10/−0.0 (0.059 +0.004/−0.0)</td><td>1.0 (0.039)</td><td rowspan="2">1.75 ±0.10 (0.069 ±0.004)</td><td rowspan="2">4.0 ±0.10 (0.157 ±0.004)</td><td rowspan="2">2.0 ±0.05 (0.079 ±0.002)</td><td>25.0 (0.984)</td><td rowspan="2">0.600 (0.024)</td><td rowspan="2">0.600 (0.024)</td><td rowspan="2">0.100 (0.004)</td></tr>
<tr><td>12 mm</td><td>1.5 (0.059)</td><td>30 (1.181)</td></tr>
</table>

<table>
<tr><th colspan="9">Variable Dimensions — Millimeters (Inches)</th></tr>
<tr><th>Tape Size</th><th>Pitch</th><th>B_1 Maximum Note 4</th><th>E_2 Minimum</th><th>F</th><th>P_1</th><th>T_2 Maximum</th><th>W Maximum</th><th>A_0, B_0 & K_0</th></tr>
<tr><td>8 mm</td><td>Single (4 mm)</td><td>4.35 (0.171)</td><td>6.25 (0.246)</td><td>3.5 ±0.05 (0.138 ±0.002)</td><td>2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)</td><td>2.5 (0.098)</td><td>8.3 (0.327)</td><td rowspan="2">Note 5</td></tr>
<tr><td>12 mm</td><td>Single (4 mm) and Double (8 mm)</td><td>8.2 (0.323)</td><td>10.25 (0.404)</td><td>5.5 ±0.05 (0.217 ±0.002)</td><td>2.0 ±0.05 (0.079 ±0.002) or 4.0 ±0.10 (0.157 ±0.004) or 8.0 ±0.10 (0.315 ±0.004)</td><td>4.6 (0.181)</td><td>12.3 (0.484)</td></tr>
</table>

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape, with or without components, shall pass around R without damage (see Figure 4).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes (see Figure 2).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape (see Figure 3).
   (e) see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

Packaging Information Performance Notes

1. Cover tape break force: 1.0 kg minimum.
2. Cover tape peel strength: The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 newton (10 to 100 gf)
12 mm	0.1 to 1.3 newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.
3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. *Refer to EIA Standards 556 and 624*.

Figure 2 – Maximum Component Rotation

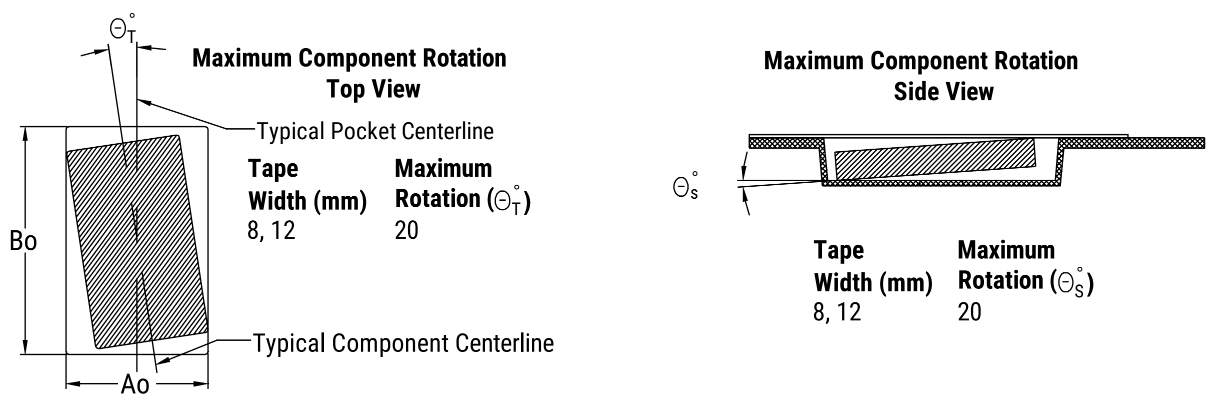


Figure 3 – Maximum Lateral Movement

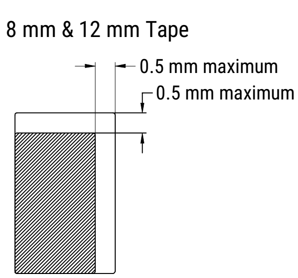


Figure 4 – Bending Radius

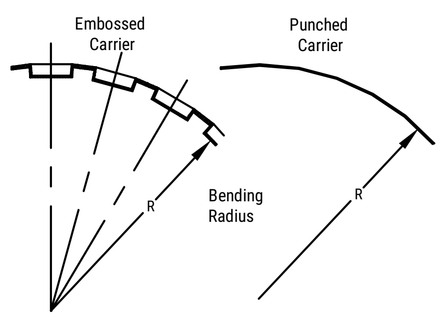
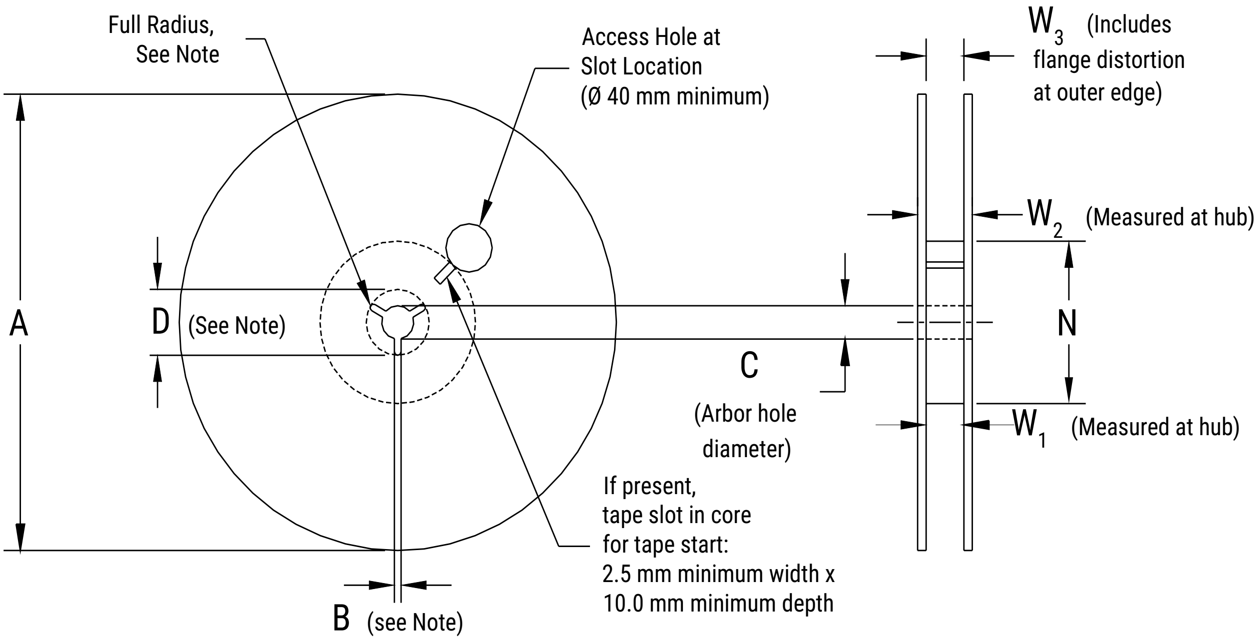


Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/−0.2 (0.521 +0.02/−0.008)	20.2 (0.795)
12 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/−0.0 (0.331 +0.059/−0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/−0.0 (0.488 +0.078/−0.0)	18.4 (0.724)	

Figure 6 – Tape Leader & Trailer Dimensions

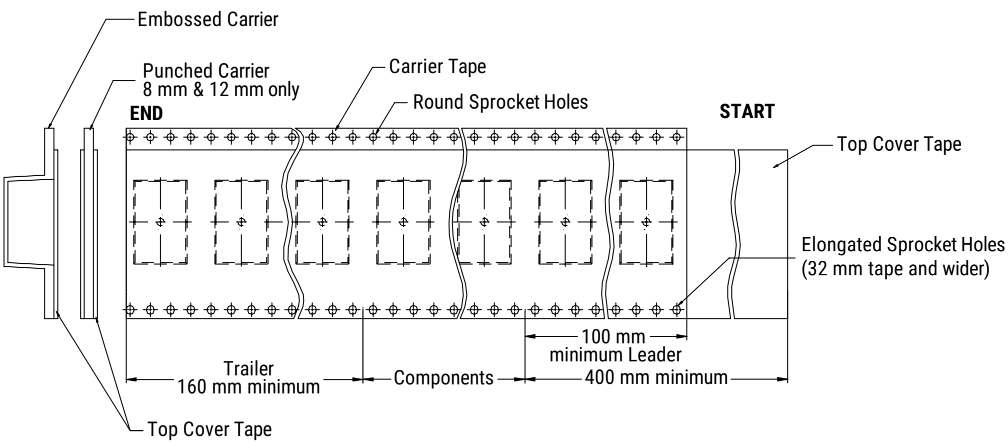


Figure 7 – Maximum Camber