

# Tantalum & Aluminum Surface Mount Capacitors

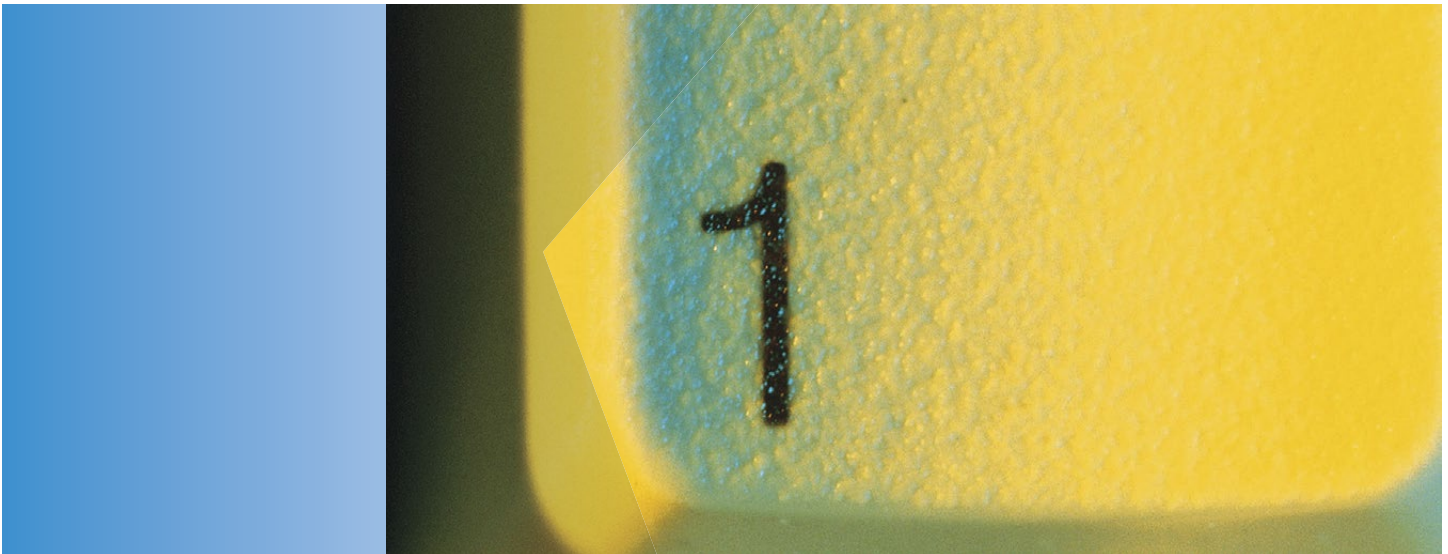
Low ESR



One world. One KEMET.

Electronic Components  
**KEMET**  
CHARGED.®

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## One world. One source. One KEMET.

When you partner with KEMET, our entire global organization provides you with the coordinated service you need. No bouncing from supplier to supplier. No endless phone calls and web browsing. We're your single, integrated source for electronic component solutions worldwide.

## Less hassles. More solutions.

Our commitment to product quality and on-time delivery has helped customers succeed for over 90 years. There's a reason KEMET components can be found in defense and aerospace equipment. Our reputation is built on a history of consistency, reliability and service.

## The "Easy-to-Buy-From" company.

KEMET offers a level of responsiveness that far surpasses any other supplier. Our passion for customer service is evident throughout our global sales organization, which offers localized support bolstered by our worldwide logistics capabilities. Whether you need rush samples, technical assistance, in-person consultation, accelerated custom design, design collaboration or prototype services, we have a solution.



## Made for you.

When you need custom products delivered on a tight schedule, you can trust KEMET. Get direct design consultation from global experts, who help you get the job done on time and within budget.

## Working for a better world.

KEMET is dedicated to economically, environmentally and socially sustainable development. We've adopted the Electronic Industry Code of Conduct (EICC) to address all aspects of corporate responsibility. Our manufacturing facilities have won numerous environmental excellence awards and recognitions, and our supply chain is certified. We believe doing the right thing is in everyone's interest.

## About KEMET.

KEMET Corporation is a leading global supplier of electronic components. We offer our customers the broadest selection of capacitor technologies in the industry across multiple dielectrics, along with an expanding range of electromechanical devices, and electromagnetic compatibility solutions. Our vision is to be the preferred supplier of electronic component solutions for customers demanding the highest standards of quality, delivery and service.

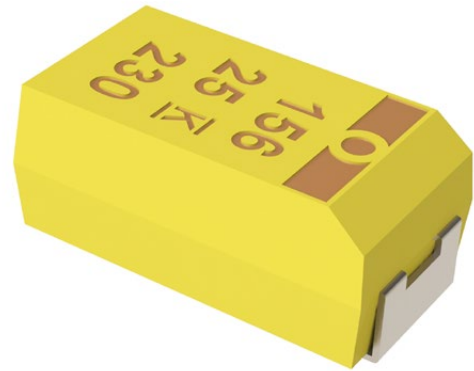
## Overview

The KEMET T494 Series is a lower ESR version of the popular T491 Series, designed specifically for today's highly automated surface mount processes and equipment. The T494 combines KEMET's proven solid tantalum technology, acclaimed and respected throughout the world, with the latest in materials, processes and automation, resulting in unsurpassed total performance and value. This product meets or exceeds the requirements of EIA standard 535BAAC. This series is classified as MSL (Moisture Sensitivity Level) 1 under J STD 020:

unlimited floor life time at  $\leq 30^{\circ}\text{C}$  / 85% RH. The T494 standard terminations are available in 100% matte tin and provide excellent wetting characteristics and compatibility with today's surface mount solder systems. Tin/lead (Sn/Pb) terminations are available upon request for any part number. Gold-plated terminations are also available for use with conductive epoxy attachment processes. Standard packaging of these devices is tape and reel in accordance with EIA 481. This system provides perfect compatibility with all tape-fed placement units.

## Benefits

- Meets or exceeds EIA Standard 535BAAC
- Taped and reeled per EIA 481
- Symmetrical, compliant terminations
- Optional gold-plated terminations
- Laser-marked case
- 100% surge current test on C, D, E, U, V, X sizes
- Halogen-free epoxy
- Capacitance values of 0.1  $\mu\text{F}$  to 1,000  $\mu\text{F}$
- Tolerances of  $\pm 10\%$  and  $\pm 20\%$
- Voltage rating of 2.5 – 50 VDC
- Extended range values
- Low profile case sizes
- RoHS Compliant and lead-free terminations
- Operating temperature range of  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$



## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn Solder



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Applications

Typical applications include decoupling and filtering in industrial and automotive end applications, such as DC/DC converters, portable electronics, telecommunications, and control units.

## Ordering Information

T	494	T	336	M	004	A	T	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	Packaging (C-Spec)
T = Tantalum	Industrial - Low ESR	A, B, C, D, E, S, T, U, V, X	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	2R5 = 2.5 V 003 = 3 V 004 = 4 V 006 = 6.3 V 010 = 10 V 016 = 16 V 020 = 20 V 025 = 25 V 035 = 35 V 050 = 50 V	A = N/A	T = 100% Matte Tin (Sn) Plated H = Standard Solder Coated (SnPb 5% Pb minimum) G = Gold Plated (A, B, C, D, X only)	Blank = 7" Reel 7280 = 13" Reel

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C
Rated Capacitance Range	0.1 – 1,000 µF @ 120 Hz/25°C
Capacitance Tolerance	K Tolerance (10%), M Tolerance (20%)
Rated Voltage Range	2.5 – 50 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.01 CV (µA) at rated voltage after 5 minutes

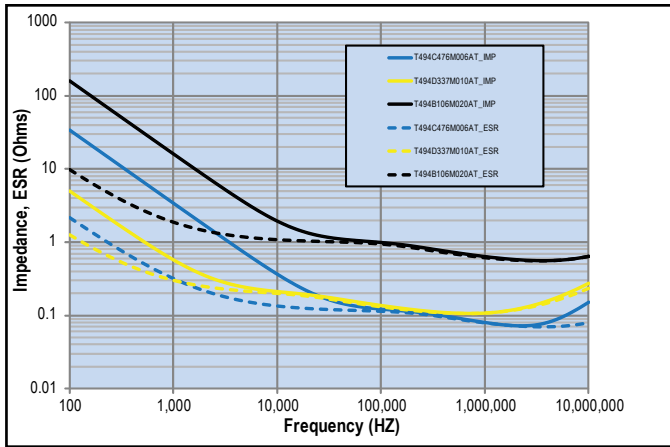
## Qualification

Test	Condition	Characteristics					
Endurance	85°C @ rated voltage, 2,000 hours 125°C @ 2/3 rated voltage, 2,000 hours	Δ C/C	Within ±10% of initial value				
		DF	Within initial limits				
		DCL	Within 1.25 x initial limit				
		ESR	Within initial limits				
Storage Life	125°C @ 0 volts, 2,000 hours	Δ C/C	Within ±10% of initial value				
		DF	Within initial limits				
		DCL	Within 1.25 x initial limit				
		ESR	Within initial limits				
Thermal Shock	MIL-STD-202, Method 107, Condition B, mounted, -55°C to 125°C, 1,000 cycles	Δ C/C	Within ±5% of initial value				
		DF	Within initial limits				
		DCL	Within 1.25 x initial limit				
		ESR	Within initial limits				
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	+125°C	
		Δ C/C	IL*	±10%	±10%	±20%	
		DF	IL	IL	1.5 x IL	1.5 x IL	
		DCL	IL	n/a	10 x IL	12 x IL	
		Surge Voltage	85°C, 1.32 x rated voltage 1,000 cycles (125°C, 1.2 x rated voltage).	Δ C/C	Within ±5% 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				

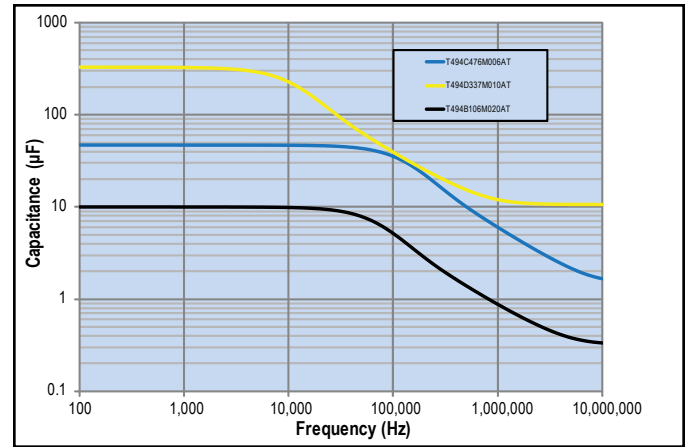
\*IL = Initial limit

## Electrical Characteristics

ESR vs. Frequency



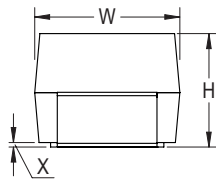
Capacitance vs. Frequency



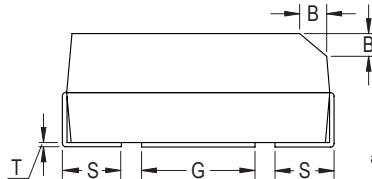
## Dimensions – Millimeters (Inches)

Metric will govern

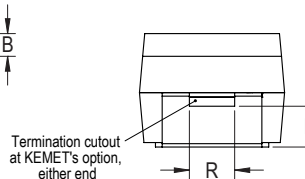
CATHODE (-) END VIEW



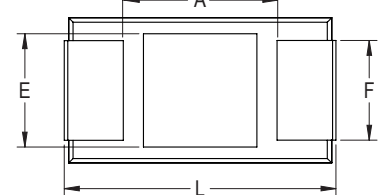
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component													
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)	
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)	0.8 (0.31)	1.1 (0.043)	1.3 (0.051)	
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)	1.1 (0.043)	1.8 (0.071)	2.2 (0.087)	
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)	2.5 (0.098)	2.8 (0.110)	2.4 (0.094)	
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)	
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)	
E	7360-38	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.236 ±0.012)	3.6 ±0.2 (0.142 ±0.008)	4.1 (0.161)	1.3 (0.051)	0.5 (0.020)	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)	
S	3216-12	3.2 ±0.2 (0.126 ±0.008)	1.6 ±0.2 (0.063 ±0.008)	1.2 (0.047)	1.2 (0.047)	0.8 (0.031)	n/a	0.05 (0.002)	n/a	n/a	0.13 (0.005)	0.8 (0.031)	1.1 (0.043)	1.3 (0.051)	
T	3528-12	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.2 (0.047)	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)	1.8 (0.071)	2.2 (0.087)	
U	6032-15	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.2 (0.110 ±0.008)	1.5 (0.059)	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)	2.8 (0.110)	2.4 (0.094)	
V	7343-20	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.0 (0.079)	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)	

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions



**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			Maximum Operating Temp	MSL
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
2.5	100	T/3528-12	T494T107(1)2R5A(2)	2.5	24.0	3.5	141	127	56	125	1
2.5	220	D/7343-31	T494D227(1)2R5A(2)	5.5	8.0	0.2	866	779	346	125	1
3	33	A/3216-18	T494A336(1)003A(2)	1.0	6.0	2.0	194	175	78	125	1
4	3.3	A/3216-18	T494A335(1)004A(2)	0.5	6.0	4.0	137	123	55	125	1
4	4.7	A/3216-18	T494A475(1)004A(2)	0.5	6.0	3.5	146	131	58	125	1
4	6.8	A/3216-18	T494A685(1)004A(2)	0.5	6.0	3.0	158	142	63	125	1
4	6.8	S/3216-12	T494S685(1)004A(2)	0.5	6.0	7.0	93	84	37	125	1
4	10	B/3528-21	T494B106(1)004A(2)	0.5	6.0	1.2	266	239	106	125	1
4	10	A/3216-18	T494A106(1)004A(2)	0.5	6.0	2.0	194	175	78	125	1
4	10	S/3216-12	T494S106(1)004A(2)	0.5	6.0	9.0	82	74	33	125	1
4	15	B/3528-21	T494B156(1)004A(2)	0.6	6.0	1.2	266	239	106	125	1
4	15	A/3216-18	T494A156(1)004A(2)	0.6	6.0	1.5	224	202	90	125	1
4	15	T/3528-12	T494T156(1)004A(2)	0.6	6.0	2.0	187	168	75	125	1
4	15	S/3216-12	T494S156(M)004A(2)	0.6	10.0	9.0	82	74	33	125	1
4	22	C/6032-28	T494C226(1)004A(2)	0.9	6.0	0.5	469	422	188	125	1
4	22	B/3528-21	T494B226(1)004A(2)	0.9	6.0	0.6	376	338	150	125	1
4	22	A/3216-18	T494A226(1)004A(2)	0.9	6.0	1.5	224	202	90	125	1
4	22	S/3216-12	T494S226(M)004A(2)	0.9	10.0	8.0	87	78	35	125	1
4	22	T/3528-12	T494T226(1)004A(2)	0.9	6.0	2.5	167	150	67	125	1
4	33	C/6032-28	T494C336(1)004A(2)	1.3	6.0	0.5	469	422	188	125	1
4	33	U/6032-15	T494U336(1)004A(2)	1.3	6.0	0.6	387	348	155	125	1
4	33	B/3528-21	T494B336(1)004A(2)	1.3	6.0	0.5	412	371	165	125	1
4	33	A/3216-18	T494A336(1)004A(2)	1.3	6.0	3.0	158	142	63	125	1
4	33	T/3528-12	T494T336(M)004A(2)	1.3	8.0	3.5	141	127	56	125	1
4	47	C/6032-28	T494C476(1)004A(2)	1.9	6.0	0.5	469	422	188	125	1
4	47	U/6032-15	T494U476(1)004A(2)	1.9	6.0	0.6	387	348	155	125	1
4	47	B/3528-21	T494B476(1)004A(2)	1.9	6.0	0.5	412	371	165	125	1
4	47	A/3216-18	T494A476(M)004A(2)	1.9	12.0	2.0	194	175	78	125	1
4	47	T/3528-12	T494T476(M)004A(2)	1.9	12.0	4.0	132	119	53	125	1
4	68	D/7343-31	T494D686(1)004A(2)	2.7	6.0	0.20	866	779	346	125	1
4	68	C/6032-28	T494C686(1)004A(2)	2.7	6.0	0.25	663	597	265	125	1
4	68	U/6032-15	T494U686(1)004A(2)	2.7	6.0	0.60	387	348	155	125	1
4	68	B/3528-21	T494B686(1)004A(2)	2.7	6.0	2.00	206	185	82	125	1
4	68	A/3216-18	T494A686(1)004A(2)	2.7	30.0	3.00	158	142	63	125	1
4	100	D/7343-31	T494D107(1)004A(2)	4.0	8.0	0.20	866	779	346	125	1
4	100	C/6032-28	T494C107(1)004A(2)	4.0	8.0	0.20	742	668	297	125	1
4	100	U/6032-15	T494U107(1)004A(2)	4.0	10.0	1.00	300	270	120	125	1
4	100	B/3528-21	T494B107(M)004A(2)	4.0	8.0	0.65	362	326	145	125	1
4	100	A/3216-18	T494A107(M)004A(2)	4.0	30.0	3.00	158	142	63	125	1
4	100	T/3528-12	T494T107(M)004A(2)	4.0	30.0	4.50	125	113	50	125	1
4	150	D/7343-31	T494D157(1)004A(2)	6.0	8.0	0.15	1000	900	400	125	1
4	150	V/7343-20	T494V157(1)004A(2)	6.0	8.0	0.20	791	712	316	125	1
4	150	C/6032-28	T494C157(1)004A(2)	6.0	8.0	0.30	606	545	242	125	1
4	150	B/3528-21	T494B157(M)004A(2)	6.0	12.0	1.00	292	263	117	125	1
4	220	V/7343-20	T494V227(1)004A(2)	8.8	8.0	0.30	645	581	258	125	1
4	220	B/3528-21	T494B227(M)004A(2)	8.8	8.0	0.40	461	415	184	125	1
4	330	D/7343-31	T494D337(1)004A(2)	13.2	8.0	0.15	1000	900	400	125	1
4	330	C/6032-28	T494C337(1)004A(2)	13.2	10.0	0.09	1106	995	442	125	1

(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, G = Gold 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. Substitutions can include better than series.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
4	330	V/7343-20	T494V337(1)004A(2)	13.2	12.0	0.30	645	581	258	125	1
4	470	X/7343-43	T494X477(1)004A(2)	18.8	8.0	0.15	1049	944	420	125	1
4	470	D/7343-31	T494D477(1)004A(2)	18.8	8.0	0.15	1000	900	400	125	1
4	680	X/7343-43	T494X687(M)004A(2)	27.2	12.0	0.10	1285	1157	514	125	1
4	680	D/7343-31	T494D687(M)004A(2)	27.2	12.0	0.15	1000	900	400	125	1
4	1000	X/7343-43	T494X108(1)004A(2)	40.0	12.0	0.10	1285	1157	514	125	1
4	1000	E/7360-38	T494E108(M)004A(2)	40.0	15.0	0.08	1581	1423	632	125	1
6.3	2.2	A/3216-18	T494A225(1)006A(2)	0.5	6.0	6.0	112	101	45	125	1
6.3	3.3	A/3216-18	T494A335(1)006A(2)	0.5	6.0	6.0	112	101	45	125	1
6.3	4.7	A/3216-18	T494A475(1)006A(2)	0.5	6.0	3.5	146	131	58	125	1
6.3	4.7	S/3216-12	T494S475(1)006A(2)	0.5	6.0	8.0	87	78	35	125	1
6.3	6.8	B/3528-21	T494B685(1)006A(2)	0.5	6.0	1.2	266	239	106	125	1
6.3	6.8	A/3216-18	T494A685(1)006A(2)	0.5	6.0	2.0	194	175	78	125	1
6.3	6.8	S/3216-12	T494S685(1)006A(2)	0.5	6.0	9.0	82	74	33	125	1
6.3	10	B/3528-21	T494B106(1)006A(2)	0.6	6.0	1.0	292	263	117	125	1
6.3	10	A/3216-18	T494A106(1)006A(2)	0.6	6.0	2.0	194	175	78	125	1
6.3	10	T/3528-12	T494T106(1)006A(2)	0.6	6.0	1.2	242	218	97	125	1
6.3	10	S/3216-12	T494S106(M)006A(2)	0.6	10.0	9.0	82	74	33	125	1
6.3	15	C/6032-28	T494C156(1)006A(2)	0.9	6.0	0.6	428	385	171	125	1
6.3	15	B/3528-21	T494B156(1)006A(2)	0.9	6.0	0.7	348	313	139	125	1
6.3	15	A/3216-18	T494A156(1)006A(2)	0.9	6.0	2.0	194	175	78	125	1
6.3	15	T/3528-12	T494T156(1)006A(2)	0.9	6.0	2.5	167	150	67	125	1
6.3	15	S/3216-12	T494S156(M)006A(2)	0.9	10.0	10.0	77	69	31	125	1
6.3	22	C/6032-28	T494C226(1)006A(2)	1.4	6.0	0.5	469	422	188	125	1
6.3	22	U/6032-15	T494U226(1)006A(2)	1.4	6.0	0.8	335	302	134	125	1
6.3	22	B/3528-21	T494B226(1)006A(2)	1.4	6.0	0.6	376	338	150	125	1
6.3	22	A/3216-18	T494A226(1)006A(2)	1.4	6.0	3.0	158	142	63	125	1
6.3	22	T/3528-12	T494T226(M)006A(2)	1.4	8.0	3.5	141	127	56	125	1
6.3	33	C/6032-28	T494C336(1)006A(2)	2.1	6.0	0.3	606	545	242	125	1
6.3	33	U/6032-15	T494U336(1)006A(2)	2.1	6.0	0.6	387	348	155	125	1
6.3	33	B/3528-21	T494B336(1)006A(2)	2.1	6.0	0.6	376	338	150	125	1
6.3	33	A/3216-18	T494A336(1)006A(2)	2.1	12.0	2.0	194	175	78	125	1
6.3	33	T/3528-12	T494T336(M)006A(2)	2.1	12.0	4.0	132	119	53	125	1
6.3	47	D/7343-31	T494D476(1)006A(2)	3.0	6.0	0.22	826	743	330	125	1
6.3	47	C/6032-28	T494C476(1)006A(2)	3.0	6.0	0.25	663	597	265	125	1
6.3	47	U/6032-15	T494U476(1)006A(2)	3.0	6.0	0.60	387	348	155	125	1
6.3	47	B/3528-21	T494B476(1)006A(2)	3.0	6.0	0.50	412	371	165	125	1
6.3	47	A/3216-18	T494A476(M)006A(2)	3.0	12.0	2.50	173	156	69	125	1
6.3	47	T/3528-12	T494T476(1)006A(2)	3.0	24.0	4.00	132	119	53	125	1
6.3	68	D/7343-31	T494D686(1)006A(2)	4.3	6.0	0.20	866	779	346	125	1
6.3	68	C/6032-28	T494C686(1)006A(2)	4.3	6.0	0.20	742	668	297	125	1
6.3	68	U/6032-15	T494U686(1)006A(2)	4.3	10.0	1.00	300	270	120	125	1
6.3	68	B/3528-21	T494B686(M)006A(2)	4.3	8.0	0.65	362	326	145	125	1
6.3	68	A/3216-18	T494A686(1)006A(2)	4.3	30.0	3.00	158	142	63	125	1
6.3	100	D/7343-31	T494D107(1)006A(2)	6.3	8.0	0.15	1000	900	400	125	1
6.3	100	V/7343-20	T494V107(1)006A(2)	6.3	8.0	0.20	791	712	316	125	1
6.3	100	C/6032-28	T494C107(1)006A(2)	6.3	8.0	0.30	606	545	242	125	1
6.3	100	U/6032-15	T494U107(M)006A(2)	6.3	10.0	1.20	274	247	110	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
6.3	100	B/3528-21	T494B107(1)006A(2)	6.3	15.0	1.50	238	214	95	125	1
6.3	150	B/3528-21	T494B157M006A(2)	9.5	15.0	2.25	194	175	78	125	1
6.3	150	D/7343-31	T494D157(1)006A(2)	9.5	8.0	0.15	1000	900	400	125	1
6.3	150	C/6032-28	T494C157(M)006A(2)	9.5	8.0	0.30	606	545	242	125	1
6.3	150	V/7343-20	T494V157(1)006A(2)	9.5	8.0	0.30	645	581	258	125	1
6.3	220	X/7343-43	T494X227(1)006A(2)	13.9	8.0	0.15	1049	944	420	125	1
6.3	220	D/7343-31	T494D227(1)006A(2)	13.9	8.0	0.15	1000	900	400	125	1
6.3	220	C/6032-28	T494C227(M)006A(2)	13.9	10.0	0.30	606	545	242	125	1
6.3	220	V/7343-20	T494V227(M)006A(2)	13.9	12.0	0.30	645	581	258	125	1
6.3	330	X/7343-43	T494X337(1)006A(2)	20.8	8.0	0.15	1049	944	420	125	1
6.3	330	D/7343-31	T494D337(1)006A(2)	20.8	8.0	0.15	1000	900	400	125	1
6.3	330	E/7360-38	T494E337(1)006A(2)	20.8	8.0	0.25	894	805	358	125	1
6.3	470	X/7343-43	T494X477(1)006A(2)	29.6	10.0	0.10	1285	1157	514	125	1
6.3	470	D/7343-31	T494D477(M)006A(2)	29.6	12.0	0.15	1000	900	400	125	1
6.3	470	E/7360-38	T494E477(1)006A(2)	29.6	10.0	0.20	1000	900	400	125	1
6.3	680	E/7360-38	T494E687(M)006A(2)	42.8	12.0	0.10	1414	1273	566	125	1
6.3	680	X/7343-43	T494X687(1)006A(2)	42.8	12.0	0.10	1285	1157	514	125	1
10	1.5	A/3216-18	T494A155(1)010A(2)	0.5	6.0	6.0	112	101	45	125	1
10	2.2	B/3528-21	T494B225(1)010A(2)	0.5	6.0	1.5	238	214	95	125	1
10	2.2	A/3216-18	T494A225(1)010A(2)	0.5	6.0	6.0	112	101	45	125	1
10	3.3	A/3216-18	T494A335(1)010A(2)	0.5	6.0	4.0	137	123	55	125	1
10	3.3	S/3216-12	T494S335(1)010A(2)	0.5	6.0	9.0	82	74	33	125	1
10	4.7	B/3528-21	T494B475(1)010A(2)	0.5	6.0	1.5	238	214	95	125	1
10	4.7	A/3216-18	T494A475(1)010A(2)	0.5	6.0	3.0	158	142	63	125	1
10	4.7	S/3216-12	T494S475(1)010A(2)	0.5	6.0	9.0	82	74	33	125	1
10	6.8	B/3528-21	T494B685(1)010A(2)	0.7	6.0	1.2	266	239	106	125	1
10	6.8	A/3216-18	T494A685(1)010A(2)	0.7	6.0	3.0	158	142	63	125	1
10	6.8	T/3528-12	T494T685(1)010A(2)	0.7	6.0	2.0	187	168	75	125	1
10	6.8	S/3216-12	T494S685(M)010A(2)	0.7	10.0	9.0	82	74	33	125	1
10	10	C/6032-28	T494C106(1)010A(2)	1.0	6.0	0.6	428	385	171	125	1
10	10	B/3528-21	T494B106(1)010A(2)	1.0	6.0	0.8	326	293	130	125	1
10	10	A/3216-18	T494A106(1)010A(2)	1.0	6.0	1.8	204	184	82	125	1
10	10	T/3528-12	T494T106(1)010A(2)	1.0	6.0	3.5	141	127	56	125	1
10	10	S/3216-12	T494S106(M)010A(2)	1.0	10.0	12.0	71	64	28	125	1
10	15	C/6032-28	T494C156(1)010A(2)	1.5	6.0	0.5	469	422	188	125	1
10	15	U/6032-15	T494U156(1)010A(2)	1.5	6.0	0.8	335	302	134	125	1
10	15	B/3528-21	T494B156(1)010A(2)	1.5	6.0	0.7	348	313	139	125	1
10	15	A/3216-18	T494A156(1)010A(2)	1.5	6.0	3.2	153	138	61	125	1
10	15	T/3528-12	T494T156(M)010A(2)	1.5	8.0	3.5	141	127	56	125	1
10	22	C/6032-28	T494C226(1)010A(2)	2.2	6.0	0.4	524	472	210	125	1
10	22	U/6032-15	T494U226(1)010A(2)	2.2	6.0	0.8	335	302	134	125	1
10	22	B/3528-21	T494B226(1)010A(2)	2.2	6.0	0.7	348	313	139	125	1
10	22	A/3216-18	T494A226(M)010A(2)	2.2	10.0	4.5	129	116	52	125	1
10	22	T/3528-12	T494T226(M)010A(2)	2.2	12.0	6.0	108	97	43	125	1
10	33	D/7343-31	T494D336(1)010A(2)	3.3	6.0	0.25	775	698	310	125	1
10	33	V/7343-20	T494V336(1)010A(2)	3.3	6.0	0.30	645	581	258	125	1
10	33	C/6032-28	T494C336(1)010A(2)	3.3	6.0	0.30	606	545	242	125	1
10	33	U/6032-15	T494U336(1)010A(2)	3.3	6.0	0.60	387	348	155	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
10	33	T/3528-12	T494T336(1)010A(2)	3.3	24.0	3.75	137	123	55	125	1
10	33	B/3528-21	T494B336(1)010A(2)	3.3	6.0	1.40	246	221	98	125	1
10	33	A/3216-18	T494A336(1)010A(2)	3.3	15.0	4.00	137	123	55	125	1
10	47	D/7343-31	T494D476(1)010A(2)	4.7	6.0	0.22	826	743	330	125	1
10	47	V/7343-20	T494V476(1)010A(2)	4.7	6.0	0.30	645	581	258	125	1
10	47	C/6032-28	T494C476(1)010A(2)	4.7	6.0	0.30	606	545	242	125	1
10	47	U/6032-15	T494U476(1)010A(2)	4.7	10.0	1.20	274	247	110	125	1
10	47	B/3528-21	T494B476(M)010A(2)	4.7	8.0	0.65	362	326	145	125	1
10	68	D/7343-31	T494D686(1)010A(2)	6.8	6.0	0.20	866	779	346	125	1
10	68	C/6032-28	T494C686(1)010A(2)	6.8	6.0	0.30	606	545	242	125	1
10	68	V/7343-20	T494V686(1)010A(2)	6.8	6.0	0.30	645	581	258	125	1
10	68	U/6032-15	T494U686(M)010A(2)	6.8	10.0	1.20	274	247	110	125	1
10	68	B/3528-21	T494B686(M)010A(2)	6.8	10.0	1.50	238	214	95	125	1
10	100	D/7343-31	T494D107(1)010A(2)	10.0	8.0	0.15	1000	900	400	125	1
10	100	C/6032-28	T494C107(1)010A(2)	10.0	8.0	0.20	742	668	297	125	1
10	100	V/7343-20	T494V107(1)010A(2)	10.0	8.0	0.40	559	503	224	125	1
10	150	X/7343-43	T494X157(1)010A(2)	15.0	8.0	0.15	1049	944	420	125	1
10	150	D/7343-31	T494D157(1)010A(2)	15.0	8.0	0.15	1000	900	400	125	1
10	150	C/6032-28	T494C157(1)010A(2)	15.0	10.0	0.70	396	356	158	125	1
10	150	V/7343-20	T494V157(M)010A(2)	15.0	8.0	0.30	645	581	258	125	1
10	220	X/7343-43	T494X227(1)010A(2)	22.0	8.0	0.15	1049	944	420	125	1
10	220	D/7343-31	T494D227(1)010A(2)	22.0	8.0	0.15	1000	900	400	125	1
10	330	X/7343-43	T494X337(1)010A(2)	33.0	10.0	0.10	1285	1157	514	125	1
10	330	D/7343-31	T494D337(1)010A(2)	33.0	10.0	0.15	1000	900	400	125	1
10	330	E/7360-38	T494E337(1)010A(2)	33.0	10.0	0.25	894	805	358	125	1
10	470	X/7343-43	T494X477(1)010A(2)	47.0	10.0	0.10	1285	1157	514	125	1
10	470	E/7360-38	T494E477(M)010A(2)	47.0	12.0	0.10	1414	1273	566	125	1
16	1	A/3216-18	T494A105(1)016A(2)	0.5	4.0	6.0	112	101	45	125	1
16	1.5	A/3216-18	T494A155(1)016A(2)	0.5	6.0	6.0	112	101	45	125	1
16	2.2	A/3216-18	T494A225(1)016A(2)	0.5	6.0	4.0	137	123	55	125	1
16	2.2	S/3216-12	T494S225(1)016A(2)	0.5	6.0	10.0	77	69	31	125	1
16	3.3	B/3528-21	T494B335(1)016A(2)	0.5	6.0	2.0	206	185	82	125	1
16	3.3	A/3216-18	T494A335(1)016A(2)	0.5	6.0	4.0	137	123	55	125	1
16	4.7	B/3528-21	T494B475(1)016A(2)	0.8	6.0	1.5	238	214	95	125	1
16	4.7	A/3216-18	T494A475(1)016A(2)	0.8	6.0	3.0	158	142	63	125	1
16	4.7	T/3528-12	T494T475(1)016A(2)	0.8	6.0	3.0	153	138	61	125	1
16	6.8	C/6032-28	T494C685(1)016A(2)	1.1	6.0	0.8	371	334	148	125	1
16	6.8	B/3528-21	T494B685(1)016A(2)	1.1	6.0	1.2	266	239	106	125	1
16	6.8	A/3216-18	T494A685(1)016A(2)	1.1	6.0	3.0	158	142	63	125	1
16	10	C/6032-28	T494C106(1)016A(2)	1.6	6.0	0.6	428	385	171	125	1
16	10	U/6032-15	T494U106(1)016A(2)	1.6	6.0	1.0	300	270	120	125	1
16	10	B/3528-21	T494B106(1)016A(2)	1.6	6.0	0.8	326	293	130	125	1
16	10	A/3216-18	T494A106(1)016A(2)	1.6	8.0	3.0	158	142	63	125	1
16	10	T/3528-12	T494T106(1)016A(2)	1.6	8.0	6.0	108	97	43	125	1
16	15	C/6032-28	T494C156(1)016A(2)	2.4	6.0	0.4	524	472	210	125	1
16	15	U/6032-15	T494U156(1)016A(2)	2.4	6.0	0.8	335	302	134	125	1
16	15	B/3528-21	T494B156(1)016A(2)	2.4	6.0	0.8	326	293	130	125	1
16	22	D/7343-31	T494D226(1)016A(2)	3.5	6.0	0.25	775	698	310	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							μA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz		
VDC @ 85°C	μF	KEMET/EIA	(See below for part options)	μA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
16	22	C/6032-28	T494C226(1)016A(2)	3.5	6.0	0.35	561	505	224	125	1
16	22	U/6032-15	T494U226(1)016A(2)	3.5	10.0	1.80	224	202	90	125	1
16	22	B/3528-21	T494B226(1)016A(2)	3.5	6.0	1.00	292	263	117	125	1
16	33	D/7343-31	T494D336(1)016A(2)	5.3	6.0	0.25	775	698	310	125	1
16	33	C/6032-28	T494C336(1)016A(2)	5.3	6.0	0.30	606	545	242	125	1
16	33	U/6032-15	T494U336(1)016A(2)	5.3	12.0	2.20	202	182	81	125	1
16	33	B/3528-21	T494B336(1)016A(2)	5.3	8.0	1.20	266	239	106	125	1
16	47	D/7343-31	T494D476(1)016A(2)	7.5	6.0	0.2	866	779	346	125	1
16	47	V/7343-20	T494V476(1)016A(2)	7.5	6.0	0.3	645	581	258	125	1
16	47	C/6032-28	T494C476(1)016A(2)	7.5	6.0	0.5	469	422	188	125	1
16	68	D/7343-31	T494D686(1)016A(2)	10.9	6.0	0.15	1000	900	400	125	1
16	68	V/7343-20	T494V686(1)016A(2)	10.9	6.0	0.5	500	450	200	125	1
16	68	C/6032-28	T494C686(1)016A(2)	10.9	12.0	1.0	332	299	133	125	1
16	100	X/7343-43	T494X107(1)016A(2)	16.0	8.0	0.15	1049	944	420	125	1
16	100	D/7343-31	T494D107(1)016A(2)	16.0	8.0	0.15	1000	900	400	125	1
16	100	V/7343-20	T494V107(1)016A(2)	16.0	12.0	0.5	500	450	200	125	1
16	150	X/7343-43	T494X157(1)016A(2)	24.0	8.0	0.15	1049	944	420	125	1
16	150	D/7343-31	T494D157(1)016A(2)	24.0	12.0	0.4	612	551	245	125	1
16	220	X/7343-43	T494X227(1)016A(2)	35.2	10.0	0.4	642	578	257	125	1
16	220	E/7360-38	T494E227(1)016A(2)	35.2	7.2	0.5	632	569	253	125	1
20	0.68	A/3216-18	T494A684(1)020A(2)	0.5	4.0	8.0	97	87	39	125	1
20	1	A/3216-18	T494A105(1)020A(2)	0.5	4.0	5.5	117	105	47	125	1
20	1	S/3216-12	T494S105(1)020A(2)	0.5	6.0	10.0	77	69	31	125	1
20	1.5	A/3216-18	T494A155(1)020AS(2)	0.5	6.0	4.5	129	116	52	125	1
20	1.5	S/3216-12	T494S155(1)020A(2)	0.5	6.0	9.0	82	74	33	125	1
20	2.2	B/3528-21	T494B225(1)020A(2)	0.5	6.0	1.5	238	214	95	125	1
20	2.2	A/3216-18	T494A225(1)020A(2)	0.5	6.0	4.0	137	123	55	125	1
20	3.3	B/3528-21	T494B335(1)020A(2)	0.7	6.0	1.3	256	230	102	125	1
20	3.3	A/3216-18	T494A335(1)020A(2)	0.7	6.0	4.0	137	123	55	125	1
20	3.3	T/3528-12	T494T335(1)020A(2)	0.7	6.0	4.0	132	119	53	125	1
20	4.7	C/6032-28	T494C475(1)020A(2)	0.9	6.0	0.6	428	385	171	125	1
20	4.7	B/3528-21	T494B475(1)020A(2)	0.9	6.0	1.0	292	263	117	125	1
20	4.7	A/3216-18	T494A475(1)020A(2)	0.9	6.0	3.0	158	142	63	125	1
20	6.8	C/6032-28	T494C685(1)020A(2)	1.4	6.0	0.6	428	385	171	125	1
20	6.8	U/6032-15	T494U685(1)020A(2)	1.4	6.0	1.4	254	229	102	125	1
20	6.8	B/3528-21	T494B685(1)020A(2)	1.4	6.0	1.0	292	263	117	125	1
20	6.8	A/3216-18	T494A685(M)020A(2)	1.4	8.0	3.0	158	142	63	125	1
20	10	C/6032-28	T494C106(1)020A(2)	2.0	6.0	0.5	469	422	188	125	1
20	10	U/6032-15	T494U106(1)020A(2)	2.0	6.0	0.8	335	302	134	125	1
20	10	B/3528-21	T494B106(1)020A(2)	2.0	6.0	1.0	292	263	117	125	1
20	10	A/3216-18	T494A106(M)020A(2)	2.0	10.0	3.0	158	142	63	125	1
20	15	D/7343-31	T494D156(1)020A(2)	3.0	6.0	0.35	655	590	262	125	1
20	15	C/6032-28	T494C156(1)020A(2)	3.0	6.0	0.40	524	472	210	125	1
20	22	D/7343-31	T494D226(1)020A(2)	4.4	6.0	0.3	707	636	283	125	1
20	22	V/7343-20	T494V226(1)020A(2)	4.4	6.0	0.4	559	503	224	125	1
20	22	C/6032-28	T494C226(1)020A(2)	4.4	6.0	0.4	524	472	210	125	1
20	22	B/3528-21	T494B226(1)020A(2)	4.4	8.0	3.0	168	151	67	125	1
20	33	D/7343-31	T494D336(1)020A(2)	6.6	6.0	0.25	775	698	310	125	1
VDC @ 85°C	μF	KEMET/EIA	(See below for part options)	μA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.



**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
20	33	C/6032-28	T494C336(M)020A(2)	6.6	6.0	0.40	524	472	210	125	1
20	33	V/7343-20	T494V336(1)020A(2)	6.6	8.0	0.40	559	503	224	125	1
20	33	B/3528-21	T494B336(M)020A(2)	6.6	10.0	3.00	168	151	67	125	1
20	47	C/6032-28	T494C476(M)020A(2)	9.4	10.0	0.80	371	334	148	125	1
20	47	D/7343-31	T494D476(1)020A(2)	9.4	6.0	0.20	866	779	346	125	1
20	68	X/7343-43	T494X686(1)020A(2)	13.6	6.0	0.20	908	817	363	125	1
20	68	D/7343-31	T494D686(1)020A(2)	13.6	8.0	0.20	866	779	346	125	1
20	100	D/7343-31	T494D107(1)020A(2)	20.0	6.0	0.68	471	424	188	125	1
20	100	X/7343-43	T494X107(1)020A(2)	20.0	8.0	0.15	1049	944	420	125	1
20	100	E/7360-38	T494E107(1)020A(2)	20.0	8.0	0.30	816	734	326	125	1
20	150	X/7343-43	T494X157(1)020A(2)	30.0	10.0	0.30	742	668	297	125	1
25	0.33	A/3216-18	T494A334(1)025A(2)	0.5	4.0	10.0	87	78	35	125	1
25	0.47	A/3216-18	T494A474(1)025A(2)	0.5	4.0	9.0	91	82	36	125	1
25	0.68	A/3216-18	T494A684(1)025A(2)	0.5	4.0	6.0	112	101	45	125	1
25	1	B/3528-21	T494B105(1)025A(2)	0.5	4.0	2.0	206	185	82	125	1
25	1	A/3216-18	T494A105(1)025A(2)	0.5	4.0	4.0	137	123	55	125	1
25	1.5	B/3528-21	T494B155(1)025A(2)	0.5	6.0	1.5	238	214	95	125	1
25	1.5	A/3216-18	T494A155(1)025A(2)	0.5	6.0	3.0	158	142	63	125	1
25	2.2	C/6032-28	T494C225(1)025A(2)	0.6	6.0	2.2	224	202	90	125	1
25	2.2	B/3528-21	T494B225(1)025A(2)	0.6	6.0	1.2	266	239	106	125	1
25	2.2	A/3216-18	T494A225(1)025A(2)	0.6	6.0	3.0	158	142	63	125	1
25	3.3	C/6032-28	T494C335(1)025A(2)	0.8	6.0	1.2	303	273	121	125	1
25	3.3	B/3528-21	T494B335(1)025A(2)	0.8	6.0	2.0	206	185	82	125	1
25	3.3	A/3216-18	T494A335(1)025A(2)	0.8	6.0	3.0	158	142	63	125	1
25	4.7	C/6032-28	T494C475(1)025A(2)	1.2	6.0	0.6	428	385	171	125	1
25	4.7	B/3528-21	T494B475(1)025A(2)	1.2	6.0	1.0	292	263	117	125	1
25	4.7	A/3216-18	T494A475(M)025A(2)	1.2	8.0	3.0	158	142	63	125	1
25	6.8	C/6032-28	T494C685(1)025A(2)	1.7	6.0	0.6	428	385	171	125	1
25	6.8	B/3528-21	T494B685(1)025A(2)	1.7	8.0	2.0	206	185	82	125	1
25	10	D/7343-31	T494D106(1)025A(2)	2.5	6.0	0.4	612	551	245	125	1
25	10	C/6032-28	T494C106(1)025A(2)	2.5	6.0	0.6	428	385	171	125	1
25	10	B/3528-21	T494B106(1)025A(2)	2.5	8.0	3.0	168	151	67	125	1
25	15	D/7343-31	T494D156(1)025A(2)	3.8	6.0	0.35	655	590	262	125	1
25	15	C/6032-28	T494C156(1)025A(2)	3.8	6.0	0.90	350	315	140	125	1
25	15	B/3528-21	T494B156(1)025A(2)	3.8	8.0	3.00	168	151	67	125	1
25	22	D/7343-31	T494D226(1)025A(2)	5.5	6.0	0.3	707	636	283	125	1
25	22	C/6032-28	T494C226(1)025A(2)	5.5	6.0	1.0	332	299	133	125	1
25	22	V/7343-20	T494V226(1)025A(2)	5.5	6.0	0.5	500	450	200	125	1
25	33	X/7343-43	T494X336(1)025A(2)	8.3	6.0	0.3	742	668	297	125	1
25	33	D/7343-31	T494D336(1)025A(2)	8.3	6.0	0.4	612	551	245	125	1
25	33	C/6032-28	T494C336(1)025A(2)	8.3	10.0	1.0	332	299	133	125	1
25	47	X/7343-43	T494X476(1)025A(2)	11.8	6.0	0.3	742	668	297	125	1
25	47	D/7343-31	T494D476(1)025A(2)	11.8	10.0	0.2	866	779	346	125	1
25	68	X/7343-43	T494X686(M)025A(2)	17.0	8.0	0.3	742	668	297	125	1
25	68	D/7343-31	T494D686(M)025A(2)	17.0	10.0	0.5	548	493	219	125	1
25	100	X/7343-43	T494X107(M)025A(2)	25.0	8.0	0.25	812	731	325	125	1
35	0.1	A/3216-18	T494A104(1)035A(2)	0.5	4.0	10.0	87	78	35	125	1
35	0.15	A/3216-18	T494A154(1)035A(2)	0.5	4.0	6.0	112	101	45	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
35	0.22	A/3216-18	T494A224(1)035A(2)	0.5	4.0	6.0	112	101	45	125	1
35	0.33	A/3216-18	T494A334(1)035A(2)	0.5	4.0	6.0	112	101	45	125	1
35	0.47	B/3528-21	T494B474(1)035A(2)	0.5	4.0	2.5	184	166	74	125	1
35	0.47	A/3216-18	T494A474(1)035A(2)	0.5	4.0	4.0	137	123	55	125	1
35	0.68	B/3528-21	T494B684(1)035A(2)	0.5	4.0	2.5	184	166	74	125	1
35	0.68	A/3216-18	T494A684(1)035A(2)	0.5	4.0	6.0	112	101	45	125	1
35	1	B/3528-21	T494B105(1)035A(2)	0.5	4.0	2.0	206	185	82	125	1
35	1	A/3216-18	T494A105(1)035A(2)	0.5	4.0	6.0	112	101	45	125	1
35	1.5	A/3216-18	T494A155(1)035A(2)	0.5	6.0	4.0	137	123	55	125	1
35	1.5	C/6032-28	T494C155(1)035A(2)	0.5	6.0	2.5	210	189	84	125	1
35	1.5	B/3528-21	T494B155(1)035A(2)	0.5	6.0	3.0	168	151	67	125	1
35	2.2	A/3216-18	T494A225(1)035A(2)	0.8	6.0	3.0	158	142	63	125	1
35	2.2	C/6032-28	T494C225(1)035A(2)	0.8	6.0	1.5	271	244	108	125	1
35	2.2	B/3528-21	T494B225(1)035A(2)	0.8	6.0	2.5	184	166	74	125	1
35	3.3	C/6032-28	T494C335(1)035A(2)	1.2	6.0	0.8	371	334	148	125	1
35	3.3	B/3528-21	T494B335(1)035A(2)	1.2	6.0	1.3	256	230	102	125	1
35	4.7	B/3528-21	T494B475(1)035A(2)	1.6	6.0	1.5	238	214	95	125	1
35	4.7	D/7343-31	T494D475(1)035A(2)	1.6	6.0	0.7	463	417	185	125	1
35	4.7	C/6032-28	T494C475(1)035A(2)	1.6	6.0	0.7	396	356	158	125	1
35	6.8	D/7343-31	T494D685(1)035A(2)	2.4	6.0	0.5	548	493	219	125	1
35	6.8	C/6032-28	T494C685(1)035A(2)	2.4	6.0	0.9	350	315	140	125	1
35	10	D/7343-31	T494D106(1)035A(2)	3.5	6.0	0.4	612	551	245	125	1
35	10	C/6032-28	T494C106(1)035A(2)	3.5	6.0	1.2	303	273	121	125	1
35	10	V/7343-20	T494V106(1)035A(2)	3.5	6.0	0.8	395	356	158	125	1
35	15	X/7343-43	T494X156(1)035A(2)	5.3	6.0	0.30	742	668	297	125	1
35	15	D/7343-31	T494D156(1)035A(2)	5.3	6.0	0.35	655	590	262	125	1
35	22	X/7343-43	T494X226(1)035A(2)	7.7	6.0	0.3	742	668	297	125	1
35	22	D/7343-31	T494D226(1)035A(2)	7.7	6.0	0.4	612	551	245	125	1
35	33	D/7343-31	T494D336(1)035A(2)	11.6	6.0	0.6	500	450	200	125	1
35	33	X/7343-43	T494X336(1)035A(2)	11.6	6.0	0.6	524	472	210	125	1
35	47	X/7343-43	T494X476(1)035A(2)	16.5	8.0	0.5	574	517	230	125	1
35	47	E/7360-38	T494E476(1)035A(2)	16.5	10.0	0.3	816	734	326	125	1
50	0.1	A/3216-18	T494A104(1)050A(2)	0.5	4.0	10.0	87	78	35	125	1
50	0.15	A/3216-18	T494A154(1)050A(2)	0.5	4.0	10.0	87	78	35	125	1
50	0.22	A/3216-18	T494A224(1)050A(2)	0.5	4.0	12.0	79	71	32	125	1
50	0.22	B/3528-21	T494B224(1)050A(2)	0.5	4.0	10.0	92	83	37	125	1
50	0.33	A/3216-18	T494A334(1)050A(2)	0.5	4.0	9.0	91	82	36	125	1
50	0.33	B/3528-21	T494B334(1)050A(2)	0.5	4.0	2.5	184	166	74	125	1
50	0.47	A/3216-18	T494A474(1)050A(2)	0.5	4.0	6.0	112	101	45	125	1
50	0.47	C/6032-28	T494C474(1)050A(2)	0.5	4.0	1.8	247	222	99	125	1
50	0.47	B/3528-21	T494B474(1)050A(2)	0.5	4.0	2.0	206	185	82	125	1
50	0.68	A/3216-18	T494A684(1)050A(2)	0.5	4.0	5.0	122	110	49	125	1
50	0.68	C/6032-28	T494C684(1)050A(2)	0.5	4.0	1.6	262	236	105	125	1
50	0.68	B/3528-21	T494B684(1)050A(2)	0.5	4.0	3.0	168	151	67	125	1
50	1	A/3216-18	T494A105(1)050A(2)	0.5	4.0	5.0	122	110	49	125	1
50	1	C/6032-28	T494C105(1)050A(2)	0.5	4.0	1.6	262	236	105	125	1
50	1	B/3528-21	T494B105(1)050A(2)	0.5	6.0	4.0	146	131	58	125	1
50	1	V/7343-20	T494V105(M)050A(2)	0.5	4.0	4.0	177	159	71	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
50	1.5	D/7343-31	T494D155(1)050A(2)	0.8	6.0	1.0	387	348	155	125	1
50	1.5	C/6032-28	T494C155(1)050A(2)	0.8	6.0	1.5	271	244	108	125	1
50	2.2	D/7343-31	T494D225(1)050A(2)	1.1	6.0	0.8	433	390	173	125	1
50	2.2	C/6032-28	T494C225(1)050A(2)	1.1	6.0	1.5	271	244	108	125	1
50	3.3	D/7343-31	T494D335(1)050A(2)	1.7	6.0	0.8	433	390	173	125	1
50	4.7	D/7343-31	T494D475(1)050A(2)	2.4	6.0	0.6	500	450	200	125	1
50	6.8	X/7343-43	T494X685(1)050A(2)	3.4	6.0	0.5	574	517	230	125	1
50	6.8	D/7343-31	T494D685(1)050A(2)	3.4	6.0	0.7	463	417	185	125	1
50	10	X/7343-43	T494X106(1)050A(2)	5.0	6.0	0.4	642	578	257	125	1
50	10	D/7343-31	T494D106(1)050A(2)	5.0	6.0	0.7	463	417	185	125	1
50	15	X/7343-43	T494X156(1)050A(2)	7.5	6.0	0.4	642	578	257	125	1
50	22	X/7343-43	T494X226(1)050A(2)	11.0	10.0	0.5	574	517	230	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 20°C Max/5 Min	% @ 20°C 120 Hz Max	Ω @ 20°C 100 kHz Max	mA @ 25°C 100 kHz	mA @ 85°C 100 kHz	mA @ 125°C 100 kHz	°C	Reflow Temp ≤ 260°C
<b>Rated Voltage</b>	<b>Rated Cap</b>	<b>Case Code/ Case Size</b>	<b>KEMET Part Number</b>	<b>DC Leakage</b>	<b>DF</b>	<b>ESR</b>	<b>Maximum Allowable Ripple Current</b>			<b>Maximum Operating Temp</b>	<b>MSL</b>

(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, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates termination finish.

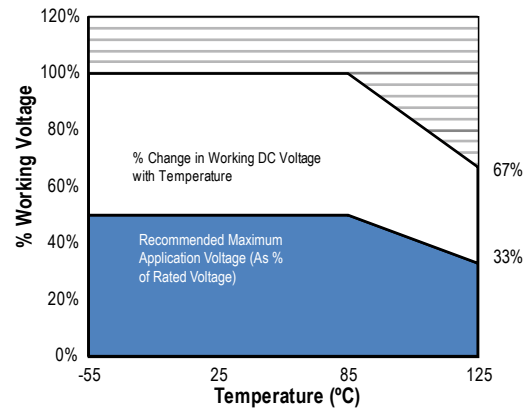
Refer to Ordering Information for additional detail.

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. Substitutions can include better than series.



## Recommended Voltage Derating Guidelines

	-55°C to 85°C	85°C to 125°C
% Change in Working DC Voltage with Temperature	V <sub>R</sub>	67% of V <sub>R</sub>
Recommended Maximum Application Voltage	50% of V <sub>R</sub>	33% of V <sub>R</sub>



## 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.

KEMET Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts @ 25°C w/+20°C Rise
A	3216-18	75
B	3528-21	85
C	6032-28	110
D	7343-31	150
X	7343-43	165
E	7360-38	200
S	3216-12	60
T	3528-12	70
U	6032-15	90
V	7343-20	125
T510X	7343-43	270
T510E	7360-38	285

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

Temperature Compensation Multipliers for Maximum Ripple Current		
T ≤ 25°C	T ≤ 85°C	T ≤ 125°C
1.00	0.90	0.40

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)

R = ESR at specified frequency (ohms)

E = rms ripple voltage (volts)

Z = Impedance at specified frequency (ohms)

P max = maximum power dissipation (watts)

## Reverse Voltage

Solid tantalum 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	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
E <sup>1</sup>	7360-38			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
S <sup>2</sup>	3216-12			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
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	7343-20			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
X <sup>1</sup>	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

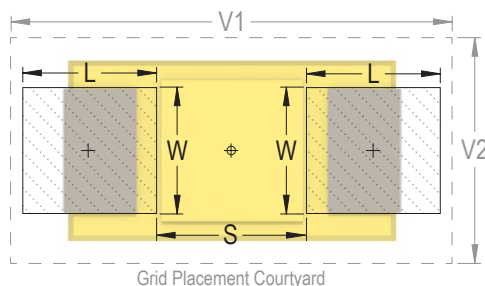
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## 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.

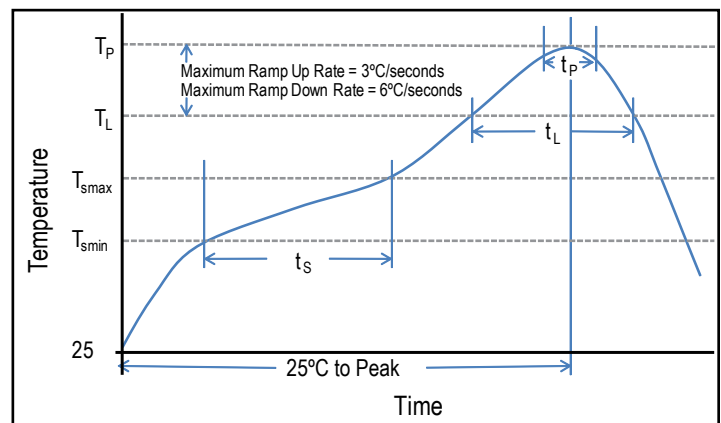
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

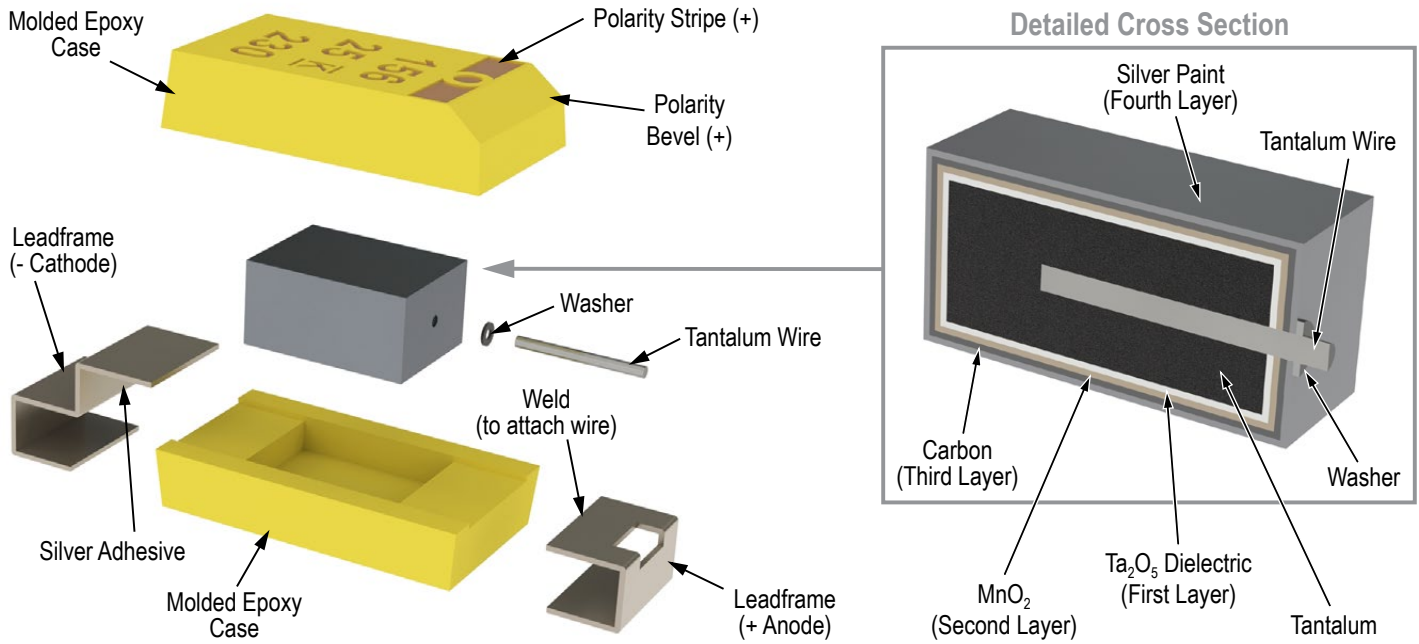
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



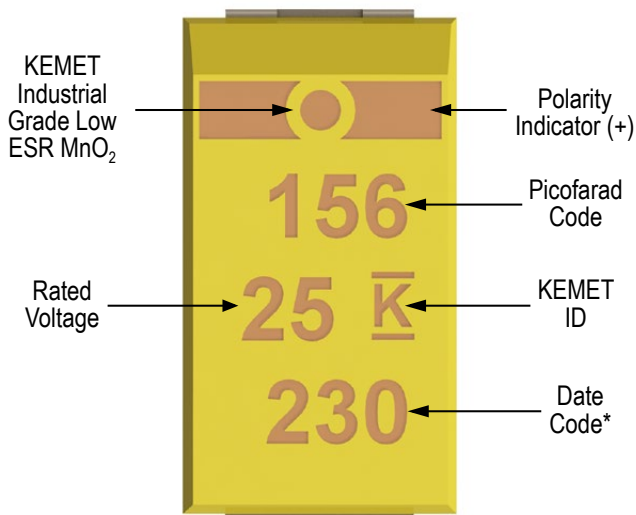
## Storage

Tantalum chip capacitors should be stored in normal working environments. While the chips 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 chip stock should be used promptly, preferably within three years of receipt.

## Construction



## Capacitor Marking



\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

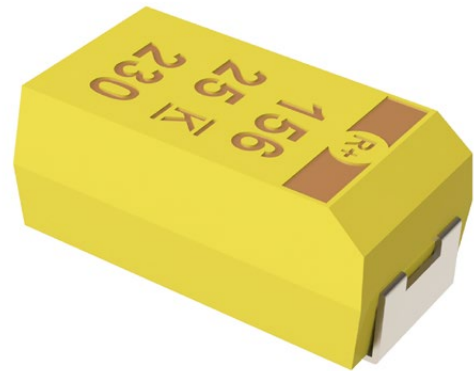
## Overview

The low ESR, surge-robust T495 Series is designed for demanding applications that require high surge current and high ripple current capability. This series builds upon the proven capabilities of our industrial grade tantalum chip capacitors to offer several advantages such as low ESR, high ripple current capability, excellent capacitance stability, and improved

resistance to high in-rush currents. These benefits are achieved through a combination of proprietary design, materials, and process parameters as well as high-stress, low impedance electrical conditioning performed prior to screening. This series is classified as MSL (Moisture Sensitivity Level) 1 under J STD 020: unlimited floor life time at ≤30°C/85% RH.

## Benefits

- Meets or exceeds EIA Standard 535BAAC
- Taped and reeled per EIA 481
- High surge current capability
- Optional gold-plated terminations
- High ripple current capability
- 100% surge current test on C, D, E, U, V, X sizes
- 100% steady-state accelerated aging
- Capacitance values of 0.1 µF to 1,000 µF
- Tolerances of ±10% and ±20%
- Voltage rating of 2.5 – 50 VDC
- Extended range values
- Available tested to DSCC 95158
- RoHS Compliant and lead-free terminations
- Operating temperature range of -55°C to +125°C



## Applications

Typical applications include decoupling and filtering in industrial and automotive end applications, such as DC/DC converters, portable electronics, telecommunications, and control units requiring high ripple current capability.

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn Solder



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

T	495	X	107	M	010	A	T	E045	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	ESR	Packaging (C-Spec)
T = Tantalum	Surge Robust Low ESR	A, B, C, D, E, M, T, U, V, X	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	2R5 = 2.5 V 004 = 4 V 006 = 6.3 V 010 = 10 V 016 = 16 V 020 = 20 V 025 = 25 V 035 = 35 V 050 = 50 V	A = N/A	T = 100% Matte Tin (Sn) Plated H = Standard Solder Coated (SnPb 5% Pb minimum) G = Gold Plated (A, B, C, D, X only)	Last three digits specify ESR in mΩ. (45 = 45 mΩ)	Blank = 7" Reel 7280 = 13" Reel

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C
Rated Capacitance Range	0.47 – 1,000 µF @ 120 Hz/25°C
Capacitance Tolerance	K Tolerance (10%), M Tolerance (20%)
Rated Voltage Range	2.5 – 50 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.01 CV (µA) at rated voltage after 5 minutes

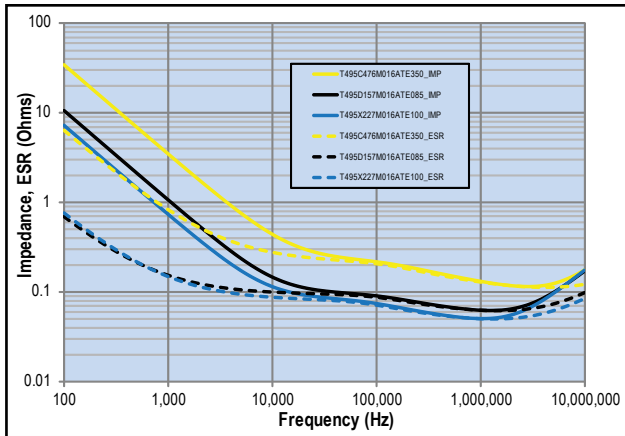
## Qualification

Test	Condition	Characteristics				
Endurance	85°C @ rated voltage, 2,000 hours. 125°C @ 2/3 rated voltage, 2,000 hours.	Δ C/C	Within ±10% of initial value			
		DF	Within initial limits			
		DCL	Within 1.25 x initial limit			
		ESR	Within initial limits			
Storage Life	125°C @ 0 volts, 2,000 hours.	Δ C/C	Within ±10% of initial value			
		DF	Within initial limits			
		DCL	Within 1.25 x initial limit			
		ESR	Within initial limits			
Thermal Shock	MIL–STD–202, Method 107, Condition B, mounted, -55°C to 125° C, 1,000 cycles.	Δ C/C	Within ±5% of initial value			
		DF	Within initial limits			
		DCL	Within 1.25 x initial limit			
		ESR	Within initial limits			
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	+125°C	
		Δ C/C	IL*	±10%	±10%	±20%
		DF	IL	IL	1.5 x IL	1.5 x IL
Surge Voltage	85°C, 1.32 x rated voltage 1,000 cycles (125°C, 1.2 x rated voltage).	DCL	10 x IL			
		ESR	12 x IL			
		IL	n/a	10 x IL	12 x IL	
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 ±5% 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			

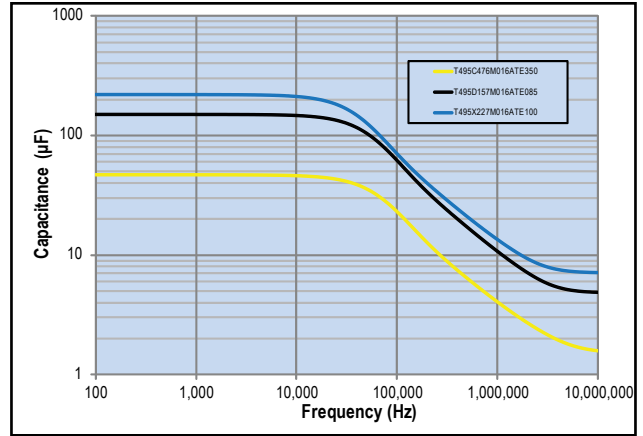
\*IL = Initial limit

## Electrical Characteristics

ESR vs. Frequency



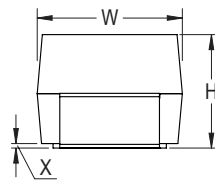
Capacitance vs. Frequency



## Dimensions – Millimeters (Inches)

Metric will govern

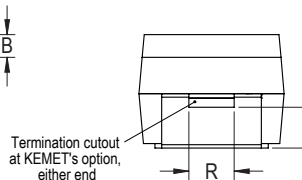
CATHODE (-) END VIEW



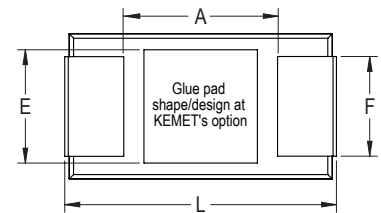
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component												
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)
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)	0.8 (0.31)	1.1 (0.043)	1.3 (0.051)
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)	1.1 (0.043)	1.8 (0.071)	2.2 (0.087)
M	3528-15	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.5 (0.059)	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)	1.8 (0.071)	2.2 (0.087)
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)	2.5 (0.098)	2.8 (0.110)	2.4 (0.094)
U	6032-15	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.2 (0.110 ±0.008)	1.5 (0.059)	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)	2.8 (0.110)	2.4 (0.094)
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)
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)
E	7360-38	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	3.6 ±0.2 (0.142 ±0.008)	4.1 (0.161)	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)
T	3528-12	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.2 (0.047)	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)	1.8 (0.071)	2.2 (0.087)
V	7343-20	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.0 (0.079)	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)

Notes: (Ref) – Dimensions provided for reference only. No dimensions provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions



Table 1 – Ratings &amp; Part Number Reference

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
2.5	100	T/3528-12	T495T107(M)2R5A(2)E3K0	2.5	24.0	3000	153	138	61	125	1
2.5	220	D/7343-31	T495D227(1)2R5A(2)E045	5.5	8.0	45	1826	1643	730	125	1
2.5	470	D/7343-31	T495D477(1)2R5A(2)E035	11.8	8.0	35	2070	1863	828	125	1
2.5	1000	X/7343-43	T495X108(1)2R5A(2)E030	25.0	15.0	30	2345	2111	938	125	1
2.5	1000	X/7343-43	T495X108(1)2R5A(2)E040	25.0	15.0	40	2031	1828	812	125	1
4	6.8	A/3216-18	T495A685(1)004A(2)E2K0	0.5	6.0	2000	194	175	78	125	1
4	22	C/6032-28	T495C226(1)004A(2)E2K4	0.9	6.0	2400	214	193	86	125	1
4	22	C/6032-28	T495C226(1)004A(2)E380	0.9	6.0	380	538	484	215	125	1
4	33	T/3528-12	T495T336(1)004A(2)E1K2	1.3	8.0	1200	242	218	97	125	1
4	47	T/3528-12	T495T476(1)004A(2)E1K0	1.9	10.0	1000	265	239	106	125	1
4	68	T/3528-12	T495T686(1)004A(2)E1K5	2.7	20.0	1500	216	194	86	125	1
4	68	V/7343-20	T495V686(1)004A(2)E150	2.7	6.0	150	913	822	365	125	1
4	100	B/3528-21	T495B107(1)004A(2)E500	4.0	8.0	500	412	371	165	125	1
4	100	D/7343-31	T495D107(1)004A(2)E800	4.0	6.0	800	433	390	173	125	1
4	150	B/3528-21	T495B157(M)004A(2)E900	6.0	12.0	900	307	276	123	125	1
4	150	C/6032-28	T495C157(1)004A(2)E070	6.0	12.0	70	1254	1129	502	125	1
4	150	C/6032-28	T495C157(1)004A(2)E250	6.0	8.0	250	663	597	265	125	1
4	150	U/6032-15	T495U157(1)004A(2)E200	6.0	8.0	200	671	604	268	125	1
4	220	D/7343-31	T495D227(1)004A(2)E040	8.8	8.0	40	1936	1742	774	125	1
4	220	D/7343-31	T495D227(1)004A(2)E050	8.8	8.0	50	1732	1559	693	125	1
4	220	D/7343-31	T495D227(1)004A(2)E100	8.8	8.0	100	1225	1103	490	125	1
4	330	C/6032-28	T495C337(1)004A(2)E300	13.2	10.0	300	606	545	242	125	1
4	330	C/6032-28	T495C337(1)004A(2)E700	13.2	12.0	700	396	356	158	125	1
4	330	D/7343-31	T495D337(1)004A(2)E030	13.2	8.0	30	2236	2012	894	125	1
4	330	D/7343-31	T495D337(1)004A(2)E045	13.2	8.0	45	1826	1643	730	125	1
4	330	D/7343-31	T495D337(1)004A(2)E100	13.2	8.0	100	1225	1103	490	125	1
4	470	D/7343-31	T495D477(1)004A(2)E045	18.8	12.0	45	1826	1643	730	125	1
4	470	D/7343-31	T495D477(1)004A(2)E100	18.8	12.0	100	1225	1103	490	125	1
4	470	X/7343-43	T495X477(1)004A(2)E030	18.8	8.0	30	2345	2111	938	125	1
4	470	X/7343-43	T495X477(1)004A(2)E045	18.8	8.0	45	1915	1724	766	125	1
4	470	X/7343-43	T495X477(1)004A(2)E060	18.8	10.0	60	1658	1492	663	125	1
4	470	X/7343-43	T495X477(1)004A(2)E100	18.8	8.0	100	1285	1157	514	125	1
4	680	X/7343-43	T495X687(1)004A(2)E040	27.2	10.0	40	2031	1828	812	125	1
4	680	X/7343-43	T495X687(1)004A(2)E060	27.2	10.0	60	1658	1492	663	125	1
4	680	X/7343-43	T495X687(1)004A(2)E100	27.2	10.0	100	1285	1157	514	125	1
4	1000	X/7343-43	T495X108(1)004A(2)E030	40.0	10.0	30	2345	2111	938	125	1
4	1000	X/7343-43	T495X108(1)004A(2)E040	40.0	10.0	40	2031	1828	812	125	1
4	1000	X/7343-43	T495X108(1)004A(2)E060	40.0	10.0	60	1658	1492	663	125	1
4	1000	X/7343-43	T495X108(1)004A(2)E070	40.0	10.0	70	1535	1382	614	125	1
4	1000	X/7343-43	T495X108(1)004A(2)E090	40.0	10.0	90	1354	1219	542	125	1
4	1000	X/7343-43	T495X108(1)004A(2)E100	40.0	10.0	100	1285	1157	514	125	1
4	1000	E/7360-38	T495E108(1)004A(2)E035	40.0	15.0	35	2390	2151	956	125	1
4	1000	E/7360-38	T495E108(1)004A(2)E050	40.0	15.0	50	2000	1800	800	125	1
6.3	2.2	A/3216-18	T495A225(1)006ATE5K0	0.5	6.0	5000	122	110	49	125	1
6.3	3.3	A/3216-18	T495A335(1)006ATE3K0	0.5	6.0	3000	158	142	63	125	1
6.3	6.8	A/3216-18	T495A685(1)006ATE1K8	0.5	6.0	1800	204	184	82	125	1
6.3	6.8	A/3216-18	T495A685(1)006ATE2K0	0.5	6.0	2000	194	175	78	125	1
6.3	6.8	A/3216-18	T495A685(1)006ATE4K5	0.5	6.0	4500	129	116	52	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
6.3	6.8	C/6032-28	T495C685(1)006A(2)E480	0.5	6.0	480	479	431	192	125	1
6.3	10	A/3216-18	T495A106(1)006A(2)E800	0.6	6.0	800	306	275	122	125	1
6.3	10	A/3216-18	T495A106(1)006A(2)E1K0	0.6	6.0	1000	274	247	110	125	1
6.3	10	A/3216-18	T495A106(1)006A(2)E1K5	0.6	6.0	1500	224	202	90	125	1
6.3	10	A/3216-18	T495A106(1)006A(2)E2K0	0.6	6.0	2000	194	175	78	125	1
6.3	10	B/3528-21	T495B106(1)006A(2)E1K0	0.6	6.0	1000	292	263	117	125	1
6.3	10	T/3528-12	T495T106(1)006A(2)E1K2	0.6	6.0	1200	242	218	97	125	1
6.3	15	A/3216-18	T495A156(1)006A(2)E2K0	0.9	6.0	2000	194	175	78	125	1
6.3	15	T/3528-12	T495T156(1)006A(2)E1K0	0.9	6.0	1000	265	239	106	125	1
6.3	22	A/3216-18	T495A226(1)006A(2)E500	1.4	6.0	500	387	348	155	125	1
6.3	22	A/3216-18	T495A226(1)006A(2)E900	1.4	8.0	900	289	260	116	125	1
6.3	22	A/3216-18	T495A226(1)006A(2)E1K5	1.4	8.0	1500	224	202	90	125	1
6.3	22	B/3528-21	T495B226(1)006A(2)E500	1.4	6.0	500	412	371	165	125	1
6.3	22	C/6032-28	T495C226(1)006A(2)E380	1.4	6.0	380	538	484	215	125	1
6.3	33	A/3216-18	T495A336(1)006A(2)E600	2.1	12.0	600	354	319	142	125	1
6.3	33	B/3528-21	T495B336(1)006A(2)E600	2.1	6.0	600	376	338	150	125	1
6.3	33	T/3528-12	T495T336(1)006A(2)E800	2.1	6.0	800	296	266	118	125	1
6.3	33	C/6032-28	T495C336(1)006A(2)E350	2.1	6.0	350	561	505	224	125	1
6.3	47	B/3528-21	T495B476(1)006A(2)E250	3.0	6.0	250	583	525	233	125	1
6.3	47	B/3528-21	T495B476(1)006A(2)E500	3.0	6.0	500	583	525	233	125	1
6.3	47	B/3528-21	T495B476(1)006A(2)E450	3.0	6.0	450	435	392	174	125	1
6.3	47	B/3528-21	T495B476(1)006A(2)E400	3.0	6.0	400	461	415	184	125	1
6.3	47	C/6032-28	T495C476(1)006A(2)E250	3.0	6.0	250	663	597	265	125	1
6.3	47	C/6032-28	T495C476(1)006A(2)E300	3.0	6.0	300	606	545	242	125	1
6.3	47	C/6032-28	T495C476(1)006A(2)E330	3.0	6.0	330	577	519	231	125	1
6.3	47	V/7343-20	T495V476(1)006A(2)E150	3.0	6.0	150	913	822	365	125	1
6.3	68	B/3528-21	T495B686(1)006A(2)E500	4.3	8.0	500	412	371	165	125	1
6.3	68	C/6032-28	T495C686(1)006A(2)E400	4.3	6.0	400	524	472	210	125	1
6.3	68	U/6032-15	T495U686(1)006A(2)E400	4.3	6.0	400	474	427	190	125	1
6.3	68	D/7343-31	T495D686(1)006A(2)E175	4.3	4.0	175	926	833	370	125	1
6.3	68	D/7343-31	T495D686(1)006A(2)E180	4.3	4.0	180	913	822	365	125	1
6.3	100	B/3528-21	T495B107(1)006A(2)E400	6.3	15.0	400	461	415	184	125	1
6.3	100	B/3528-21	T495B107(M)006A(2)E700	6.3	15.0	700	348	313	139	125	1
6.3	100	M/3528-15	T495M107(1)006A(2)E500	6.3	20.0	500	490	441	196	125	1
6.3	100	M/3528-15	T495M107(1)006A(2)E1K0	6.3	20.0	1000	346	311	138	125	1
6.3	100	C/6032-28	T495C107(1)006A(2)E075	6.3	8.0	75	1211	1090	484	125	1
6.3	100	C/6032-28	T495C107(1)006A(2)E150	6.3	8.0	150	856	770	342	125	1
6.3	100	D/7343-31	T495D107(1)006A(2)E050	6.3	6.0	50	1732	1559	693	125	1
6.3	100	D/7343-31	T495D107(1)006A(2)E130	6.3	6.0	130	1074	967	430	125	1
6.3	100	D/7343-31	T495D107(1)006A(2)E150	6.3	8.0	150	1000	900	400	125	1
6.3	100	D/7343-31	T495D107(1)006A(2)E800	6.3	6.0	800	433	390	173	125	1
6.3	100	V/7343-20	T495V107(1)006A(2)E090	6.3	8.0	90	1179	1061	472	125	1
6.3	100	V/7343-20	T495V107(1)006A(2)E150	6.3	8.0	150	913	822	365	125	1
6.3	150	C/6032-28	T495C157(1)006A(2)E050	9.5	8.0	50	1483	1335	593	125	1
6.3	150	C/6032-28	T495C157(M)006A(2)E200	9.5	8.0	200	742	668	297	125	1
6.3	150	V/7343-20	T495V157(1)006A(2)E040	9.5	8.0	40	1768	1591	707	125	1
6.3	150	V/7343-20	T495V157(1)006A(2)E070	9.5	8.0	70	1336	1202	534	125	1
6.3	150	V/7343-20	T495V157(1)006A(2)E150	9.5	8.0	150	913	822	365	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
6.3	150	D/7343-31	T495D157(1)006A(2)E050	9.5	6.0	50	1732	1559	693	125	1
6.3	150	D/7343-31	T495D157(1)006A(2)E065	9.5	6.0	65	1519	1367	608	125	1
6.3	150	D/7343-31	T495D157(1)006A(2)E080	9.5	6.0	80	1369	1232	548	125	1
6.3	150	D/7343-31	T495D157(1)006A(2)E100	9.5	6.0	100	1225	1103	490	125	1
6.3	150	D/7343-31	T495D157(1)006A(2)E125	9.5	6.0	125	1095	986	438	125	1
6.3	150	X/7343-43	T495X157(1)006A(2)E100	9.5	6.0	100	1285	1157	514	125	1
6.3	220	C/6032-28	T495C227(1)006A(2)E225	13.9	10.0	225	699	629	280	125	1
6.3	220	C/6032-28	T495C227(1)006A(2)E200	13.9	10.0	200	742	668	297	125	1
6.3	220	D/7343-31	T495D227(1)006A(2)E045	13.9	8.0	45	1826	1643	730	125	1
6.3	220	D/7343-31	T495D227(1)006A(2)E050	13.9	8.0	50	1732	1559	693	125	1
6.3	220	D/7343-31	T495D227(1)006A(2)E100	13.9	8.0	100	1225	1103	490	125	1
6.3	220	W/7343-15	T495W227(1)006A(2)E250	13.9	8.0	250	849	764	340	125	1
6.3	220	X/7343-43	T495X227(1)006A(2)E070	13.9	8.0	70	1535	1382	614	125	1
6.3	220	X/7343-43	T495X227(1)006A(2)E080	13.9	8.0	80	1436	1292	574	125	1
6.3	220	X/7343-43	T495X227(1)006A(2)E100	13.9	8.0	100	1285	1157	514	125	1
6.3	220	V/7343-20	T495V227(1)006A(2)E150	13.9	8.0	150	913	822	365	125	1
6.3	330	C/6032-28	T495C337(1)006A(2)E200	20.8	18.0	200	742	668	297	125	1
6.3	330	D/7343-31	T495D337(1)006A(2)E040	20.8	8.0	40	1936	1742	774	125	1
6.3	330	D/7343-31	T495D337(1)006A(2)E045	20.8	8.0	45	1826	1643	730	125	1
6.3	330	D/7343-31	T495D337(1)006A(2)E050	20.8	8.0	50	1732	1559	693	125	1
6.3	330	D/7343-31	T495D337(1)006A(2)E070	20.8	8.0	70	1464	1318	586	125	1
6.3	330	D/7343-31	T495D337(1)006A(2)E100	20.8	8.0	100	1225	1103	490	125	1
6.3	330	V/7343-20	T495V337(1)006A(2)E150	20.8	8.0	150	913	822	365	125	1
6.3	330	X/7343-43	T495X337(1)006A(2)E045	20.8	8.0	45	1915	1724	766	125	1
6.3	330	X/7343-43	T495X337(1)006A(2)E050	20.8	8.0	50	1817	1635	727	125	1
6.3	330	X/7343-43	T495X337(1)006A(2)E065	20.8	8.0	65	1593	1434	637	125	1
6.3	330	X/7343-43	T495X337(1)006A(2)E080	20.8	8.0	80	1436	1292	574	125	1
6.3	330	X/7343-43	T495X337(1)006A(2)E100	20.8	8.0	100	1285	1157	514	125	1
6.3	330	E/7360-38	T495E337(1)006A(2)E060	20.8	8.0	60	1826	1643	730	125	1
6.3	330	E/7360-38	T495E337(1)006A(2)E100	20.8	8.0	100	1414	1273	566	125	1
6.3	470	D/7343-31	T495D477(1)006A(2)E045	29.6	12.0	45	1826	1643	730	125	1
6.3	470	D/7343-31	T495D477(1)006A(2)E100	29.6	12.0	100	1225	1103	490	125	1
6.3	470	D/7343-31	T495D477(1)006A(2)E125	29.6	12.0	125	1095	986	438	125	1
6.3	470	D/7343-31	T495D477(1)006A(2)E150	29.6	12.0	150	1000	900	400	125	1
6.3	470	V/7343-20	T495V477(1)006A(2)E150	29.6	15.0	150	913	822	365	125	1
6.3	470	X/7343-43	T495X477(1)006A(2)E030	29.6	10.0	30	2345	2111	938	125	1
6.3	470	X/7343-43	T495X477(1)006A(2)E045	29.6	10.0	45	1915	1724	766	125	1
6.3	470	X/7343-43	T495X477(1)006A(2)E050	29.6	10.0	50	1817	1635	727	125	1
6.3	470	X/7343-43	T495X477(1)006A(2)E060	29.6	10.0	60	1658	1492	663	125	1
6.3	470	X/7343-43	T495X477(1)006A(2)E065	29.6	10.0	65	1593	1434	637	125	1
6.3	470	X/7343-43	T495X477(1)006A(2)E100	29.6	10.0	100	1285	1157	514	125	1
6.3	470	X/7343-43	T495X477(1)006A(2)E125	29.6	10.0	125	1149	1034	460	125	1
6.3	470	E/7360-38	T495E477(1)006A(2)E040	29.6	12.0	40	2236	2012	894	125	1
6.3	470	E/7360-38	T495E477(1)006A(2)E055	29.6	10.0	55	1907	1716	763	125	1
6.3	470	E/7360-38	T495E477(1)006A(2)E100	29.6	10.0	100	1414	1273	566	125	1
6.3	680	X/7343-43	T495X687(1)006A(2)E100	42.8	12.0	100	1285	1157	514	125	1
6.3	680	X/7343-43	T495X687(1)006A(2)E060	42.8	12.0	60	1658	1492	663	125	1
6.3	680	X/7343-43	T495X687(1)006A(2)E045	42.8	12.0	45	1915	1724	766	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
6.3	1000	X/7343-43	T495X108(1)006A(2)E100	63.0	20.0	100	1285	1157	514	125	1
6.3	1000	E/7360-38	T495E108(1)006A(2)E050	63.0	15.0	50	2000	1800	800	125	1
10	2.2	A/3216-18	T495A225(1)010A(2)E1K8	0.5	6.0	1800	204	184	82	125	1
10	2.2	A/3216-18	T495A225(1)010A(2)E7K0	0.5	6.0	7000	104	94	42	125	1
10	3.3	A/3216-18	T495A335(1)010A(2)E2K0	0.5	6.0	2000	194	175	78	125	1
10	4.7	A/3216-18	T495A475(1)010A(2)E1K2	0.5	6.0	1200	250	225	100	125	1
10	4.7	A/3216-18	T495A475(1)010A(2)E1K3	0.5	6.0	1300	240	216	96	125	1
10	4.7	A/3216-18	T495A475(1)010A(2)E1K4	0.5	6.0	1400	231	208	92	125	1
10	4.7	A/3216-18	T495A475(1)010A(2)E1K8	0.5	6.0	1800	204	184	82	125	1
10	4.7	A/3216-18	T495A475(1)010A(2)E2K0	0.5	6.0	2000	194	175	78	125	1
10	4.7	B/3528-21	T495B475(1)010A(2)E1K3	0.5	15.0	1300	256	230	102	125	1
10	4.7	B/3528-21	T495B475(1)010A(2)E1K5	0.5	6.0	1500	238	214	95	125	1
10	6.8	A/3216-18	T495A685(1)010A(2)E1K8	0.7	6.0	1800	204	184	82	125	1
10	6.8	B/3528-21	T495B685(1)010A(2)E900	0.7	6.0	900	307	276	123	125	1
10	6.8	B/3528-21	T495B685(1)010A(2)E1K1	0.7	6.0	1100	278	250	111	125	1
10	6.8	B/3528-21	T495B685(1)010A(2)E1K2	0.7	6.0	1200	266	239	106	125	1
10	10	A/3216-18	T495A106(1)010A(2)E1K8	1.0	6.0	1800	204	184	82	125	1
10	10	A/3216-18	T495A106(1)010A(2)E2K0	1.0	6.0	2000	194	175	78	125	1
10	10	A/3216-18	T495A106(1)010A(2)E2K5	1.0	6.0	2500	173	156	69	125	1
10	10	A/3216-18	T495A106(1)010A(2)E3K8	1.0	6.0	3800	140	126	56	125	1
10	10	B/3528-21	T495B106(1)010A(2)E600	1.0	6.0	600	376	338	150	125	1
10	10	B/3528-21	T495B106(1)010A(2)E750	1.0	6.0	750	337	303	135	125	1
10	10	B/3528-21	T495B106(1)010A(2)E1K2	1.0	6.0	1200	266	239	106	125	1
10	10	B/3528-21	T495B106(1)010A(2)E3K0	1.0	6.0	3000	168	151	67	125	1
10	10	C/6032-28	T495C106(1)010AT E400	1.0	6.0	400	524	472	210	125	1
10	10	T/3528-12	T495T106(1)010AT E1K5	1.0	6.0	1500	216	194	86	125	1
10	15	A/3216-18	T495A156(1)010AT E1K0	1.5	6.0	1000	274	247	110	125	1
10	15	A/3216-18	T495A156(1)010AT E1K8	1.5	6.0	1800	204	184	82	125	1
10	15	B/3528-21	T495B156(1)010AT E600	1.5	6.0	600	376	338	150	125	1
10	15	B/3528-21	T495B156(1)010AT E900	1.5	6.0	900	307	276	123	125	1
10	15	T/3528-12	T495T156(1)010AT E1K2	1.5	6.0	1200	242	218	97	125	1
10	15	B/3528-21	T495B156(1)010A(2)E500	1.5	6.0	500	412	371	165	125	1
10	15	C/6032-28	T495C156(1)010A(2)E375	1.5	6.0	375	542	488	217	125	1
10	15	C/6032-28	T495C156(1)010A(2)E400	1.5	6.0	400	524	472	210	125	1
10	15	C/6032-28	T495C156(1)010A(2)E475	1.5	6.0	475	481	433	192	125	1
10	22	A/3216-18	T495A226(1)010AT E1K2	2.2	8.0	1200	250	225	100	125	1
10	22	A/3216-18	T495A226(1)010AT E1K5	2.2	8.0	1500	224	202	90	125	1
10	22	B/3528-21	T495B226(1)010AT E400	2.2	6.0	400	461	415	184	125	1
10	22	B/3528-21	T495B226(1)010AT E500	2.2	6.0	500	412	371	165	125	1
10	22	B/3528-21	T495B226(1)010AT E700	2.2	6.0	700	348	313	139	125	1
10	22	B/3528-21	T495B226(1)010AT E800	2.2	6.0	800	326	293	130	125	1
10	22	B/3528-21	T495B226(1)010A(2)E2K3	2.2	6.0	2300	192	173	77	125	1
10	22	C/6032-28	T495C226(1)010A(2)E200	2.2	6.0	200	742	668	297	125	1
10	22	C/6032-28	T495C226(1)010A(2)E245	2.2	6.0	245	670	603	268	125	1
10	22	C/6032-28	T495C226(1)010A(2)E290	2.2	6.0	290	616	554	246	125	1
10	22	C/6032-28	T495C226(1)010A(2)E300	2.2	6.0	300	606	545	242	125	1
10	22	C/6032-28	T495C226(1)010A(2)E345	2.2	6.0	345	565	509	226	125	1
10	22	C/6032-28	T495C226(1)010A(2)E350	2.2	6.0	350	561	505	224	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
10	22	C/6032-28	T495C226(1)010A(2)E380	2.2	6.0	380	538	484	215	125	1
10	33	B/3528-21	T495B336(1)010A(2)E450	3.3	6.0	450	435	392	174	125	1
10	33	B/3528-21	T495B336(1)010A(2)E550	3.3	6.0	550	393	354	157	125	1
10	33	B/3528-21	T495B336(1)010A(2)E650	3.3	6.0	650	362	326	145	125	1
10	33	V/7343-20	T495V336(1)010A(2)E100	3.3	6.0	100	1118	1006	447	125	1
10	33	V/7343-20	T495V336(1)010A(2)E150	3.3	6.0	150	913	822	365	125	1
10	47	B/3528-21	T495B476(1)010A(2)E500	4.7	6.0	500	412	371	165	125	1
10	47	B/3528-21	T495B476(1)010A(2)E650	4.7	6.0	650	362	326	145	125	1
10	47	C/6032-28	T495C476(1)010A(2)E300	4.7	6.0	300	606	545	242	125	1
10	47	U/6032-15	T495U476(1)010A(2)E400	4.7	6.0	400	474	427	190	125	1
10	47	D/7343-31	T495D476(1)010A(2)E080	4.7	4.0	80	1369	1232	548	125	1
10	47	D/7343-31	T495D476(1)010A(2)E090	4.7	6.0	90	1291	1162	516	125	1
10	47	D/7343-31	T495D476(1)010A(2)E100	4.7	6.0	100	1225	1103	490	125	1
10	47	D/7343-31	T495D476(1)010A(2)E200	4.7	4.0	200	866	779	346	125	1
10	47	V/7343-20	T495V476(1)010A(2)E200	4.7	6.0	200	791	712	316	125	1
10	68	B/3528-21	T495B686(1)010A(2)E600	6.8	8.0	600	376	338	150	125	1
10	68	B/3528-21	T495B686(1)010A(2)E750	6.8	8.0	750	337	303	135	125	1
10	68	B/3528-21	T495B686(M)010A(2)E900	6.8	8.0	900	307	276	123	125	1
10	68	C/6032-28	T495C686(1)010A(2)E080	6.8	6.0	80	1173	1056	469	125	1
10	68	C/6032-28	T495C686(1)010A(2)E200	6.8	6.0	200	742	668	297	125	1
10	68	C/6032-28	T495C686(1)010A(2)E225	6.8	6.0	225	699	629	280	125	1
10	68	C/6032-28	T495C686(1)010A(2)E250	6.8	6.0	250	663	597	265	125	1
10	68	V/7343-20	T495V686(1)010A(2)E070	6.8	6.0	70	1336	1202	534	125	1
10	68	V/7343-20	T495V686(1)010A(2)E100	6.8	6.0	100	1118	1006	447	125	1
10	68	V/7343-20	T495V686(1)010A(2)E140	6.8	6.0	140	945	851	378	125	1
10	68	V/7343-20	T495V686(1)010A(2)E200	6.8	6.0	200	791	712	316	125	1
10	68	D/7343-31	T495D686(1)010A(2)E070	6.8	6.0	70	1464	1318	586	125	1
10	68	D/7343-31	T495D686(1)010A(2)E090	6.8	6.0	90	1291	1162	516	125	1
10	68	D/7343-31	T495D686(1)010A(2)E100	6.8	6.0	100	1225	1103	490	125	1
10	68	D/7343-31	T495D686(1)010A(2)E150	6.8	6.0	150	1000	900	400	125	1
10	68	X/7343-43	T495X686(1)010A(2)E150	6.8	4.0	150	1049	944	420	125	1
10	100	B/3528-21	T495B107(M)010A(2)E350	10.0	12.0	350	493	444	197	125	1
10	100	B/3528-21	T495B107(M)010A(2)E500	10.0	30.0	500	412	371	165	125	1
10	100	B/3528-21	T495B107(M)010A(2)E700	10.0	30.0	700	348	313	139	125	1
10	100	C/6032-28	T495C107(1)010A(2)E100	10.0	8.0	100	1050	945	420	125	1
10	100	C/6032-28	T495C107(1)010A(2)E150	10.0	8.0	150	856	812	542	125	1
10	100	C/6032-28	T495C107(1)010A(2)E180	10.0	8.0	180	782	704	313	125	1
10	100	C/6032-28	T495C107(1)010A(2)E200	10.0	8.0	200	742	668	297	125	1
10	100	C/6032-28	T495C107(1)010A(2)E250	10.0	8.0	250	663	597	265	125	1
10	100	U/6032-15	T495U107(1)010A(2)E150	10.0	8.0	150	775	698	310	125	1
10	100	W/7343-15	T495W107(1)010A(2)E200	10.0	8.0	200	949	854	380	125	1
10	100	V/7343-20	T495V107(1)010A(2)E100	10.0	8.0	100	1118	1006	447	125	1
10	100	V/7343-20	T495V107(1)010A(2)E150	10.0	8.0	150	913	822	365	125	1
10	100	V/7343-20	T495V107(1)010A(2)E200	10.0	8.0	200	791	712	316	125	1
10	100	D/7343-31	T495D107(1)010A(2)E050	10.0	8.0	50	1732	1559	693	125	1
10	100	D/7343-31	T495D107(1)010A(2)E065	10.0	8.0	65	1519	1367	608	125	1
10	100	D/7343-31	T495D107(1)010A(2)E080	10.0	8.0	80	1369	1232	548	125	1
10	100	D/7343-31	T495D107(1)010A(2)E100	10.0	8.0	100	1225	1103	490	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.



**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
10	100	D/7343-31	T495D107(1)010A(2)E120	10.0	8.0	120	1118	1006	447	125	1
10	100	D/7343-31	T495D107(1)010A(2)E125	10.0	8.0	125	1095	986	438	125	1
10	100	X/7343-43	T495X107(1)010A(2)E100	10.0	6.0	100	1285	1157	514	125	1
10	150	C/6032-28	T495C157(1)010A(2)E200	15.0	10.0	200	742	668	297	125	1
10	150	V/7343-20	T495V157(1)010A(2)E100	15.0	8.0	100	1118	1006	447	125	1
10	150	V/7343-20	T495V157(1)010A(2)E150	15.0	8.0	150	913	822	365	125	1
10	150	V/7343-20	T495V157(1)010A(2)E200	15.0	8.0	200	791	712	316	125	1
10	150	D/7343-31	T495D157(1)010A(2)E050	15.0	8.0	50	1732	1559	693	125	1
10	150	D/7343-31	T495D157(1)010A(2)E060	15.0	8.0	60	1581	1423	632	125	1
10	150	D/7343-31	T495D157(1)010A(2)E080	15.0	8.0	80	1369	1232	548	125	1
10	150	D/7343-31	T495D157(1)010A(2)E100	15.0	8.0	100	1225	1103	490	125	1
10	150	X/7343-43	T495X157(1)010A(2)E070	15.0	8.0	70	1535	1382	614	125	1
10	150	X/7343-43	T495X157(1)010A(2)E080	15.0	8.0	80	1436	1292	574	125	1
10	150	X/7343-43	T495X157(1)010A(2)E085	15.0	8.0	85	1393	1254	557	125	1
10	150	X/7343-43	T495X157(1)010A(2)E100	15.0	8.0	100	1285	1157	514	125	1
10	220	D/7343-31	T495D227(1)010A(2)E045	22.0	8.0	45	1826	1643	730	125	1
10	220	D/7343-31	T495D227(1)010A(2)E050	22.0	9.0	50	1732	1559	693	125	1
10	220	D/7343-31	T495D227(1)010A(2)E075	22.0	8.0	75	1414	1273	566	125	1
10	220	D/7343-31	T495D227(1)010A(2)E100	22.0	8.0	100	1225	1103	490	125	1
10	220	D/7343-31	T495D227(1)010A(2)E125	22.0	8.0	125	1095	986	438	125	1
10	220	V/7343-20	T495V227(1)010A(2)E150	22.0	10.0	150	913	822	365	125	1
10	220	V/7343-20	T495V227(1)010A(2)E200	22.0	10.0	200	791	712	316	125	1
10	220	X/7343-43	T495X227(1)010A(2)E045	22.0	8.0	45	1915	1724	766	125	1
10	220	X/7343-43	T495X227(1)010A(2)E050	22.0	8.0	50	1817	1635	727	125	1
10	220	X/7343-43	T495X227(1)010A(2)E060	22.0	8.0	60	1658	1492	663	125	1
10	220	X/7343-43	T495X227(1)010A(2)E070	22.0	8.0	70	1535	1382	614	125	1
10	220	X/7343-43	T495X227(1)010A(2)E080	22.0	8.0	80	1436	1292	574	125	1
10	220	X/7343-43	T495X227(1)010A(2)E100	22.0	8.0	100	1285	1157	514	125	1
10	330	D/7343-31	T495D337(1)010A(2)E100	33.0	8.0	100	1225	1103	490	125	1
10	330	D/7343-31	T495D337(1)010A(2)E125	33.0	10.0	125	1095	986	438	125	1
10	330	D/7343-31	T495D337(1)010A(2)E150	33.0	10.0	150	1000	900	400	125	1
10	330	X/7343-43	T495X337(1)010A(2)E035	33.0	10.0	35	2171	1954	868	125	1
10	330	X/7343-43	T495X337(1)010A(2)E040	33.0	10.0	40	2031	1828	812	125	1
10	330	X/7343-43	T495X337(1)010A(2)E050	33.0	10.0	50	1817	1635	727	125	1
10	330	X/7343-43	T495X337(1)010A(2)E060	33.0	10.0	60	1658	1492	663	125	1
10	330	X/7343-43	T495X337(1)010A(2)E080	33.0	10.0	80	1436	1292	574	125	1
10	330	X/7343-43	T495X337(1)010A(2)E100	33.0	10.0	100	1285	1157	514	125	1
10	330	E/7360-38	T495E337(1)010A(2)E040	33.0	8.0	40	2236	2012	894	125	1
10	330	E/7360-38	T495E337(1)010A(2)E060	33.0	10.0	60	1826	1643	730	125	1
10	330	E/7360-38	T495E337(1)010A(2)E100	33.0	10.0	100	1414	1273	566	125	1
10	470	X/7343-43	T495X477(1)010A(2)E045	47.0	10.0	45	1915	1724	766	125	1
10	470	X/7343-43	T495X477(1)010A(2)E050	47.0	10.0	50	1817	1635	727	125	1
10	470	X/7343-43	T495X477(1)010A(2)E060	47.0	10.0	60	1658	1492	663	125	1
10	470	X/7343-43	T495X477(1)010A(2)E080	47.0	10.0	80	1436	1292	574	125	1
10	470	X/7343-43	T495X477(1)010A(2)E100	47.0	10.0	100	1285	1157	514	125	1
10	470	X/7343-43	T495X477(1)010A(2)E200	47.0	10.0	200	908	817	363	125	1
10	470	E/7360-38	T495E477(1)010A(2)E040	47.0	10.0	40	2236	2012	894	125	1
10	470	E/7360-38	T495E477(1)010A(2)E060	47.0	10.0	60	1826	1643	730	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
10	470	E/7360-38	T495E477(1)010A(2)E100	47.0	10.0	100	1414	1273	566	125	1
16	1.0	A/3216-18	T495A105(1)016A(2)E5K0	0.5	6.0	5000	122	110	49	125	1
16	1.5	A/3216-18	T495A155(1)016A(2)E5K0	0.5	6.0	5000	122	110	49	125	1
16	2.2	A/3216-18	T495A225(1)016A(2)E2K5	0.5	6.0	2500	173	156	69	125	1
16	2.2	A/3216-18	T495A225(1)016A(2)E1K8	0.5	6.0	1800	204	184	82	125	1
16	3.3	A/3216-18	T495A335(1)016A(2)E3K0	0.5	6.0	3000	158	142	63	125	1
16	3.3	B/3528-21	T495B335(1)016A(2)E2K0	0.5	6.0	2000	206	185	82	125	1
16	4.7	A/3216-18	T495A475(1)016A(2)E2K0	0.8	6.0	2000	194	175	78	125	1
16	4.7	B/3528-21	T495B475(1)016A(2)E700	0.8	6.0	700	348	313	139	125	1
16	4.7	B/3528-21	T495B475(1)016A(2)E800	0.8	6.0	800	326	293	130	125	1
16	4.7	B/3528-21	T495B475(1)016A(2)E1K0	0.8	6.0	1000	292	263	117	125	1
16	4.7	B/3528-21	T495B475(1)016A(2)E1K5	0.8	6.0	1500	238	214	95	125	1
16	6.8	B/3528-21	T495B685(1)016A(2)E1K2	1.1	6.0	1200	266	239	106	125	1
16	6.8	C/6032-28	T495C685(1)016A(2)E750	1.1	6.0	750	383	345	153	125	1
16	10	A/3216-18	T495A106(1)016A(2)E1K7	1.6	6.0	1700	210	189	84	125	1
16	10	B/3528-21	T495B106(1)016A(2)E500	1.6	6.0	500	412	371	165	125	1
16	10	B/3528-21	T495B106(1)016A(2)E650	1.6	6.0	650	362	326	145	125	1
16	10	B/3528-21	T495B106(1)016A(2)E800	1.6	6.0	800	326	293	130	125	1
16	10	B/3528-21	T495B106(1)016A(2)E2K5	1.6	6.0	2500	184	166	74	125	1
16	10	T/3528-12	T495T106(M)016A(2)E4K0	1.6	8.0	4000	132	119	53	125	1
16	15	A/3216-18	T495A156(1)016A(2)E2K5	2.4	8.0	2500	173	156	69	125	1
16	15	B/3528-21	T495B156(1)016A(2)E500	2.4	6.0	500	412	371	165	125	1
16	15	B/3528-21	T495B156(1)016A(2)E650	2.4	6.0	650	362	326	145	125	1
16	15	B/3528-21	T495B156(1)016A(2)E800	2.4	6.0	800	326	293	130	125	1
16	15	C/6032-28	T495C156(1)016A(2)E400	2.4	6.0	400	524	472	210	125	1
16	22	B/3528-21	T495B226(1)016A(2)E600	3.5	6.0	600	376	338	150	125	1
16	22	B/3528-21	T495B226(1)016A(2)E700	3.5	6.0	700	348	313	139	125	1
16	22	C/6032-28	T495C226(1)016A(2)E300	3.5	6.0	300	606	545	242	125	1
16	22	C/6032-28	T495C226(1)016A(2)E350	3.5	6.0	350	561	505	224	125	1
16	22	C/6032-28	T495C226(1)016A(2)E500	3.5	6.0	500	469	422	188	125	1
16	22	U/6032-15	T495U226(1)016A(2)E500	3.5	6.0	500	424	382	170	125	1
16	33	C/6032-28	T495C336(1)016A(2)E200	5.3	6.0	200	742	668	297	125	1
16	33	C/6032-28	T495C336(1)016A(2)E225	5.3	6.0	225	699	629	280	125	1
16	33	C/6032-28	T495C336(1)016A(2)E230	5.3	6.0	230	692	623	277	125	1
16	33	C/6032-28	T495C336(1)016A(2)E275	5.3	6.0	275	632	569	253	125	1
16	33	C/6032-28	T495C336(1)016A(2)E300	5.3	6.0	300	606	545	242	125	1
16	33	U/6032-15	T495U336(1)016A(2)E200	5.3	6.0	200	671	604	268	125	1
16	33	U/6032-15	T495U336(1)016A(2)E400	5.3	6.0	400	474	427	190	125	1
16	33	B/3528-21	T495B336(1)016A(2)E350	5.3	6.0	350	493	444	197	125	1
16	33	D/7343-31	T495D336(1)016A(2)E150	5.3	6.0	150	1000	900	400	125	1
16	33	D/7343-31	T495D336(1)016A(2)E175	5.3	6.0	175	926	833	370	125	1
16	33	D/7343-31	T495D336(1)016A(2)E200	5.3	6.0	200	866	779	346	125	1
16	33	D/7343-31	T495D336(1)016A(2)E225	5.3	4.0	225	816	734	326	125	1
16	33	D/7343-31	T495D336(1)016A(2)E250	5.3	6.0	250	775	698	310	125	1
16	47	C/6032-28	T495C476(1)016A(2)E300	7.5	6.0	300	606	545	242	125	1
16	47	C/6032-28	T495C476(1)016A(2)E350	7.5	6.0	350	561	505	224	125	1
16	47	D/7343-31	T495D476(1)016A(2)E080	7.5	6.0	80	1369	1232	548	125	1
16	47	D/7343-31	T495D476(1)016A(2)E100	7.5	6.0	100	1225	1103	490	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							μA @ +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max		
VDC @ 85°C	μF	KEMET/EIA	(See below for part options)							°C	Reflow Temp ≤ 260°C
16	47	D/7343-31	T495D476(1)016A(2)E150	7.5	6.0	150	1000	900	400	125	1
16	47	D/7343-31	T495D476(1)016A(2)E180	7.5	6.0	180	913	822	365	125	1
16	47	D/7343-31	T495D476(1)016A(2)E800	7.5	6.0	800	433	390	173	125	1
16	68	C/6032-28	T495C686(1)016A(2)E250	10.9	6.0	250	663	597	265	125	1
16	68	C/6032-28	T495C686(1)016A(2)E200	10.9	6.0	200	742	668	297	125	1
16	68	C/6032-28	T495C686(1)016A(2)E180	10.9	6.0	180	782	704	313	125	1
16	68	V/7343-20	T495V686(1)016A(2)E180	10.9	6.0	180	833	750	333	125	1
16	68	V/7343-20	T495V686(1)016A(2)E250	10.9	6.0	250	707	636	283	125	1
16	68	V/7343-20	T495V686(1)016A(2)E300	10.9	6.0	300	645	581	258	125	1
16	68	D/7343-31	T495D686(1)016A(2)E070	10.9	6.0	70	1464	1318	586	125	1
16	68	D/7343-31	T495D686(1)016A(2)E100	10.9	6.0	100	1225	1103	490	125	1
16	68	D/7343-31	T495D686(1)016A(2)E150	10.9	6.0	150	1000	900	400	125	1
16	68	X/7343-43	T495X686(1)016A(2)E150	10.9	5.0	150	1049	944	420	125	1
16	100	C/6032-28	T495C107(1)016A(2)E200	16.0	10.0	200	742	668	297	125	1
16	100	D/7343-31	T495D107(1)016A(2)E060	16.0	8.0	60	1581	1423	632	125	1
16	100	D/7343-31	T495D107(1)016A(2)E100	16.0	8.0	100	1225	1103	490	125	1
16	100	D/7343-31	T495D107(1)016A(2)E125	16.0	8.0	125	1095	986	438	125	1
16	100	D/7343-31	T495D107(1)016A(2)E130	16.0	8.0	130	1074	967	430	125	1
16	100	D/7343-31	T495D107(1)016A(2)E150	16.0	8.0	150	1000	900	400	125	1
16	100	D/7343-31	T495D107(1)016A(2)E800	16.0	8.0	800	433	390	173	125	1
16	100	V/7343-20	T495V107(1)016A(2)E250	16.0	8.0	250	707	636	283	125	1
16	100	X/7343-43	T495X107(1)016A(2)E080	16.0	8.0	80	1436	1292	574	125	1
16	100	X/7343-43	T495X107(1)016A(2)E100	16.0	8.0	100	1285	1157	514	125	1
16	150	D/7343-31	T495D157(M)016A(2)E060	24.0	12.0	60	1581	1423	632	125	1
16	150	D/7343-31	T495D157(M)016A(2)E085	24.0	8.0	85	1328	1195	531	125	1
16	150	D/7343-31	T495D157(1)016A(2)E100	24.0	8.0	100	1225	1103	490	125	1
16	150	D/7343-31	T495D157(1)016A(2)E125	24.0	8.0	125	1095	986	438	125	1
16	150	D/7343-31	T495D157(1)016A(2)E130	24.0	8.0	130	1074	967	430	125	1
16	150	D/7343-31	T495D157(1)016A(2)E150	24.0	8.0	150	1000	900	400	125	1
16	150	X/7343-43	T495X157(1)016A(2)E075	24.0	8.0	75	1483	1335	593	125	1
16	150	X/7343-43	T495X157(1)016A(2)E100	24.0	8.0	100	1285	1157	514	125	1
16	220	D/7343-31	T495D227(1)016A(2)E150	35.2	12.0	150	1000	900	400	125	1
16	220	D/7343-31	T495D227(1)016A(2)E200	35.2	12.0	200	866	779	346	125	1
16	220	D/7343-31	T495D227(1)016A(2)E220	35.2	12.0	220	826	743	330	125	1
16	220	X/7343-43	T495X227(1)016A(2)E100	35.2	8.0	100	1285	1157	514	125	1
16	220	E/7360-38	T495E227(1)016A(2)E050	35.2	12.0	50	2000	1800	800	125	1
16	220	E/7360-38	T495E227(1)016A(2)E075	35.2	8.0	75	1633	1470	653	125	1
16	220	E/7360-38	T495E227(1)016A(2)E100	35.2	7.2	100	1414	1273	566	125	1
16	220	E/7360-38	T495E227(1)016A(2)E150	35.2	7.2	150	1155	1040	462	125	1
20	1	A/3216-18	T495A105(1)020A(2)E3K0	0.5	4.0	3000	158	142	63	125	1
20	1	A/3216-18	T495A105(1)020A(2)E5K0	0.5	4.0	5000	122	110	49	125	1
20	2.2	A/3216-18	T495A225(1)020A(2)E3K0	0.5	6.0	3000	158	142	63	125	1
20	4.7	A/3216-18	T495A475(1)020A(2)E1K8	0.9	6.0	1800	204	184	82	125	1
20	4.7	A/3216-18	T495A475(1)020A(2)E2K0	0.9	6.0	2000	194	175	78	125	1
20	4.7	B/3528-21	T495B475(1)020A(2)E750	0.9	6.0	750	337	303	135	125	1
20	4.7	B/3528-21	T495B475(1)020A(2)E1K0	0.9	6.0	1000	292	263	117	125	1
20	6.8	C/6032-28	T495C685(1)020A(2)E480	1.4	6.0	480	479	431	192	125	1
20	10	B/3528-21	T495B106(1)020A(2)E1K0	2.0	6.0	1000	292	263	117	125	1
VDC @ 85°C	μF	KEMET/EIA	(See below for part options)	μA @ +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.



Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							VDC @ 85°C	μF	KEMET/EIA		
20	10	B/3528-21	T495B106(1)020A(2)E800	2.0	6.0	800	326	293	130	125	1
20	10	C/6032-28	T495C106(1)020A(2)E300	2.0	6.0	300	606	545	242	125	1
20	10	C/6032-28	T495C106(1)020A(2)E350	2.0	6.0	350	561	505	224	125	1
20	10	C/6032-28	T495C106(1)020A(2)E400	2.0	6.0	400	524	472	210	125	1
20	10	C/6032-28	T495C106(1)020A(2)E450	2.0	6.0	450	494	445	198	125	1
20	10	C/6032-28	T495C106(1)020A(2)E475	2.0	6.0	475	481	433	192	125	1
20	15	C/6032-28	T495C156(1)020A(2)E375	3.0	6.0	375	542	488	217	125	1
20	15	C/6032-28	T495C156(1)020A(2)E400	3.0	6.0	400	524	472	210	125	1
20	15	D/7343-31	T495D156(1)020A(2)E275	3.0	4.0	275	739	665	296	125	1
20	15	D/7343-31	T495D156(1)020A(2)E1K2	3.0	4.0	1200	354	319	142	125	1
20	22	D/7343-31	T495D226(1)020A(2)E180	4.4	4.0	180	913	822	365	125	1
20	22	D/7343-31	T495D226(1)020A(2)E200	4.4	4.0	200	866	779	346	125	1
20	22	D/7343-31	T495D226(1)020A(2)E225	4.4	4.0	225	816	734	326	125	1
20	22	V/7343-20	T495V226(1)020A(2)E400	4.4	6.0	400	559	503	224	125	1
20	33	C/6032-28	T495C336(1)020A(2)E200	6.6	6.0	200	742	668	297	125	1
20	33	D/7343-31	T495D336(1)020A(2)E100	6.6	6.0	100	1225	1103	490	125	1
20	33	D/7343-31	T495D336(1)020A(2)E150	6.6	6.0	150	1000	900	400	125	1
20	33	D/7343-31	T495D336(1)020A(2)E200	6.6	6.0	200	866	779	346	125	1
20	33	X/7343-43	T495X336(1)020A(2)E200	6.6	6.0	200	908	817	363	125	1
20	47	D/7343-31	T495D476(1)020A(2)E075	9.4	6.0	75	1414	1273	566	125	1
20	47	D/7343-31	T495D476(1)020A(2)E100	9.4	6.0	100	1225	1103	490	125	1
20	47	D/7343-31	T495D476(1)020A(2)E150	9.4	6.0	150	1000	900	400	125	1
20	47	D/7343-31	T495D476(1)020A(2)E175	9.4	6.0	175	926	833	370	125	1
20	47	D/7343-31	T495D476(1)020A(2)E200	9.4	6.0	200	866	779	346	125	1
20	47	D/7343-31	T495D476(1)020A(2)E250	9.4	6.0	250	775	698	310	125	1
20	47	X/7343-43	T495X476(1)020A(2)E065	9.4	8.0	65	1593	1434	637	125	1
20	47	X/7343-43	T495X476(1)020A(2)E070	9.4	6.0	70	1535	1382	614	125	1
20	47	X/7343-43	T495X476(1)020A(2)E100	9.4	6.0	100	1285	1157	514	125	1
20	47	X/7343-43	T495X476(1)020A(2)E125	9.4	6.0	125	1149	1034	460	125	1
20	47	X/7343-43	T495X476(1)020A(2)E130	9.4	6.0	130	1127	1014	451	125	1
20	47	X/7343-43	T495X476(1)020A(2)E150	9.4	4.0	150	1049	944	420	125	1
20	68	D/7343-31	T495D686(1)020A(2)E070	13.6	6.0	70	1464	1318	586	125	1
20	68	D/7343-31	T495D686(1)020A(2)E150	13.6	6.0	150	1000	900	400	125	1
20	68	D/7343-31	T495D686(1)020A(2)E200	13.6	6.0	200	866	779	346	125	1
20	68	D/7343-31	T495D686(1)020A(2)E300	13.6	6.0	300	707	636	283	125	1
20	68	X/7343-43	T495X686(1)020A(2)E120	13.6	6.0	120	1173	1056	469	125	1
20	68	X/7343-43	T495X686(1)020A(2)E130	13.6	6.0	130	1127	1014	451	125	1
20	68	X/7343-43	T495X686(1)020A(2)E150	13.6	6.0	150	1049	944	420	125	1
20	68	X/7343-43	T495X686(1)020A(2)E200	13.6	6.0	200	908	817	363	125	1
20	100	X/7343-43	T495X107(1)020A(2)E100	20.0	6.0	100	1285	1157	514	125	1
20	100	X/7343-43	T495X107(1)020A(2)E150	20.0	8.0	150	1049	944	420	125	1
20	100	E/7360-38	T495E107(1)020A(2)E060	20.0	8.0	60	1826	1643	730	125	1
20	100	E/7360-38	T495E107(1)020A(2)E085	20.0	8.0	85	1534	1381	614	125	1
20	100	E/7360-38	T495E107(1)020A(2)E100	20.0	8.0	100	1414	1273	566	125	1
20	100	E/7360-38	T495E107(1)020A(2)E200	20.0	8.0	200	1000	900	400	125	1
20	150	E/7360-38	T495E157(1)020A(2)E080	30.0	8.0	80	1581	1423	632	125	1
25	0.47	A/3216-18	T495A474(1)025A(2)E4K5	0.5	4.0	4500	129	116	52	125	1
25	0.47	A/3216-18	T495A474(1)025A(2)E7K0	0.5	4.0	7000	104	94	42	125	1
VDC @ 85°C	μF	KEMET/EIA	(See below for part options)	μA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
25	1	A/3216-18	T495A105(1)025A(2)E2K5	0.5	4.0	2500	173	156	69	125	1
25	1	A/3216-18	T495A105(1)025A(2)E3K0	0.5	4.0	3000	158	142	63	125	1
25	1	A/3216-18	T495A105(1)025A(2)E4K0	0.5	4.0	4000	137	123	55	125	1
25	1	A/3216-18	T495A105(1)025A(2)E5K0	0.5	4.0	5000	122	110	49	125	1
25	1.5	A/3216-18	T495A155(1)025A(2)E3K0	0.5	6.0	3000	158	142	63	125	1
25	2.2	B/3528-21	T495B225(1)025A(2)E1K2	0.6	4.0	1200	266	239	106	125	1
25	2.2	C/6032-28	T495C225(1)025A(2)E1K3	0.6	6.0	1300	291	262	116	125	1
25	3.3	B/3528-21	T495B335(1)025A(2)E1K2	0.8	6.0	1200	266	239	106	125	1
25	3.3	C/6032-28	T495C335(1)025A(2)E750	0.8	6.0	750	383	345	153	125	1
25	4.7	C/6032-28	T495C475(1)025A(2)E530	1.2	6.0	530	456	410	182	125	1
25	4.7	C/6032-28	T495C475(1)025A(2)E575	1.2	6.0	575	437	393	175	125	1
25	4.7	B/3528-21	T495B475(1)025A(2)E700	1.2	6.0	700	348	313	139	125	1
25	4.7	B/3528-21	T495B475(1)025A(2)E750	1.2	6.0	750	337	303	135	125	1
25	4.7	B/3528-21	T495B475(1)025A(2)E800	1.2	6.0	800	326	293	130	125	1
25	4.7	B/3528-21	T495B475(1)025A(2)E900	1.2	6.0	900	307	276	123	125	1
25	4.7	B/3528-21	T495B475(1)025A(2)E1K0	1.2	6.0	1000	292	263	117	125	1
25	6.8	B/3528-21	T495B685(1)025A(2)E1K0	1.7	6.0	1000	292	263	117	125	1
25	6.8	B/3528-21	T495B685(1)025A(2)E1K5	1.7	6.0	1500	238	214	95	125	1
25	6.8	C/6032-28	T495C685(1)025A(2)E400	1.7	6.0	400	524	472	210	125	1
25	6.8	C/6032-28	T495C685(1)025A(2)E490	1.7	6.0	490	474	427	190	125	1
25	6.8	C/6032-28	T495C685(1)025A(2)E500	1.7	6.0	500	469	422	188	125	1
25	10	B/3528-21	T495B106(1)025A(2)E750	2.5	6.0	750	337	303	135	125	1
25	10	C/6032-28	T495C106(1)025A(2)E275	2.5	6.0	275	632	569	253	125	1
25	10	C/6032-28	T495C106(1)025A(2)E300	2.5	6.0	300	606	545	242	125	1
25	10	C/6032-28	T495C106(1)025A(2)E450	2.5	6.0	450	494	445	198	125	1
25	10	D/7343-31	T495D106(1)025A(2)E1K2	2.5	6.0	1200	354	319	142	125	1
25	15	C/6032-28	T495C156(1)025A(2)E300	3.8	6.0	300	606	545	242	125	1
25	15	D/7343-31	T495D156(1)025A(2)E100	3.8	6.0	100	1225	1103	490	125	1
25	15	D/7343-31	T495D156(1)025A(2)E230	3.8	4.0	230	808	727	323	125	1
25	15	D/7343-31	T495D156(1)025A(2)E275	3.8	6.0	275	739	665	296	125	1
25	15	V/7343-20	T495V156(1)025A(2)E500	3.8	6.0	500	500	450	200	125	1
25	15	X/7343-43	T495X156(1)025A(2)E200	3.8	4.0	200	908	817	363	125	1
25	22	C/6032-28	T495C226(1)025A(2)E275	5.5	6.0	275	632	569	253	125	1
25	22	C/6032-28	T495C226(1)025A(2)E280	5.5	6.0	280	627	564	251	125	1
25	22	C/6032-28	T495C226(1)025A(2)E300	5.5	8.0	300	606	545	242	125	1
25	22	C/6032-28	T495C226(1)025A(2)E900	5.5	6.0	900	350	315	140	125	1
25	22	D/7343-31	T495D226(1)025A(2)E200	5.5	6.0	200	866	779	346	125	1
25	22	D/7343-31	T495D226(1)025A(2)E230	5.5	6.0	230	808	727	323	125	1
25	22	X/7343-43	T495X226(1)025A(2)E225	5.5	4.0	225	856	770	342	125	1
25	33	D/7343-31	T495D336(1)025A(2)E090	8.3	6.0	90	1291	1162	516	125	1
25	33	D/7343-31	T495D336(1)025A(2)E100	8.3	6.0	100	1225	1103	490	125	1
25	33	D/7343-31	T495D336(1)025A(2)E150	8.3	6.0	150	1000	900	400	125	1
25	33	D/7343-31	T495D336(1)025A(2)E200	8.3	6.0	200	866	779	346	125	1
25	33	D/7343-31	T495D336(1)025A(2)E225	8.3	6.0	225	816	734	326	125	1
25	33	D/7343-31	T495D336(1)025A(2)E230	8.3	6.0	230	808	727	323	125	1
25	33	D/7343-31	T495D336(1)025A(2)E300	8.3	6.0	300	707	636	283	125	1
25	33	X/7343-43	T495X336(1)025A(2)E100	8.3	4.0	100	1285	1157	514	125	1
25	33	X/7343-43	T495X336(1)025A(2)E175	8.3	4.0	175	971	874	388	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
25	33	X/7343-43	T495X336(1)025A(2)E180	8.3	4.0	180	957	861	383	125	1
25	33	X/7343-43	T495X336(1)025A(2)E200	8.3	4.0	200	908	817	363	125	1
25	47	X/7343-43	T495X476(1)025A(2)E080	11.8	6.0	80	1436	1292	574	125	1
25	47	X/7343-43	T495X476(1)025A(2)E100	11.8	6.0	100	1285	1157	514	125	1
25	47	X/7343-43	T495X476(1)025A(2)E120	11.8	6.0	120	1173	1056	469	125	1
25	47	X/7343-43	T495X476(1)025A(2)E150	11.8	6.0	150	1049	944	420	125	1
25	47	X/7343-43	T495X476(1)025A(2)E185	11.8	6.0	185	944	850	378	125	1
25	47	X/7343-43	T495X476(1)025A(2)E200	11.8	6.0	200	908	817	363	125	1
25	47	D/7343-31	T495D476(1)025A(2)E100	11.8	6.0	100	1225	1103	490	125	1
25	47	D/7343-31	T495D476(1)025A(2)E120	11.8	6.0	120	1118	1006	447	125	1
25	47	D/7343-31	T495D476(1)025A(2)E130	11.8	6.0	130	1074	967	430	125	1
25	47	D/7343-31	T495D476(1)025A(2)E150	11.8	6.0	150	1000	900	400	125	1
25	47	D/7343-31	T495D476(1)025A(2)E250	11.8	6.0	250	775	698	310	125	1
25	68	D/7343-31	T495D686(1)025A(2)E150	17.0	10.0	150	1000	900	400	125	1
25	68	D/7343-31	T495D686(1)025A(2)E200	17.0	10.0	200	866	779	346	125	1
25	68	X/7343-43	T495X686(1)025A(2)E125	17.0	6.0	125	1149	1034	460	125	1
25	68	X/7343-43	T495X686(1)025A(2)E130	17.0	6.0	130	1127	1014	451	125	1
25	68	X/7343-43	T495X686(1)025A(2)E150	17.0	6.0	150	1049	944	420	125	1
25	68	X/7343-43	T495X686(1)025A(2)E200	17.0	6.0	200	908	817	363	125	1
25	100	X/7343-43	T495X107(1)025A(2)E150	25.0	10.0	150	1049	944	420	125	1
25	100	E/7360-38	T495E107(1)025A(2)E100	25.0	8.0	100	1414	1273	566	125	1
35	0.33	A/3216-18	T495A334(1)035A(2)E6K0	0.5	4.0	6000	112	101	45	125	1
35	0.47	A/3216-18	T495A474(1)035A(2)E4K0	0.5	4.0	4000	137	123	55	125	1
35	0.47	B/3528-21	T495B474(1)035A(2)E1K5	0.5	4.0	1500	238	214	95	125	1
35	0.47	B/3528-21	T495B474(1)035A(2)E2K2	0.5	4.0	2200	197	177	79	125	1
35	0.47	B/3528-21	T495B474(1)035A(2)E2K5	0.5	4.0	2500	184	166	74	125	1
35	0.47	B/3528-21	T495B474(1)035A(2)E11K	0.5	4.0	11000	88	79	35	125	1
35	1	A/3216-18	T495A105(1)035A(2)E3K0	0.5	4.0	3000	158	142	63	125	1
35	1	B/3528-21	T495B105(1)035A(2)E1K5	0.5	4.0	1500	238	214	95	125	1
35	1	B/3528-21	T495B105(1)035A(2)E1K7	0.5	4.0	1700	224	202	90	125	1
35	1	B/3528-21	T495B105(1)035A(2)E2K0	0.5	4.0	2000	206	185	82	125	1
35	1	B/3528-21	T495B105(1)035A(2)E7K0	0.5	4.0	7000	110	99	44	125	1
35	2.2	B/3528-21	T495B225(1)035A(2)E1K5	0.8	6.0	1500	238	214	95	125	1
35	2.2	B/3528-21	T495B225(1)035A(2)E2K0	0.8	6.0	2000	206	185	82	125	1
35	2.2	B/3528-21	T495B225(1)035A(2)E4K0	0.8	6.0	4000	146	131	58	125	1
35	2.2	C/6032-28	T495C225(1)035A(2)E750	0.8	6.0	750	383	345	153	125	1
35	3.3	B/3528-21	T495B335(1)035A(2)E1K0	1.2	6.0	1000	292	263	117	125	1
35	3.3	B/3528-21	T495B335(1)035A(2)E900	1.2	6.0	900	307	276	123	125	1
35	3.3	C/6032-28	T495C335(1)035A(2)E525	1.2	6.0	525	458	412	183	125	1
35	3.3	C/6032-28	T495C335(1)035A(2)E550	1.2	6.0	550	447	402	179	125	1
35	3.3	C/6032-28	T495C335(1)035A(2)E600	1.2	6.0	600	428	385	171	125	1
35	4.7	B/3528-21	T495B475(1)035A(2)E1K0	1.6	6.0	1000	292	263	117	125	1
35	4.7	C/6032-28	T495C475(1)035A(2)E450	1.6	6.0	450	494	445	198	125	1
35	4.7	C/6032-28	T495C475(1)035A(2)E500	1.6	6.0	500	469	422	188	125	1
35	4.7	C/6032-28	T495C475(1)035A(2)E600	1.6	6.0	600	428	385	171	125	1
35	4.7	D/7343-31	T495D475(1)035A(2)E300	1.6	6.0	300	707	636	283	125	1
35	6.8	C/6032-28	T495C685(1)035A(2)E1K8	2.4	6.0	1800	247	222	99	125	1
35	6.8	D/7343-31	T495D685(1)035A(2)E150	2.4	6.0	150	1000	900	400	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
35	6.8	D/7343-31	T495D685(1)035A(2)E300	2.4	6.0	300	707	636	283	125	1
35	6.8	D/7343-31	T495D685(1)035A(2)E400	2.4	6.0	400	612	551	245	125	1
35	6.8	V/7343-20	T495V685(1)035A(2)E600	2.4	6.0	600	456	410	182	125	1
35	6.8	X/7343-43	T495X685(1)035A(2)E300	2.4	4.0	300	742	668	297	125	1
35	10	C/6032-28	T495C106(1)035A(2)E400	3.5	6.0	400	524	472	210	125	1
35	10	D/7343-31	T495D106(1)035A(2)E120	3.5	4.0	120	1118	1006	447	125	1
35	10	D/7343-31	T495D106(1)035A(2)E125	3.5	6.0	125	1095	986	438	125	1
35	10	D/7343-31	T495D106(1)035A(2)E130	3.5	6.0	130	1074	967	430	125	1
35	10	D/7343-31	T495D106(1)035A(2)E250	3.5	6.0	250	775	698	310	125	1
35	10	D/7343-31	T495D106(1)035A(2)E260	3.5	6.0	260	760	684	304	125	1
35	10	D/7343-31	T495D106(1)035A(2)E300	3.5	6.0	300	707	636	283	125	1
35	10	D/7343-31	T495D106(1)035A(2)E1K0	3.5	6.0	1000	387	348	155	125	1
35	10	V/7343-20	T495V106(1)035A(2)E600	3.5	6.0	600	456	410	182	125	1
35	10	X/7343-43	T495X106(1)035A(2)E175	3.5	6.0	175	971	874	388	125	1
35	10	X/7343-43	T495X106(1)035A(2)E200	3.5	6.0	200	908	817	363	125	1
35	10	X/7343-43	T495X106(1)035A(2)E250	3.5	4.0	250	812	731	325	125	1
35	10	X/7343-43	T495X106(1)035A(2)E260	3.5	4.0	260	797	717	319	125	1
35	15	C/6032-28	T495C156(M)035A(2)E350	5.3	6.0	350	561	505	224	125	1
35	15	D/7343-31	T495D156(1)035A(2)E225	5.3	6.0	225	816	734	326	125	1
35	15	D/7343-31	T495D156(1)035A(2)E260	5.3	6.0	260	760	684	304	125	1
35	15	D/7343-31	T495D156(1)035A(2)E300	5.3	6.0	300	707	636	283	125	1
35	15	X/7343-43	T495X156(1)035A(2)E200	5.3	6.0	200	908	817	363	125	1
35	15	X/7343-43	T495X156(1)035A(2)E225	5.3	6.0	225	856	770	342	125	1
35	15	X/7343-43	T495X156(1)035A(2)E250	5.3	6.0	250	812	731	325	125	1
35	15	X/7343-43	T495X156(1)035A(2)E260	5.3	6.0	260	797	717	319	125	1
35	22	D/7343-31	T495D226(1)035A(2)E125	7.7	6.0	125	1095	986	438	125	1
35	22	D/7343-31	T495D226(1)035A(2)E200	7.7	6.0	200	866	779	346	125	1
35	22	D/7343-31	T495D226(1)035A(2)E250	7.7	6.0	250	775	698	310	125	1
35	22	D/7343-31	T495D226(1)035A(2)E260	7.7	6.0	260	760	684	304	125	1
35	22	D/7343-31	T495D226(1)035A(2)E300	7.7	6.0	300	707	636	283	125	1
35	22	X/7343-43	T495X226(1)035A(2)E125	7.7	6.0	125	1149	1034	460	125	1
35	22	X/7343-43	T495X226(1)035A(2)E130	7.7	6.0	130	1127	1014	451	125	1
35	22	X/7343-43	T495X226(1)035A(2)E180	7.7	6.0	180	957	861	383	125	1
35	22	X/7343-43	T495X226(1)035A(2)E200	7.7	6.0	200	908	817	363	125	1
35	22	X/7343-43	T495X226(1)035A(2)E260	7.7	6.0	260	797	717	319	125	1
35	22	X/7343-43	T495X226(1)035A(2)E275	7.7	6.0	275	775	698	310	125	1
35	22	X/7343-43	T495X226(1)035A(2)E300	7.7	6.0	300	742	668	297	125	1
35	33	D/7343-31	T495D336(1)035A(2)E200	11.6	6.0	200	866	779	346	125	1
35	33	D/7343-31	T495D336(1)035A(2)E300	11.6	6.0	300	707	636	283	125	1
35	33	X/7343-43	T495X336(1)035A(2)E100	11.6	6.0	100	1285	1157	514	125	1
35	33	X/7343-43	T495X336(1)035A(2)E175	11.6	6.0	175	971	874	388	125	1
35	33	X/7343-43	T495X336(1)035A(2)E250	11.6	6.0	250	812	731	325	125	1
35	33	X/7343-43	T495X336(1)035A(2)E260	11.6	6.0	260	797	717	319	125	1
35	33	E/7360-38	T495E336(1)035A(2)E200	11.6	6.0	200	1000	900	400	125	1
35	47	X/7343-43	T495X476(1)035A(2)E185	16.5	8.0	185	944	850	378	125	1
35	47	X/7343-43	T495X476(1)035A(2)E200	16.5	8.0	200	908	817	363	125	1
35	47	X/7343-43	T495X476(1)035A(2)E230	16.5	8.0	230	847	762	339	125	1
35	47	X/7343-43	T495X476(1)035A(2)E300	16.5	8.0	300	742	668	297	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold 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. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
50	1	C/6032-28	T495C105(1)050A(2)E1K3	0.5	4.0	1300	291	262	116	125	1
50	1	C/6032-28	T495C105(1)050A(2)E1K6	0.5	4.0	1600	262	236	105	125	1
50	2.2	D/7343-31	T495D225(1)050A(2)E600	1.1	6.0	600	500	450	200	125	1
50	3.3	D/7343-31	T495D335(1)050A(2)E700	1.7	6.0	700	463	417	185	125	1
50	4.7	D/7343-31	T495D475(1)050A(2)E275	2.4	6.0	275	739	665	296	125	1
50	4.7	D/7343-31	T495D475(1)050A(2)E300	2.4	6.0	300	707	636	283	125	1
50	4.7	X/7343-43	T495X475(1)050A(2)E300	2.4	4.0	300	742	668	297	125	1
50	6.8	D/7343-31	T495D685(1)050A(2)E190	3.4	6.0	190	889	800	356	125	1
50	6.8	D/7343-31	T495D685(1)050A(2)E200	3.4	6.0	200	866	779	346	125	1
50	6.8	D/7343-31	T495D685(1)050A(2)E275	3.4	6.0	275	739	665	296	125	1
50	6.8	D/7343-31	T495D685(1)050A(2)E300	3.4	6.0	300	707	636	283	125	1
50	6.8	D/7343-31	T495D685(1)050A(2)E400	3.4	6.0	400	612	551	245	125	1
50	6.8	X/7343-43	T495X685(1)050A(2)E300	3.4	6.0	300	742	668	297	125	1
50	10	X/7343-43	T495X106(1)050A(2)E250	5.0	8.0	250	812	731	325	125	1
50	10	X/7343-43	T495X106(1)050A(2)E260	5.0	6.0	260	797	717	319	125	1
50	10	X/7343-43	T495X106(1)050A(2)E300	5.0	6.0	300	742	668	297	125	1
50	15	X/7343-43	T495X156(1)050A(2)E200	7.5	6.0	200	908	817	363	125	1
50	15	X/7343-43	T495X156(1)050A(2)E250	7.5	6.0	250	812	731	325	125	1
50	15	X/7343-43	T495X156(1)050A(2)E300	7.5	6.0	300	742	668	297	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates termination finish.

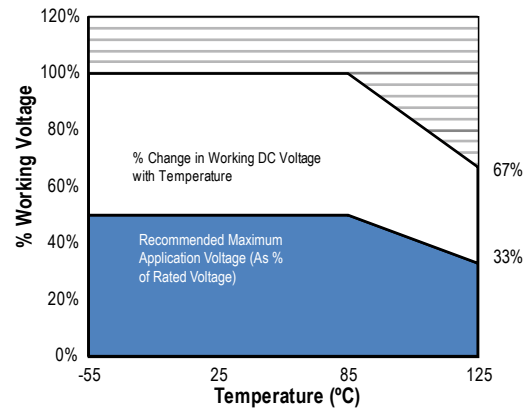
Refer to Ordering Information for additional detail.

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. Substitutions can include better than series.



## Recommended Voltage Derating Guidelines

	-55°C to 85°C	85°C to 125°C
% Change in Working DC Voltage with Temperature	V <sub>R</sub>	67% of V <sub>R</sub>
Recommended Maximum Application Voltage	50% of V <sub>R</sub>	33% of V <sub>R</sub>



## 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.

KEMET Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts @ 25°C w/+20°C Rise
A	3216-18	75
B	3528-21	85
C	6032-28	110
D	7343-31	150
X	7343-43	165
E	7360-38	200
S	3216-12	60
T	3528-12	70
U	6032-15	90
V	7343-20	125
T510X	7343-43	270
T510E	7360-38	285

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

Temperature Compensation Multipliers for Maximum Ripple Current		
T ≤ 25°C	T ≤ 85°C	T ≤ 125°C
1.00	0.90	0.40

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)

## Reverse Voltage

Solid tantalum 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	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		
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		
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		
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		
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		
E <sup>1</sup>	7360-38	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		
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		
X <sup>1</sup>	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		

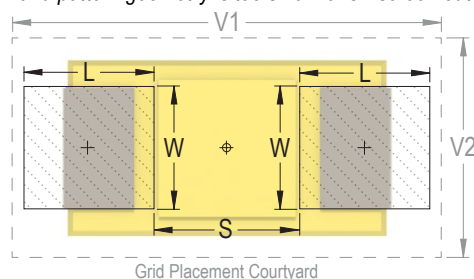
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## 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.

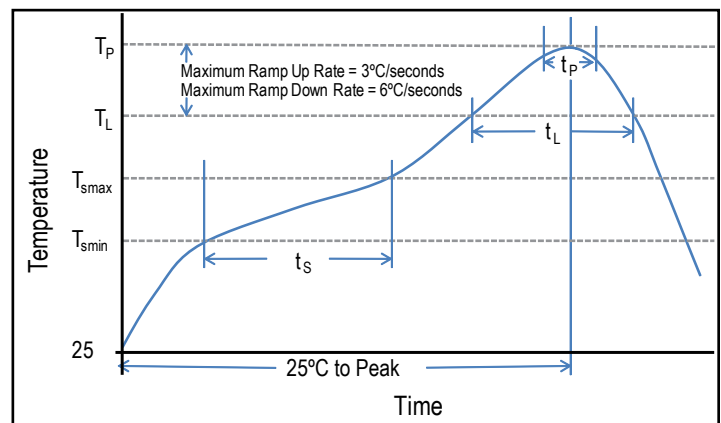
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z

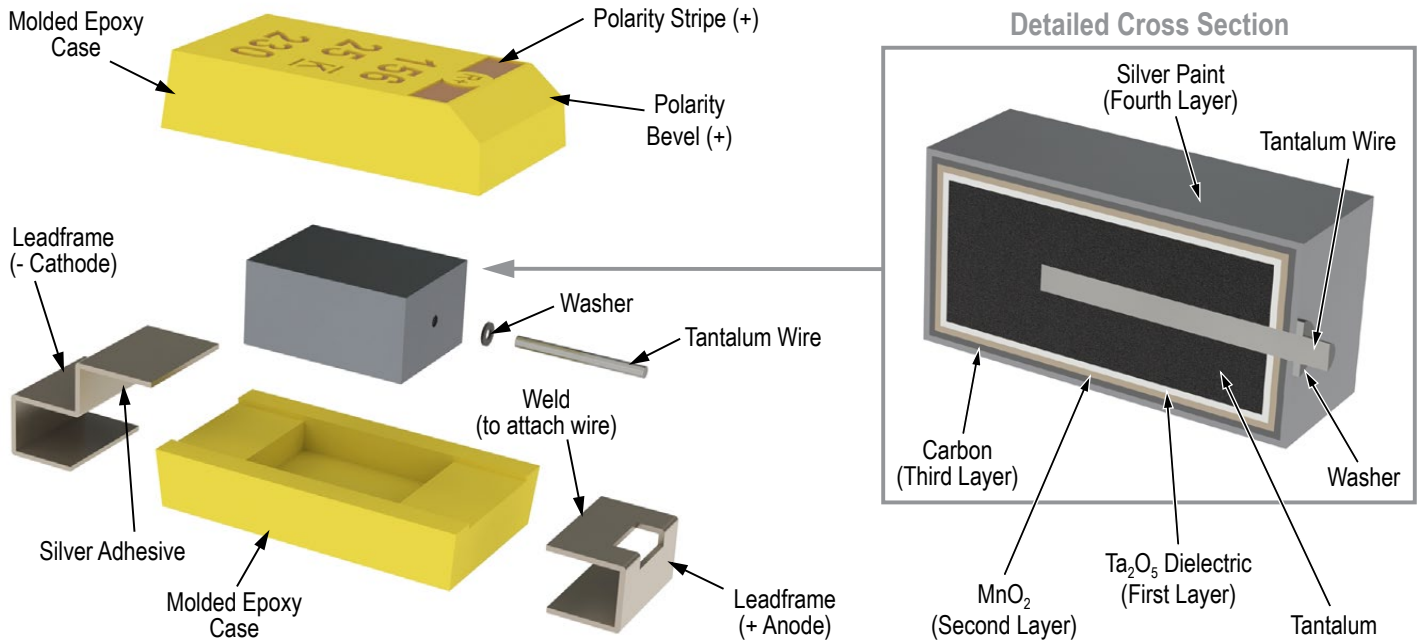


## Storage

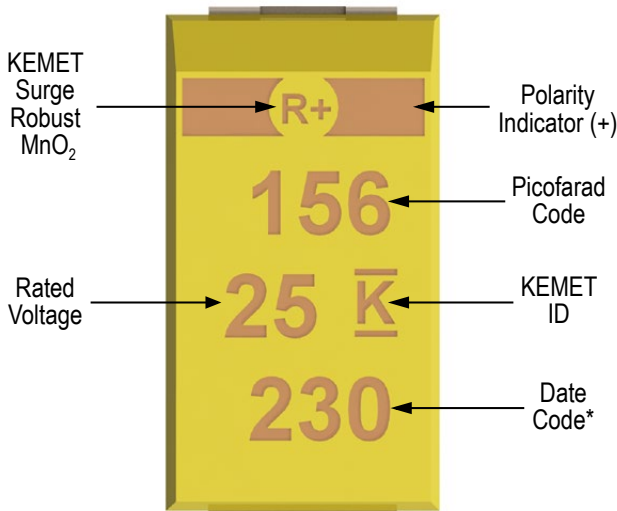
Tantalum chip capacitors should be stored in normal working environments. While the chips themselves are quite robust in other environments, solderability will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. In addition, packaging materials will 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 chip stock should be used promptly, preferably within three years of receipt.



## Construction



## Capacitor Marking



\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

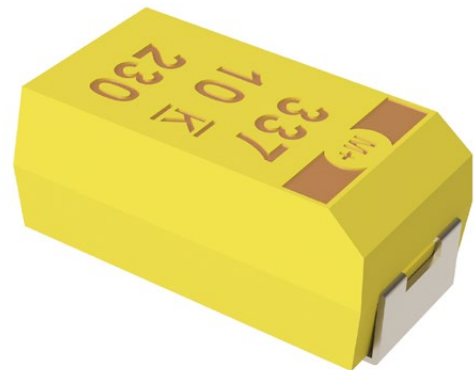
## Overview

The low ESR, surge-robust T510 Series is designed for demanding applications that require high surge current and high ripple current capability. This series builds upon the proven capabilities of our industrial grade tantalum chip capacitors to offer several advantages such as low ESR, high ripple current capability, excellent capacitance stability, and improved

resistance to high in-rush currents. These benefits are achieved through the utilization of multiple anodes as well as high-stress, low impedance electrical conditioning performed prior to screening. This series is classified as MSL (Moisture Sensitivity Level) 1 under J STD 020: unlimited floor life time at ≤30°C/85% RH.

## Benefits

- Meets or exceeds EIA Standard 535BAAC
- Taped and reeled per EIA 481
- High surge current capability
- Optional gold-plated terminations
- High ripple current capability
- 100% surge current test
- 100% steady-state accelerated aging
- Capacitance values of 10 µF to 1,000 µF
- Tolerances of ±10% and ±20%
- Voltage rating of 4 to 50 VDC
- Case sizes E and X
- ESR as low as 10 mΩ
- RoHS Compliant and lead-free terminations
- Operating temperature range of -55°C to +125°C



## Applications

Typical applications include decoupling and filtering in industrial and automotive end applications, such as DC/DC converters, portable electronics, telecommunications, and control units requiring high ripple current capability.

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

T	510	X	477	M	006	A	T	E800	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	ESR	Packaging (C-Spec)
T = Tantalum	Multiple Anode Low ESR	E, X	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	004 = 4 V 006 = 6.3 V 010 = 10 V 016 = 16 V 020 = 20 V 025 = 25 V 035 = 35 V 050 = 50 V	A = N/A Z = N/A	T = 100% Matte Tin (Sn) Plated H = Standard Solder Coated (SnPb 5% Pb minimum) G = Gold Plated (A, B, C, D, X only)	Last three digits specify ESR in mΩ. (800 = 800 mΩ)	Blank = 7" Reel 7280 = 13" Reel

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C
Rated Capacitance Range	10 – 1,000 μF @ 120 Hz/25°C
Capacitance Tolerance	K Tolerance (10%), M Tolerance (20%)
Rated Voltage Range	4 – 50 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.01 CV (μA) at rated voltage after 5 minutes

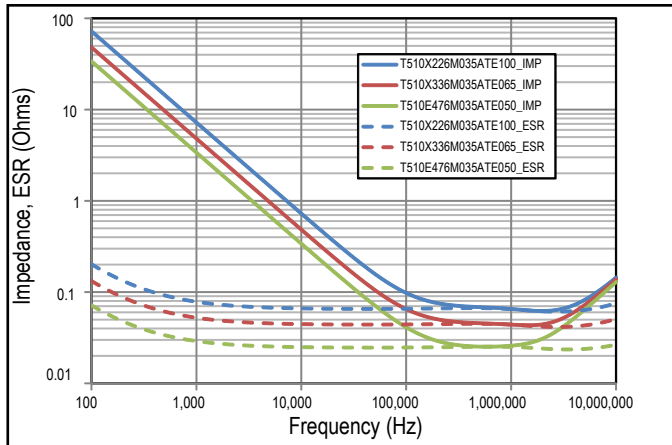
## Qualification

Test	Condition	Characteristics					
Endurance	85°C @ rated voltage, 2,000 hours 125°C @ 2/3 rated voltage, 2,000 hours	ΔC/C	Within ±10% of initial value				
		DF	Within initial limits				
		DCL	Within 1.25 x initial limit				
		ESR	Within initial limits				
Storage Life	125°C @ 0 volts, 2,000 hours	ΔC/C	Within ±10% of initial value				
		DF	Within initial limits				
		DCL	Within 1.25 x initial limit				
		ESR	Within initial limits				
Thermal Shock	MIL-STD-202, Method 107, Condition B, mounted, -55°C to 125°C, 1,000 cycles	ΔC/C	Within ±5% of initial value				
		DF	Within initial limits				
		DCL	Within 1.25 x initial limit				
		ESR	Within initial limits				
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	+125°C	
		ΔC/C	IL*	±10%	±10%	±20%	
		DF	IL	IL	1.5 x IL	1.5 x IL	
		DCL	IL	n/a	10 x IL	12 x IL	
		Surge Voltage	85°C, 1.32 x rated voltage 1,000 cycles (125°C, 1.2 x rated voltage)	ΔC/C	Within ±5% 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	ΔC/C	Within ±10% of initial value				
		DF	Within initial limits				
		DCL	Within initial limits				

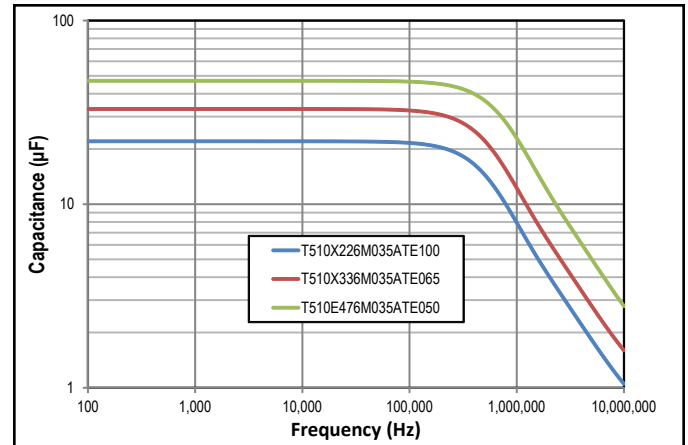
\*IL = Initial limit

## Electrical Characteristics

Impedance, ESR vs. Frequency



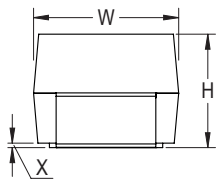
Capacitance vs. Frequency



## Dimensions – Millimeters (Inches)

Metric will govern

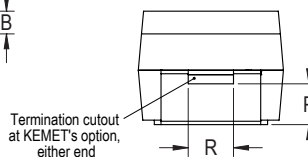
CATHODE (-) END VIEW



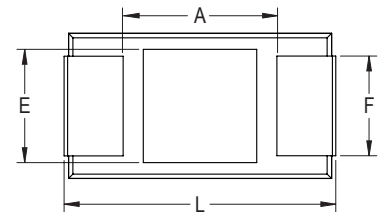
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component												
KEMET	EIA	L*	W*	H*	F* ±0.1 ±(.004)	S* ±0.3 ±(.012)	B* ±0.15 (Ref) ±.006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Min)	G (Ref)	E (Ref)
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 (.094)	1.3 (.051)	0.5 (.020)	0.10 ± 0.10 (.004 ± .004)	1.7 (.067)	1.0 (.039)	0.13 (.005)	3.8 (.150)	3.5 (.138)	3.5 (.138)
E	7360-38	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	3.6 ±0.2 (0.142 ±0.008)	4.1 (.161)	1.3 (.051)	0.5 (.020)	0.10 ± 0.10 (.004 ± .004)	n/a	n/a	0.13 (.005)	3.8 (.150)	3.5 (.138)	3.5 (.138)

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions

Table 1 – Ratings &amp; Part Number Reference

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Maximum Operating Temp	MSL
							mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz		
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
4	680	X/7343-43	T510X687(1)004A(2)E030	27.2	6.0	30	3000	2700	1200	125	1
4	1000	X/7343-43	T510X108(1)004A(2)E018	40.0	6.0	18	3873	3486	1549	125	1
4	1000	X/7343-43	T510X108(1)004A(2)E023	40.0	6.0	23	3426	3083	1370	125	1
4	1000	X/7343-43	T510X108(1)004A(2)E030	40.0	6.0	30	3000	2700	1200	125	1
4	1000	X/7343-43	T510X108(1)004A(2)E035	40.0	6.0	35	2777	2499	1111	125	1
4	1000	E/7360-38	T510E108(1)004A(2)E018	40.0	6.0	18	3979	3581	1592	125	1
4	1000	E/7360-38	T510E108(1)004A(2)E010	40.0	6.0	10	5339	4805	2136	125	1
6.3	470	X/7343-43	T510X477(1)006A(2)E030	29.6	6.0	30	3000	2700	1200	125	1
6.3	680	X/7343-43	T510X687(1)006A(2)E023	42.8	6.0	23	3426	3083	1370	125	1
6.3	680	X/7343-43	T510X687(1)006A(2)E045	42.8	12.0	45	2449	2204	980	125	1
6.3	680	E/7360-38	T510E687(1)006A(2)E023	42.8	6.0	23	3520	3168	1408	125	1
6.3	680	E/7360-38	T510E687(1)006A(2)E012	42.8	6.0	12	4873	4386	1949	125	1
10	330	X/7343-43	T510X337(1)010A(2)E035	33.0	6.0	35	2777	2499	1111	125	1
16	150	X/7343-43	T510X157(1)016A(2)E030	24.0	6.0	30	3000	2700	1200	125	1
16	150	X/7343-43	T510X157(1)016A(2)E040	24.0	6.0	40	2598	2338	1039	125	1
16	220	X/7343-43	T510X227(1)016A(2)E040	35.2	10.0	40	2598	2338	1039	125	1
16	220	X/7343-43	T510X227(1)016A(2)E025	35.2	10.0	25	3286	2957	1314	125	1
20	68	X/7343-43	T510X686(1)020A(2)E055	14.0	6.0	55	2216	1994	886	125	1
20	68	X/7343-43	T510X686(1)020A(2)E045	14.0	6.0	45	2449	2204	980	125	1
20	100	X/7343-43	T510X107(1)020A(2)E035	20.0	8.0	35	2777	2499	1111	125	1
20	100	X/7343-43	T510X107(1)020A(2)E040	20.0	6.0	40	2598	2338	1039	125	1
20	100	X/7343-43	T510X107(1)020A(2)E045	20.0	6.0	45	2449	2204	980	125	1
20	100	X/7343-43	T510X107(1)020A(2)E055	20.0	6.0	55	2216	1994	886	125	1
25	68	X/7343-43	T510X686(1)025A(2)E045	17.0	8.0	45	2449	2204	980	125	1
25	100	E/7360-38	T510E107(1)025A(2)E050	25.0	8.0	50	2387	2148	955	125	1
35	22	X/7343-43	T510X226(1)035A(2)E100	7.7	6.0	100	1643	1479	657	125	1
35	22	X/7343-43	T510X226(1)035A(2)E080	7.7	6.0	80	1837	1653	735	125	1
35	22	X/7343-43	T510X226(1)035A(2)E060	7.7	6.0	60	2121	1909	848	125	1
35	33	X/7343-43	T510X336(1)035A(2)E065	11.6	6.0	65	2038	1834	815	125	1
35	33	X/7343-43	T510X336(1)035A(2)E050	11.6	6.0	50	2324	2092	930	125	1
35	47	X/7343-43	T510X476(1)035A(2)E055	16.5	8.0	55	2216	1994	886	125	1
35	47	X/7343-43	T510X476(1)035A(2)E065	16.5	8.0	65	2038	1834	815	125	1
35	47	E/7360-38	T510E476(1)035A(2)E050	16.5	8.0	50	2387	2148	955	125	1
50	10	X/7343-43	T510X106(1)050A(2)E120	5.0	8.0	120	1500	1350	600	125	1
50	10	X/7343-43	T510X106(1)050A(2)E090	5.0	8.0	90	1732	1559	693	125	1
50	22	X/7343-43	T510X226(1)050A(2)E100	11.0	8.0	100	1643	1479	657	125	1
50	22	X/7343-43	T510X226(1)050A(2)E075	11.0	8.0	75	1897	1707	759	125	1
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ +20°C Max/5 Min	% @ +20°C 120 Hz Max	mΩ @ 20°C 100 kHz Max	mA @ +25°C 100 kHz	mA @ +85°C 100 kHz	mA @ +125°C 100 kHz	°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	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% or K for ±10%. Designates Capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum).

Designates Termination Finish.

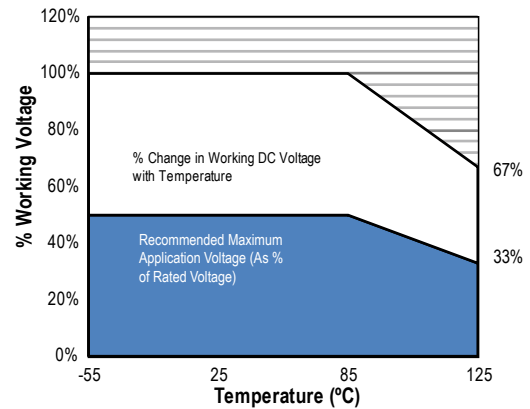
Refer to Ordering Information for additional detail.

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. Substitutions can include better than series.



## Recommended Voltage Derating Guidelines

	-55°C to 85°C	85°C to 125°C
% Change in Working DC Voltage with Temperature	V <sub>R</sub>	67% of V <sub>R</sub>
Recommended Maximum Application Voltage	50% of V <sub>R</sub>	33% of V <sub>R</sub>



## 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.

KEMET Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts @ 25°C w/+20°C Rise
A	3216-18	75
B	3528-21	85
C	6032-28	110
D	7343-31	150
X	7343-43	165
E	7360-38	200
S	3216-12	60
T	3528-12	70
U	6032-15	90
V	7343-20	125
T510X	7343-43	270
T510E	7360-38	285

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

Temperature Compensation Multipliers for Maximum Ripple Current		
T ≤ 25°C	T ≤ 85°C	T ≤ 125°C
1.00	0.90	0.40

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)

## Reverse Voltage

Solid tantalum 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	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)				
		W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
E <sup>1</sup>	7360-38	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 <sup>1</sup>	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

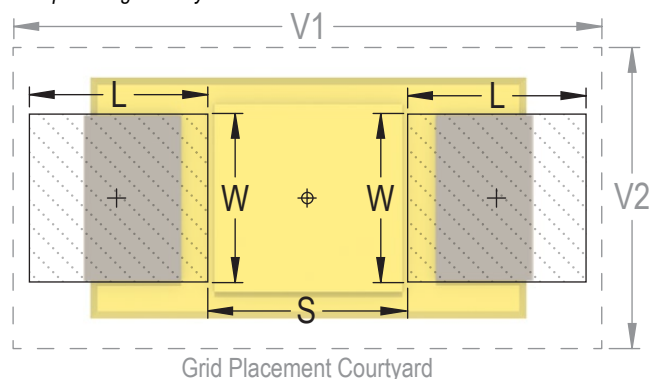
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## 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.

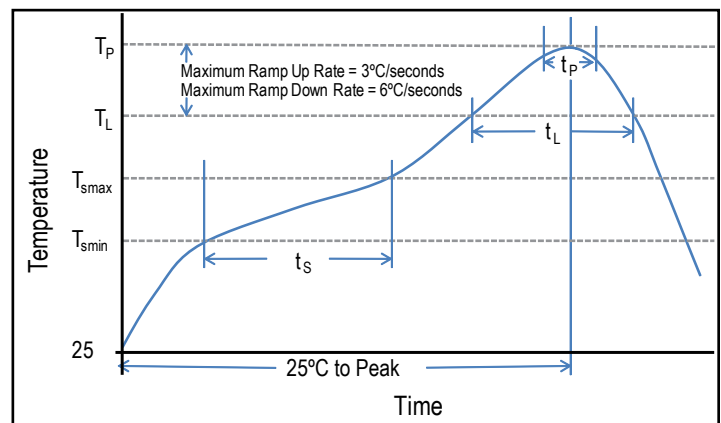
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

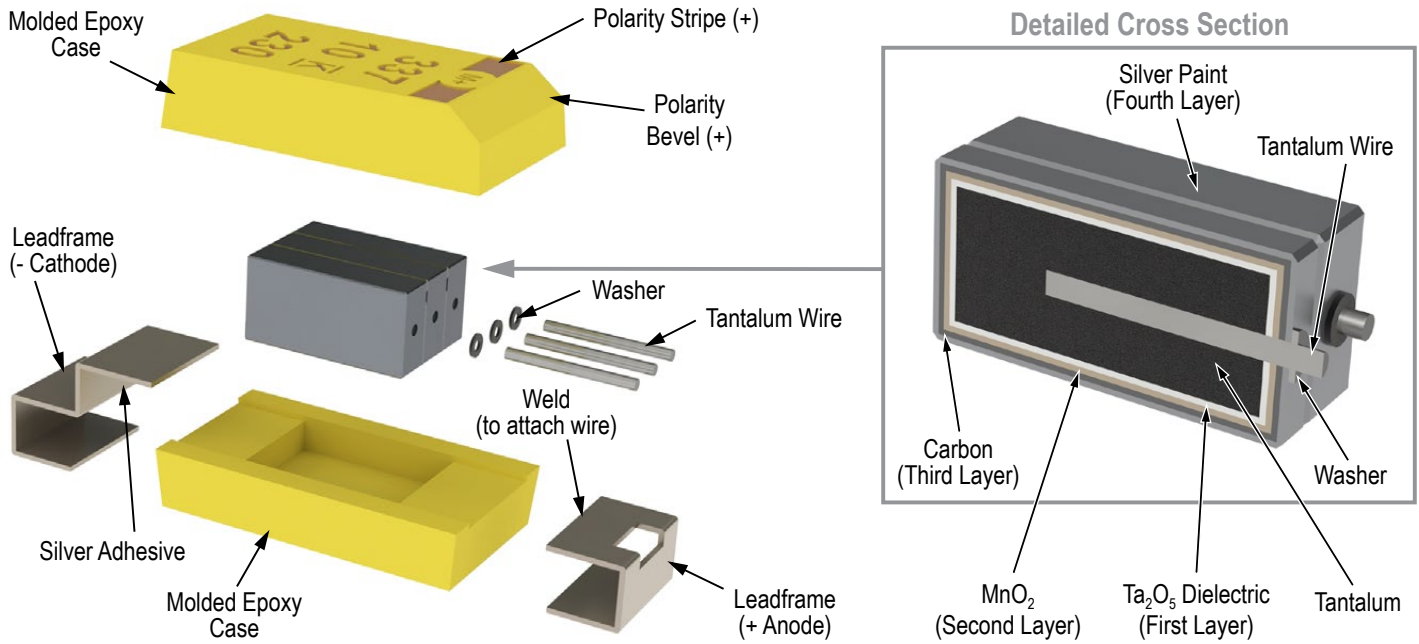
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



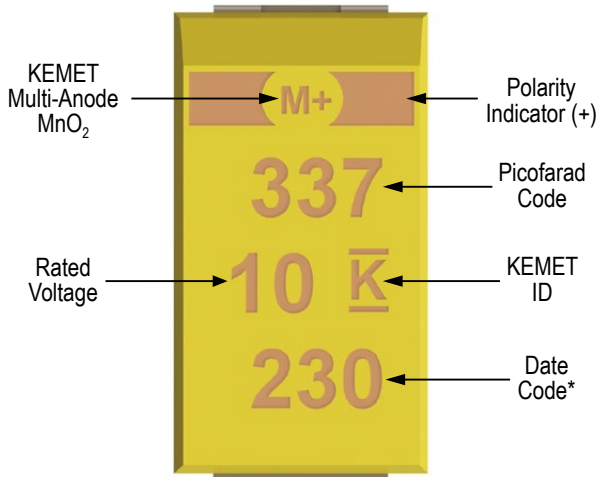
## Storage

Tantalum chip capacitors should be stored in normal working environments. While the chips 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 chip stock should be used promptly, preferably within three years of receipt.

## Construction



## Capacitor Marking



\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

## Overview

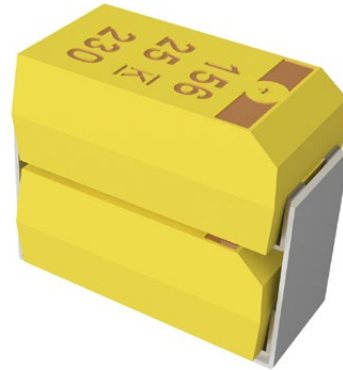
The KEMET Tantalum Stack MnO<sub>2</sub> (TSM) Series is designed to provide the highest capacitance/voltage ratings in surface mount configuration. KEMET's T493 COTS Military/Aerospace capacitors are utilized in stacks of 2, 3, 4, and 6 components to achieve a broad range of capacitance and voltage ratings. The T493 COTS series offers component level Weibull grading options, surge current testing options and standard, low, and

ultra-low ESR options. All component level lots of this series are conditioned with MIL-PRF-55365 Group A testing. Stacking configurations offer this high reliability product with custom capacitance/voltage solutions and very low ESR options.

*Note: Custom stacking solutions are available with other KEMET Tantalum Surface Mount Series. Please contact KEMET Product Management for availability.*

## Benefits

- High capacitance
- Surface mountable
- Capacitance values of 9.4  $\mu$ F to 2,000  $\mu$ F
- Capacitance can be custom specified
- Voltage ratings of 6 VDC to 50 VDC
- High volumetric efficiency
- Ultra-low ESR
- Surge capability
- Weibull failure options B and C
- Operating temperature range of -55°C to +125°C
- Laser-marked case
- Discrete components EIA standard case sizes (others available)
- High Temperature lead attach material available (> 260°C)



## Applications

Typical applications include decoupling and filtering in a variety of market segments. The T493 COTS stack devices can be utilized in military and aerospace applications. Other KEMET series can be utilized in filtering and decoupling applications to service various market segments.

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

T	SM	2D	447	K	10	A	H	61	20	D493
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	Surge	ESR	C-Spec 2
T = Tantalum	Stacks MnO <sub>2</sub> Cathode	2C, 3C, 4C, 6C, 2D, 3D, 4D, 6D, 2X, 3X, 4X, 6X	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	006 = 6.3 V 010 = 10 V 016 = 16 V 020 = 20 V 025 = 25 V 035 = 35 V 050 = 50 V	A = N/A B = 0.1%/1,000 hours C = 0.01%/1,000 hours	H = Standard Solder Coated (SnPb 5% Pb minimum) C = Hot Solder Dipped B = Gold Plated T = 100% Tin	61 = None 62 = 10 Cycles 25°C After Weibull 63 = 10 cycles, -55°C and 85°C After Weibull 64 = 10 cycles, -55°C and 85°C Before Weibull Special CSPEC: CECC	10 = ESR-Standard 20 = ESR-Low 30 = ESR-Ultra-low	Designates discrete component series. D493 = T493

Note: These TSM Stacks are specific to T493 COTS.

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C
Rated Capacitance Range	9.4 – 2,000 µF @ 120 Hz/25°C
Capacitance Tolerance	K Tolerance (10%), M Tolerance (20%)
Rated Voltage Range	6 – 50 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.01 CV (µA) at rated voltage after 5 minutes



## Qualification

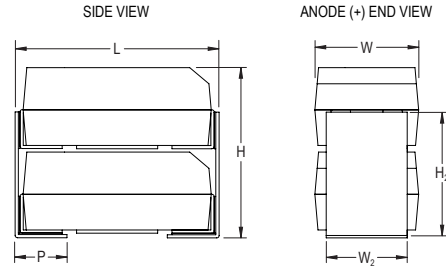
Test	Condition	Characteristics	
Endurance	85°C @ rated voltage, 2,000 hours 125°C @ 2/3 rated voltage, 2,000 hours	Δ C/C	Within ±10% of initial value
		DF	Within initial limits
		DCL	Within 1.25 x initial limit
		ESR	Within initial limits
Thermal Shock	KEMET specified test, mounted, -55°C to 125° C, 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	125° C, 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

## Dimensions – Millimeters (Inches)

Metric will govern

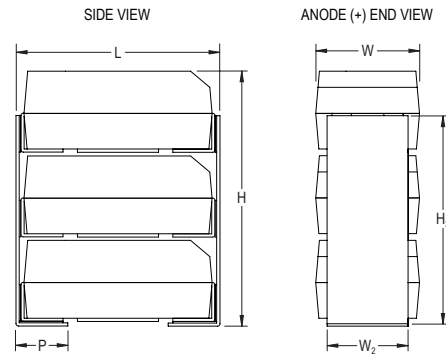
### TSM2

KEMET 2 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
2C	6.5 ± 0.38	3.3 ± 0.2	5.3 ± 0.38	2.5 ± 0.2	4.5 ± 0.38	1.4 ± 0.38
	(.258 ± .015)	(.130 ± .008)	(.210 ± .015)	(.100 ± .008)	(.176 ± .015)	(.055 ± .015)
2D	8.0 ± 0.38	4.4 ± 0.2	6.2 ± 0.38	3.0 ± 0.2	4.8 ± 0.38	1.9 ± 0.38
	(.315 ± .015)	(.174 ± .008)	(.245 ± .015)	(.120 ± .008)	(.192 ± .015)	(.075 ± .015)
2X	8.0 ± 0.38	4.4 ± 0.2	8.9 ± 0.38	3.0 ± 0.2	6.9 ± 0.38	1.9 ± 0.38
	(.315 ± .015)	(.174 ± .008)	(.352 ± .015)	(.120 ± .008)	(.272 ± .015)	(.075 ± .015)



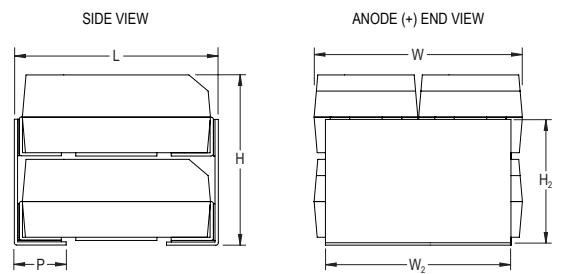
### TSM3

KEMET 3 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
3C	6.5 ± 0.38	3.3 ± 0.2	7.8 ± 0.38	2.5 ± 0.2	6.4 ± 0.38	1.4 ± 0.38
	(.258 ± .015)	(.130 ± .008)	(.310 ± .015)	(.100 ± .008)	(.252 ± .015)	(.055 ± .015)
3D	8.0 ± 0.38	4.4 ± 0.2	9.2 ± 0.38	3.0 ± 0.2	7.7 ± 0.38	1.9 ± 0.38
	(.315 ± .015)	(.174 ± .008)	(.365 ± .015)	(.120 ± .008)	(.304 ± .015)	(.075 ± .015)
3X	8.0 ± 0.38	4.4 ± 0.2	13.3 ± 0.38	3.0 ± 0.2	11.0 ± 0.38	1.9 ± 0.38
	(.315 ± .015)	(.174 ± .008)	(.525 ± .015)	(.120 ± .008)	(.436 ± .015)	(.075 ± .015)



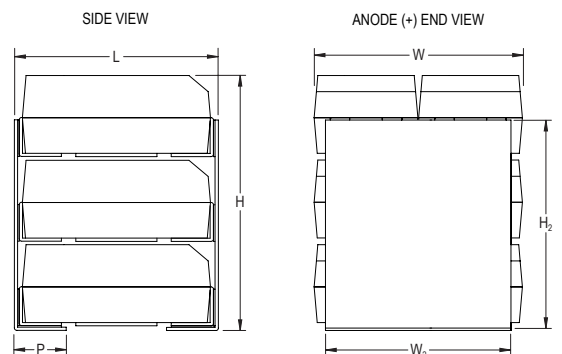
### TSM4

KEMET 4 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
4C	6.5 ± 0.38	6.6 ± 0.2	5.3 ± 0.38	5.8 ± 0.2	4.6 ± 0.38	1.4 ± 0.38
	(.258 ± .015)	(.262 ± .008)	(.210 ± .015)	(.230 ± .008)	(.180 ± .015)	(.055 ± .015)
4D	8.0 ± 0.38	8.9 ± 0.2	6.2 ± 0.38	7.4 ± 0.2	4.8 ± 0.38	1.9 ± 0.38
	(.315 ± .015)	(.350 ± .008)	(.245 ± .015)	(.292 ± .008)	(.192 ± .015)	(.075 ± .015)
4X	8.0 ± 0.38	8.9 ± 0.2	8.9 ± 0.38	7.4 ± 0.2	6.9 ± 0.38	1.9 ± 0.38
	(.315 ± .015)	(.350 ± .008)	(.352 ± .015)	(.292 ± .008)	(.272 ± .015)	(.075 ± .015)



### TSM6

KEMET 6 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
6C	6.5 ± 0.38	6.6 ± 0.2	7.8 ± 0.38	5.8 ± 0.2	6.6 ± 0.38	1.4 ± 0.38
	(.258 ± .015)	(.262 ± .008)	(.310 ± .015)	(.230 ± .008)	(.260 ± .015)	(.055 ± .015)
6D	8.0 ± 0.38	8.9 ± 0.2	9.2 ± 0.38	7.4 ± 0.2	7.7 ± 0.38	1.9 ± 0.38
	(.315 ± .015)	(.350 ± .008)	(.365 ± .015)	(.292 ± .008)	(.304 ± .015)	(.075 ± .015)
6X	8.0 ± 0.38	8.9 ± 0.2	13.3 ± 0.38	7.4 ± 0.2	11.0 ± 0.38	1.9 ± 0.38
	(.315 ± .015)	(.350 ± .008)	(.525 ± .015)	(.292 ± .008)	(.436 ± .015)	(.075 ± .015)



## Capacitance and Rated Voltage Chart

Capacitance		Rated Voltage						
μF	Code	6 V	10 V	16 V	20 V	25 V	35 V	50 V
9.4	945							2D
14	146							3D
19	196							4D
20	206						2C	2X
28	286							6D
30	306					2C	3C	3X
40	406						4C	4X
44	446				2C		2D	
45	456					3C		
60	606					4C	6C	6X
66	666				3C		3D	
88	886				4C		4D	
90	906					6C		
94	946			2C		2D		
130	137				6C, 2D		6D	
140	147			3C		3D		
190	197			4C		4D		
200	207		2C		3D			
270	277				4D			
280	287			6C		6D		
300	307		3C	2D				
400	407		4C					
410	417				6D			
440	447	2C	2D					
450	457			3D				
600	607		6C	4D				
660	667	3C, 2D	3D, 2X					
880	887	4C	4D					
900	907			6D				
990	997	3D	3X					
1300	138	6C, 4D	6D, 4X					
2000	208	6D	6X					

Table 1A – TSM2 Ratings &amp; 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	MSL
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ +20°C Maximum/ 5 Minutes	% @ +20°C 120 Hz Maximum	Ω @ 20°C 100 kHz Maximum	Ω @ 20°C 100 kHz Maximum	Ω @ 20°C 100 kHz Maximum	°C	Reflow Temp ≤ 260°C
6.3	440	2C	TSM2C447(1)006(2)(3)(4)(5)	27.8	10	0.600	0.150	0.120	125	1
10	200	2C	TSM2C207(1)010(2)(3)(4)(5)	20.0	8	0.600	0.150	NA	125	1
16	94	2C	TSM2C946(1)016(2)(3)(4)(5)	15.0	6	0.600	0.250	0.175	125	1
20	44	2C	TSM2C446(1)020(2)(3)(4)(5)	8.8	6	0.600	0.200	NA	125	1
25	30	2C	TSM2C306(1)025(2)(3)(4)(5)	7.6	6	0.750	0.450	NA	125	1
35	20	2C	TSM2C206(1)035(2)(3)(4)(5)	7.0	6	1.000	0.600	NA	125	1
6.3	660	2D	TSM2D667(1)006(2)(3)(4)(5)	41.6	8	0.250	0.075	0.050	125	1
10	440	2D	TSM2D447(1)010(2)(3)(4)(5)	44.0	8	0.250	0.100	0.040	125	1
16	300	2D	TSM2D307(1)016(2)(3)(4)(5)	48.0	8	0.350	0.200	0.075	125	1
20	130	2D	TSM2D137(1)020(2)(3)(4)(5)	27.2	8	0.350	0.100	0.075	125	1
25	94	2D	TSM2D946(1)025(2)(3)(4)(5)	23.6	10	0.350	0.100	0.060	125	1
35	44	2D	TSM2D446(1)035(2)(3)(4)(5)	15.4	6	0.350	0.200	0.100	125	1
50	9.4	2D	TSM2D945(1)050(2)(3)(4)(5)	4.8	6	0.750	0.300	0.140	125	1
10	660	2X	TSM2X667(1)010(2)(3)(4)(5)	66.0	10	0.250	0.050	0.025	125	1
50	20	2X	TSM2X206(1)050(2)(3)(4)(5)	10.0	6	0.350	0.200	NA	125	1

Table 1B – TSM3 Ratings &amp; 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	MSL
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ +20°C Maximum/ 5 Minutes	% @ +20°C 120 Hz Maximum	Ω @ 20°C 100 kHz Maximum	Ω @ 20°C 100 kHz Maximum	Ω @ 20°C 100 kHz Maximum	°C	Reflow Temp ≤ 260°C
6.3	660	3C	TSM3C667(1)006(2)(3)(4)(5)	41.7	10	0.400	0.100	0.077	125	1
10	300	3C	TSM3C307(1)010(2)(3)(4)(5)	30.0	8	0.400	0.100	NA	125	1
16	140	3C	TSM3C147(1)016(2)(3)(4)(5)	22.5	6	0.400	0.167	0.117	125	1
20	66	3C	TSM3C666(1)020(2)(3)(4)(5)	13.2	6	0.400	0.133	NA	125	1
25	45	3C	TSM3C456(1)025(2)(3)(4)(5)	11.4	6	0.500	0.300	NA	125	1
35	30	3C	TSM3C306(1)035(2)(3)(4)(5)	10.5	6	0.667	0.400	NA	125	1
6.3	990	3D	TSM3D997(1)006(2)(3)(4)(5)	62.4	8	0.167	0.050	0.033	125	1
10	660	3D	TSM3D667(1)010(2)(3)(4)(5)	66.0	8	0.167	0.067	0.027	125	1
16	450	3D	TSM3D457(1)016(2)(3)(4)(5)	72.0	8	0.233	0.133	0.050	125	1
20	200	3D	TSM3D207(1)020(2)(3)(4)(5)	40.8	8	0.233	0.067	0.050	125	1
25	140	3D	TSM3D147(1)025(2)(3)(4)(5)	35.4	10	0.233	0.067	0.040	125	1
35	66	3D	TSM3D666(1)035(2)(3)(4)(5)	23.1	6	0.233	0.133	0.067	125	1
50	14	3D	TSM3D146(1)050(2)(3)(4)(5)	7.2	6	0.500	0.200	0.093	125	1
10	990	3X	TSM3X997(1)010(2)(3)(4)(5)	99.0	10	0.167	0.033	0.017	125	1
50	30	3X	TSM3X306(1)050(2)(3)(4)(5)	15.0	6	0.233	0.133	NA	125	1

(1) To complete KEMET part number, insert M for ± 20%, K for ± 10%. Designates Capacitance tolerance.

(2) To complete KEMET part number, insert B (0.1%/1,000 hours), C (0.01%/1,000 hours) or A = N/A. Designates Reliability Level.

(3) To complete KEMET part number, insert B = Gold Plated, C = Hot solder dipped, H = Solder Plated, or T = 100% Tin (Sn). Designates Termination Finish.

(4) To complete KEMET part number, insert 61 = None, 62 = 10 cycles +25°C, 63 = 10 cycles -55°C +85°C after Weibull or 64 = 10 cycles -55°C +85°C before Weibull. Designates Surge current option.

(5) To complete KEMET part number, insert 10 = Standard ESR, 20 = Low ESR or 30 = Ultra Low ESR. Designates ESR option.

Refer to Ordering Information for additional detail.

Table 1C – TSM4 Ratings &amp; 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	MSL
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ +20°C Maximum/ 5 Minutes	% @ +20°C 120 Hz Maximum	Ω @ 20°C 100 kHz Maximum	Ω @ 20°C 100 kHz Maximum	Ω @ 20°C 100 kHz Maximum	°C	Reflow Temp ≤ 260°C
6.3	880	4C	TSM4C887(1)006(2)(3)(4)(5)	55.6	10	0.300	0.075	0.058	125	1
10	400	4C	TSM4C407(1)010(2)(3)(4)(5)	40.0	8	0.300	0.075	NA	125	1
16	190	4C	TSM4C197(1)016(2)(3)(4)(5)	30.0	6	0.300	0.125	0.088	125	1
20	88	4C	TSM4C886(1)020(2)(3)(4)(5)	17.6	6	0.300	0.100	NA	125	1
25	60	4C	TSM4C606(1)025(2)(3)(4)(5)	15.2	6	0.375	0.225	NA	125	1
35	40	4C	TSM4C406(1)035(2)(3)(4)(5)	14.0	6	0.500	0.300	NA	125	1
6.3	1300	4D	TSM4D138(1)006(2)(3)(4)(5)	83.2	8	0.125	0.038	0.025	125	1
10	880	4D	TSM4D887(1)010(2)(3)(4)(5)	88.0	8	0.125	0.050	0.020	125	1
16	600	4D	TSM4D607(1)016(2)(3)(4)(5)	96.0	8	0.175	0.100	0.038	125	1
20	270	4D	TSM4D277(1)020(2)(3)(4)(5)	54.4	8	0.175	0.050	0.038	125	1
25	180	4D	TSM4D187(1)025(2)(3)(4)(5)	47.2	10	0.175	0.050	0.030	125	1
35	88	4D	TSM4D886(1)035(2)(3)(4)(5)	30.8	6	0.175	0.100	0.050	125	1
50	19	4D	TSM4D196(1)050(2)(3)(4)(5)	9.6	6	0.375	0.150	0.070	125	1
10	1300	4X	TSM4X138(1)010(2)(3)(4)(5)	132.0	10	0.125	0.025	0.013	125	1
50	40	4X	TSM4X406(1)050(2)(3)(4)(5)	20.0	6	0.175	0.100	NA	125	1

Table 1D – TSM6 Ratings &amp; 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	MSL
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ +20°C Maximum/ 5 Minutes	% @ +20°C 120 Hz Maximum	Ω @ 20°C 100 kHz Maximum	Ω @ 20°C 100 kHz Maximum	Ω @ 20°C 100 kHz Maximum	°C	Reflow Temp ≤ 260°C
6.3	1300	6C	TSM6C138(1)006(2)(3)(4)(5)	83.4	10	0.200	0.050	0.038	125	1
10	600	6C	TSM6C607(1)010(2)(3)(4)(5)	60.0	8	0.200	0.050	NA	125	1
16	280	6C	TSM6C287(1)016(2)(3)(4)(5)	45.0	6	0.200	0.083	0.058	125	1
20	130	6C	TSM6C137(1)020(2)(3)(4)(5)	26.4	6	0.200	0.067	NA	125	1
25	90	6C	TSM6C906(1)025(2)(3)(4)(5)	22.8	6	0.250	0.150	NA	125	1
35	60	6C	TSM6C606(1)035(2)(3)(4)(5)	21.0	6	0.333	0.200	NA	125	1
6.3	2000	6D	TSM6D208(1)006(2)(3)(4)(5)	124.8	8	0.083	0.025	0.017	125	1
10	1300	6D	TSM6D138(1)010(2)(3)(4)(5)	132.0	8	0.083	0.033	0.013	125	1
16	900	6D	TSM6D907(1)016(2)(3)(4)(5)	144.0	8	0.117	0.067	0.025	125	1
20	410	6D	TSM6D417(1)020(2)(3)(4)(5)	81.6	8	0.117	0.033	0.025	125	1
25	280	6D	TSM6D287(1)025(2)(3)(4)(5)	70.8	10	0.117	0.033	0.020	125	1
35	130	6D	TSM6D137(1)035(2)(3)(4)(5)	46.2	6	0.117	0.067	0.033	125	1
50	28	6D	TSM6D286(1)050(2)(3)(4)(5)	14.4	6	0.250	0.100	0.047	125	1
10	2000	6X	TSM6X208(1)010(2)(3)(4)(5)	198.0	10	0.083	0.017	0.008	125	1
50	60	6X	TSM6X606(1)050(2)(3)(4)(5)	30.0	6	0.117	0.067	NA	125	1

1) To complete KEMET part number, insert M for ± 20%, K for ± 10%. Designates Capacitance tolerance.

2) To complete KEMET part number, insert B (0.1%/1,000 hours), C (0.01%/1,000 hours) or A = N/A. Designates Reliability Level.

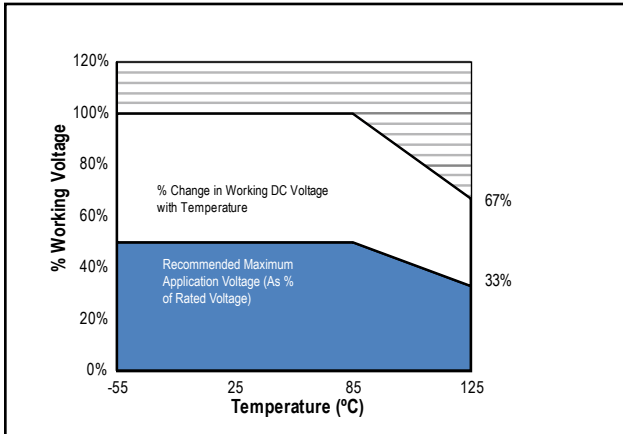
3) To complete KEMET part number, insert B = Gold Plated, C = Hot solder dipped, H = Solder Plated, or T = 100% Tin (Sn). Designates Termination Finish.

4) To complete KEMET part number, insert 61 = None, 62 = 10 cycles +25°C, 63 = 10 cycles -55°C +85°C after Weibull or 64 = 10 cycles -55°C +85°C before Weibull. Designates Surge current option.

5) To complete KEMET part number, insert 10 = Standard ESR, 20 = Low ESR or 30 = Ultra Low ESR. Designates ESR option.

Refer to Ordering Information for additional detail.

## Recommended Voltage Derating Guidelines



## Reverse Voltage

Solid tantalum 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**

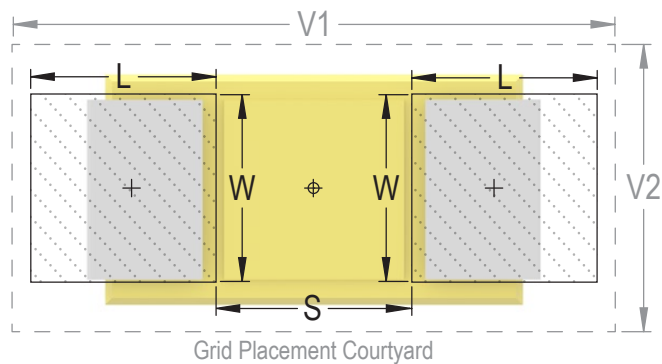
KEMET	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
	L	W	S	V1	V2	L	W	S	V1	V2	L	W	S	V1	V2
TSM2C	2.98	2.74	2.53	9.50	4.50	2.58	2.62	2.73	8.40	4.00	2.20	2.52	2.89	7.54	3.74
TSM2D	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
TSM2X	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
TSM3C	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
TSM3D	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
TSM3X	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
TSM4C	2.98	6.04	2.53	9.50	7.80	2.58	5.92	2.73	8.40	7.30	2.20	5.82	2.89	7.54	7.04
TSM4D	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
TSM4X	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
TSM6C	2.98	6.04	2.53	9.50	7.80	2.58	5.92	2.73	8.40	7.30	2.20	5.82	2.89	7.54	7.04
TSM6D	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
TSM6X	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

**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).

<sup>1</sup> 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.

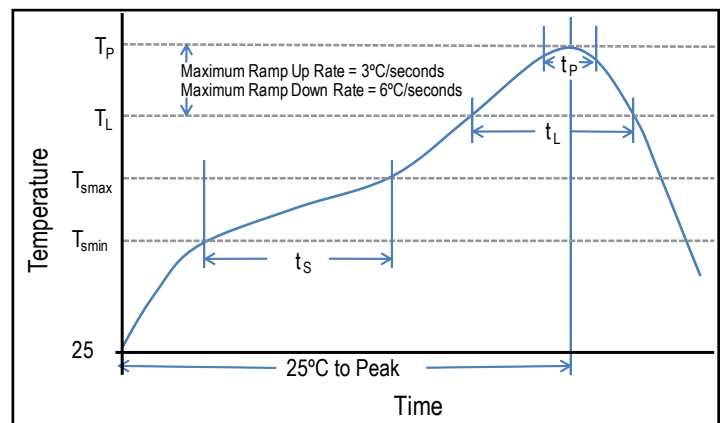
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

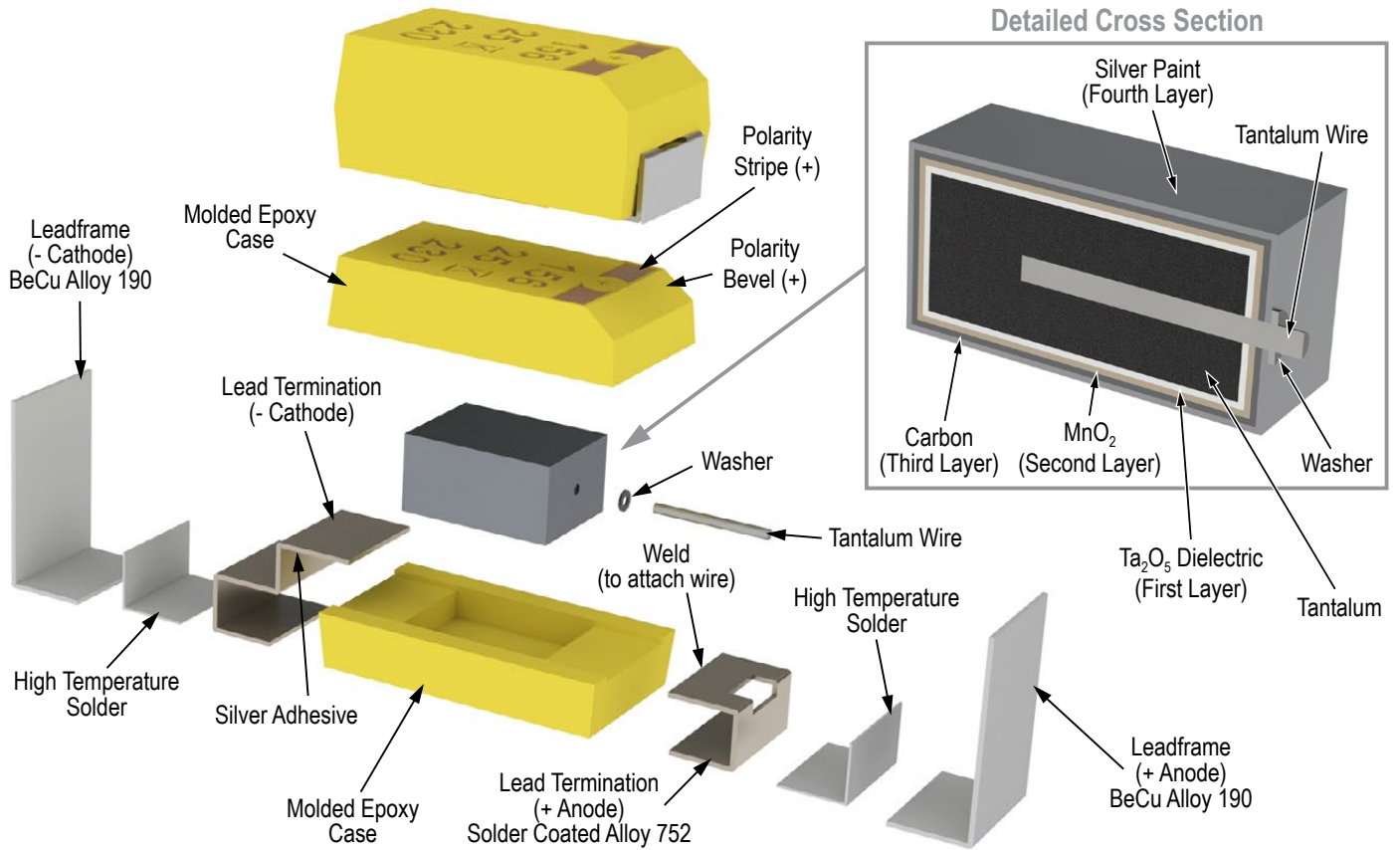
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



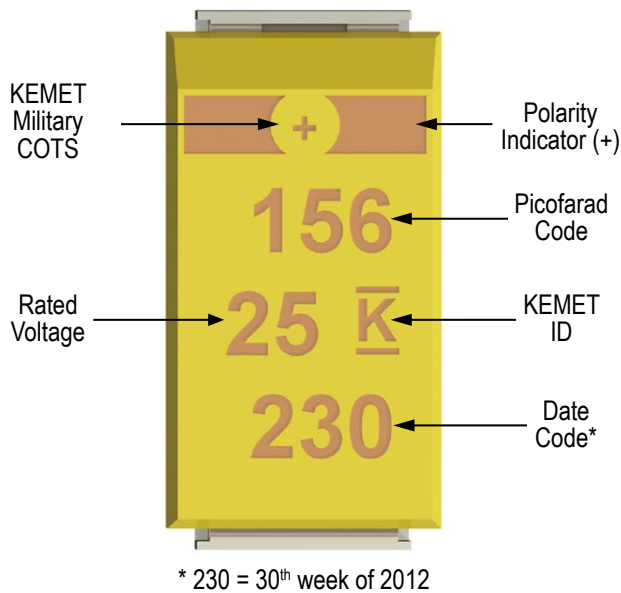
## Storage

Tantalum chip capacitors should be stored in normal working environments. While the chips 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 chip stock should be used promptly, preferably within three years of receipt.

## Construction



## Capacitor Marking



Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

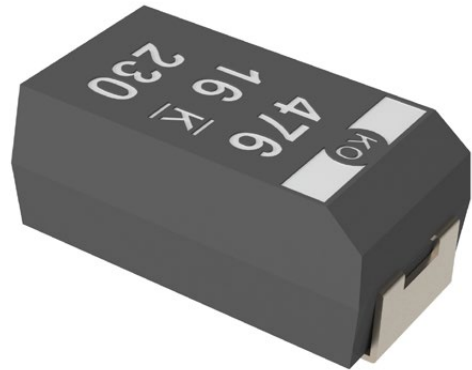
## Overview

The KEMET Organic Capacitor (KO-CAP) is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The KO-CAP also exhibits a benign failure mode which eliminates the ignition failures that can occur in standard MnO<sub>2</sub> tantalum types. KO-CAPs may also be operated at steady state voltages up to 90% of rated voltage for part types with rated voltages of ≤ 10 volts and up to 80% of rated voltage for part types > 10 volts with equivalent or better reliability than traditional MnO<sub>2</sub> tantalum capacitors operated at 50% of rated voltage.

The T520 Series KO-CAP Low ESR Polymer captures the best features of multilayer ceramic (low ESR, high frequency capacitance retention), aluminum electrolytic (higher capacitance, benign failure mode), and proven solid tantalum technology (volumetric efficiency, surface mount capability, extremely long life). The T520 can reduce component counts, eliminate through-hole assembly by replacing cumbersome leaded aluminum capacitors, and offer a cost-effective and space-saving solution.

## Benefits

- Extremely low ESR
- -55°C to 105°C operating temperature range
- Polymer cathode technology
- High frequency capacitance retention
- Non-ignition failure mode
- Capacitance up to 1,500 µF
- 100% accelerated steady state aging
- 100% surge current tested
- Taped and reeled per EIA 481
- Volumetric efficiency
- Self-healing mechanism
- EIA standard case sizes



## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Applications

Typical applications include DC/DC converters, notebook PCs, portable electronics, telecommunications (mobile phone and base station), displays, SSD, HDD and USB.

## Ordering Information

T	520	V	157	M	006	A	T	E045	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	ESR Code	Packaging (C-Spec)
T = Tantalum	520 = Polymer	A, B, C, D, H, L, M, Q, T, U, V, W, X, Y	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	2R5 = 2.5 V 003 = 3 V 004 = 4 V 006 = 6.3 V 008 = 8 V 010 = 10 V 011 = 11 V 12R = 12.5 V 016 = 16 V 020 = 20 V 025 = 25 V	A = N/A	T = 100% Matte Tin (Sn) Plated H = Tin/Lead (SnPb) Solder Coated (5% Pb minimum) N = Non-Magnetic 100% Tin (Sn) M = Non-Magnetic (SnPb)	E = ESR Last three digits specify ESR in mΩ. (045 = 45 mΩ)	Blank = 7" Reel 7280 = 13" Reel

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 105°C
Rated Capacitance Range	10 – 1,500 μF @ 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2.5 – 25 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

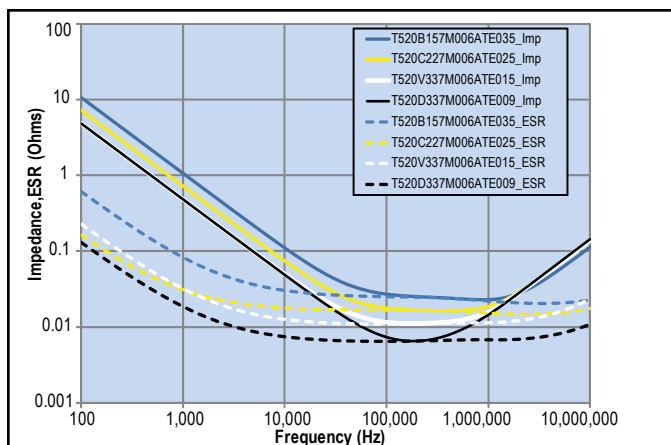
## Qualification

Test	Condition	Characteristics				
Endurance	105°C @ rated voltage, 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			
Storage Life	105°C @ 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, 500 hours, No Load	Δ C/C	Within -5%/+35% of initial value			
		DF	Within initial limits			
		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 +25°C, -55°C, +25°C, +85°C, +105°C, +25°C	Δ C/C	+25°C	-55°C	+85°C	+105°C
		DF	IL*	±20%	±20%	±30%
		DCL	IL	IL	1.2 x IL	1.5 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			

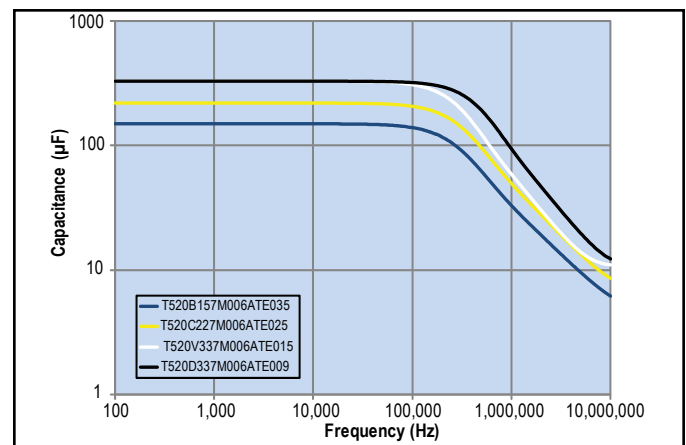
\*IL = Initial limit

## Electrical Characteristics

ESR vs. Frequency



Capacitance vs. Frequency

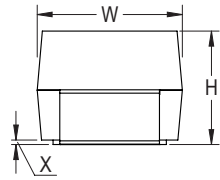




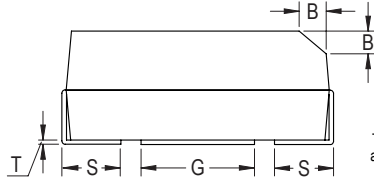
## Dimensions – Millimeters (Inches)

Metric will govern

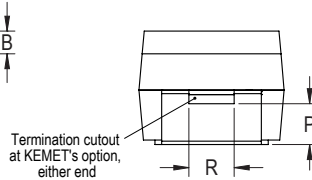
CATHODE (-) END VIEW



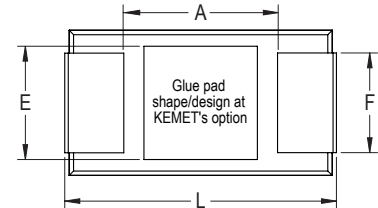
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component												
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)
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)	0.8 (0.31)	1.1 (0.043)	1.3 (0.051)
B	3528-21	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)	1.8 (0.071)	2.2 (0.087)
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)	2.5 (0.098)	2.8 (0.110)	2.4 (0.094)
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)
H	7360-20	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	2.0 (0.078) Maximum	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)	3.5 (0.138)	3.5 (0.138)
L	6032-19	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.2 (0.110 ±0.008)	1.9 (0.075)	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)	2.8 (0.110)	2.4 (0.094)
M	3528-15	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.5 (0.059)	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)	1.8 (0.071)	2.2 (0.087)
Q	7343-12	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.2 (0.047) Maximum	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)
T	3528-12	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.2 (0.047)	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)	1.8 (0.071)	2.2 (0.087)
U	6032-15	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.2 (0.110 ±0.008)	1.5 (0.059)	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)	2.8 (0.110)	2.4 (0.094)
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)
W	7343-15	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.5 (0.059)	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)
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)
Y	7343-40	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	4.0 (0.157)	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)

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions

**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
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
2	470	V/7343-19	T520V477M002A(1)E040	94	10	40	2200	3	105
2.5	47	A/3216-18	T520A476M2R5A(1)E090	12	8	90	1100	3	105
2.5	68	A/3216-18	T520A686M2R5A(1)E070	17	8	70	1300	3	105
2.5	68	A/3216-18	T520A686M2R5A(1)E080	17	8	80	1200	3	105
2.5	100	T/3528-12	T520T107M2R5A(1)E040	25	8	40	1600	3	105
2.5	100	T/3528-12	T520T107M2R5A(1)E070	25	8	70	1200	3	105
2.5	100	B/3528-21	T520B107M2R5A(1)E025	25	8	25	2300	3	105
2.5	100	B/3528-21	T520B107M2R5A(1)E035	25	8	35	1900	3	105
2.5	100	B/3528-21	T520B107M2R5A(1)E040	25	8	40	1800	3	105
2.5	100	B/3528-21	T520B107M2R5A(1)E070	25	8	70	1300	3	105
2.5	150	U/6032-15	T520U157M2R5A(1)E055	38	8	55	1600	3	105
2.5	220	B/3528-21	T520B227M2R5A(1)E015	55	8	15	2900	3	105
2.5	220	B/3528-21	T520B227M2R5A(1)E018	55	8	18	2700	3	105
2.5	220	B/3528-21	T520B227M2R5A(1)E021	55	8	21	2500	3	105
2.5	220	B/3528-21	T520B227M2R5A(1)E025	55	8	25	2300	3	105
2.5	220	B/3528-21	T520B227M2R5A(1)E030	55	8	30	2100	3	105
2.5	220	B/3528-21	T520B227M2R5A(1)E035	55	8	35	1900	3	105
2.5	220	B/3528-21	T520B227M2R5A(1)E055	55	8	55	1500	3	105
2.5	220	B/3528-21	T520B227M2R5A(1)E070	55	8	70	1300	3	105
2.5	220	<b>T/3528-12</b>	<b>T520T227M2R5A(1)E070</b>	<b>55</b>	<b>10</b>	<b>70</b>	<b>1225</b>	<b>3</b>	<b>105</b>
2.5	220	U/6032-15	T520U227M2R5A(1)E055	55	8	55	1600	3	105
2.5	220	C/6032-28	T520C227M2R5A(1)E025	55	8	25	2600	3	105
2.5	220	C/6032-28	T520C227M2R5A(1)E045	55	8	45	1900	3	105
2.5	220	W/7343-15	T520W227M2R5A(1)E025	55	10	25	2700	3	105
2.5	220	V/7343-19	T520V227M2R5A(1)E006	55	10	6	5600	3	105
2.5	220	V/7343-19	T520V227M2R5A(1)E007	55	10	7	5200	3	105
2.5	220	V/7343-19	T520V227M2R5A(1)E009	55	10	9	4600	3	105
2.5	220	V/7343-19	T520V227M2R5A(1)E012	55	10	12	3900	3	105
2.5	220	V/7343-19	T520V227M2R5A(1)E015	55	10	15	3500	3	105
2.5	220	V/7343-19	T520V227M2R5A(1)E025	55	10	25	2700	3	105
2.5	220	V/7343-19	T520V227M2R5A(1)E045	55	10	45	2000	3	105
2.5	220	D/7343-31	T520D227M2R5A(1)E007	55	10	7	5700	3	105
2.5	220	D/7343-31	T520D227M2R5A(1)E040	55	10	40	2400	3	105
2.5	<b>330</b>	<b>B/3528-21</b>	<b>T520B337M2R5A(1)E009</b>	<b>83</b>	<b>8</b>	<b>9</b>	<b>3073</b>	<b>3</b>	<b>105</b>
2.5	<b>330</b>	<b>B/3528-21</b>	<b>T520B337M2R5A(1)E012</b>	<b>83</b>	<b>8</b>	<b>12</b>	<b>2700</b>	<b>3</b>	<b>105</b>
2.5	330	B/3528-21	T520B337M2R5A(1)E015	83	8	15	2900	3	105
2.5	330	B/3528-21	T520B337M2R5A(1)E018	83	8	18	2700	3	105
2.5	330	B/3528-21	T520B337M2R5A(1)E035	83	8	35	1900	3	105
2.5	330	B/3528-21	T520B337M2R5A(1)E045	83	8	45	1700	3	105
2.5	330	B/3528-21	T520B337M2R5A(1)E070	83	8	70	1300	3	105
2.5	330	C/6032-28	T520C337M2R5A(1)E015	83	8	15	3300	3	105
2.5	330	C/6032-28	T520C337M2R5A(1)E018	83	8	18	3000	3	105
2.5	330	C/6032-28	T520C337M2R5A(1)E025	83	8	25	2600	3	105
2.5	330	C/6032-28	T520C337M2R5A(1)E045	83	8	45	1900	3	105
2.5	330	L/6032-19	T520L337M2R5A(1)E009	83	8	9	4100	3	105
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin.

Refer to Ordering Information for additional detail. (Sn), M = Non-Magnetic (SnPb)

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.

**Blue color text denotes "Under Development"**

**Bold text denotes black epoxy product**

\* Part numbers with an asterisk are not recommended for new designs. Please use the T521 version of these part numbers.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
2.5	330	L/6032-19	T520L337M2R5A(1)E012	83	8	12	3500	3	105
2.5	330	L/6032-19	T520L337M2R5A(1)E025	83	8	25	2400	3	105
2.5	330	W/7343-15	T520W337M2R5A(1)E015	83	10	15	3500	3	105
2.5	330	W/7343-15	T520W337M2R5A(1)E025	83	10	25	2700	3	105
2.5	330	W/7343-15	T520W337M2R5A(1)E040	83	10	40	2100	3	105
2.5	330	V/7343-19	T520V337M2R5A(1)E006	83	10	6	5600	3	105
2.5	330	V/7343-19	T520V337M2R5A(1)E007	83	10	7	5200	3	105
2.5	330	V/7343-19	T520V337M2R5A(1)E009	83	10	9	4600	3	105
2.5	330	V/7343-19	T520V337M2R5A(1)E012	83	10	12	3900	3	105
2.5	330	V/7343-19	T520V337M2R5A(1)E015	83	10	15	3500	3	105
2.5	330	V/7343-19	T520V337M2R5A(1)E018	83	10	18	3200	3	105
2.5	330	V/7343-19	T520V337M2R5A(1)E025	83	10	25	2700	3	105
2.5	330	V/7343-19	T520V337M2R5A(1)E040	83	10	40	2200	3	105
2.5	330	D/7343-31	T520D337M2R5A(1)E006	83	10	6	6100	3	105
2.5	330	D/7343-31	T520D337M2R5A(1)E007	83	10	7	5700	3	105
2.5	470	V/7343-19	T520V477M2R5A(1)E006	118	10	6	5600	3	105
2.5	470	V/7343-19	T520V477M2R5A(1)E007	118	10	7	5200	3	105
2.5	470	V/7343-19	T520V477M2R5A(1)E009	118	10	9	4600	3	105
2.5	470	V/7343-19	T520V477M2R5A(1)E012	118	10	12	3900	3	105
2.5	470	V/7343-19	T520V477M2R5A(1)E015	118	10	15	3500	3	105
2.5	470	V/7343-19	T520V477M2R5A(1)E018	118	10	18	3200	3	105
2.5	470	C/6032-28	T520C477M2R5A(1)E025	118	8	25	2600	3	105
2.5	470	C/6032-28	T520C477M2R5A(1)E045	118	8	45	1900	3	105
2.5	470	D/7343-31	T520D477M2R5A(1)E006	118	10	6	6100	3	105
2.5	470	D/7343-31	T520D477M2R5A(1)E007	118	10	7	5700	3	105
2.5	470	D/7343-31	T520D477M2R5A(1)E009	118	10	9	5000	3	105
2.5	680	D/7343-31	T520D687M2R5A(1)E010	170	10	10	4700	3	105
2.5	680	D/7343-31	T520D687M2R5A(1)E015	170	10	15	3900	3	105
2.5	680	D/7343-31	T520D687M2R5A(1)E040	170	10	40	2400	3	105
2.5	680	Y/7343-40	T520Y687M2R5A(1)E025	170	10	25	3100	3	105
2.5	1000	D/7343-31	T520D108M2R5A(1)E007	250	10	7	5700	3	105
2.5	1000	D/7343-31	T520D108M2R5A(1)E009	250	10	9	5000	3	105
2.5	1000	D/7343-31	T520D108M2R5A(1)E010	250	10	10	4700	3	105
2.5	1000	D/7343-31	T520D108M2R5A(1)E015	250	10	15	3900	3	105
2.5	1000	D/7343-31	T520D108M2R5A(1)E030	250	10	30	2700	3	105
2.5	1000	Y/7343-40	T520Y108M2R5A(1)E010	250	10	10	4900	3	105
2.5	1000	Y/7343-40	T520Y108M2R5A(1)E015	250	10	15	4000	3	105
2.5	1000	Y/7343-40	T520Y108M2R5A(1)E025	250	10	25	3100	3	105
2.5	1000	X/7343-43	T520X108M2R5A(1)E010	250	10	10	5000	3	105
3	100	B/3528-21	T520B107M003A(1)E025	30	8	25	2300	3	105
3	100	B/3528-21	T520B107M003A(1)E035	30	8	35	1900	3	105
3	100	B/3528-21	T520B107M003A(1)E040	30	8	40	1800	3	105
3	100	B/3528-21	T520B107M003A(1)E070	30	8	70	1300	3	105
3	150	B/3528-21	T520B157M003A(1)E025	45	8	25	2300	3	105
3	150	B/3528-21	T520B157M003A(1)E035	45	8	35	1900	3	105
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin.

Refer to Ordering Information for additional detail. (Sn), M = Non-Magnetic (SnPb)

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.

**Blue color text denotes "Under Development"**

**Bold text denotes black epoxy product**

\* Part numbers with an asterisk are not recommended for new designs. Please use the T521 version of these part numbers.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
3	150	B/3528-21	T520B157M003A(1)E040	45	8	40	1800	3	105
3	150	B/3528-21	T520B157M003A(1)E070	45	8	70	1300	3	105
3	330	V/7343-19	T520V337M003A(1)E009	99	10	9	4600	3	105
3	330	V/7343-19	T520V337M003A(1)E012	99	10	12	3900	3	105
3	330	V/7343-19	T520V337M003A(1)E015	99	10	15	3500	3	105
3	330	V/7343-19	T520V337M003A(1)E025	99	10	25	2700	3	105
3	680	D/7343-31	T520D687M003A(1)E015	204	10	15	3900	3	105
3	680	D/7343-31	T520D687M003A(1)E040	204	10	40	2400	3	105
3	1000	X/7343-43	T520X108M003A(1)E015	300	10	15	4100	3	105
3	1000	X/7343-43	T520X108M003A(1)E030	300	10	30	2900	3	105
4	15	T/3528-12	T520T156M004A(1)E100	6	8	100	1000	3	105
4	33	A/3216-18	T520A336M004A(1)E070	13	8	70	1300	3	105
4	33	A/3216-18	T520A336M004A(1)E080	13	8	80	1200	3	105
4	47	A/3216-18	T520A476M004A(1)E070	19	8	70	1300	3	105
4	47	A/3216-18	T520A476M004A(1)E080	19	8	80	1200	3	105
4	47	T/3528-12	T520T476M004A(1)E070	19	8	70	1200	3	105
4	68	T/3528-12	T520T686M004A(1)E070	27	8	70	1200	3	105
4	68	B/3528-21	T520B686M004A(1)E025	27	8	25	2300	3	105
4	68	B/3528-21	T520B686M004A(1)E035	27	8	35	1900	3	105
4	68	B/3528-21	T520B686M004A(1)E040	27	8	40	1800	3	105
4	68	B/3528-21	T520B686M004A(1)E070	27	8	70	1300	3	105
4	68	U/6032-15	T520U686M004A(1)E055	27	8	55	1600	3	105
4	100	A/3216-18	T520A107M004A(1)E150	40	8	150	900	3	105
4	100	A/3216-18	T520A107M004A(1)E200	40	8	200	700	3	105
4	100	T/3528-12	T520T107M004A(1)E070	40	8	70	1200	3	105
4	100	T/3528-12	T520T107M004A(1)E150	40	8	150	800	3	105
4	100	B/3528-21	T520B107M004A(1)E025	40	8	25	2300	3	105
4	100	B/3528-21	T520B107M004A(1)E035	40	8	35	1900	3	105
4	100	B/3528-21	T520B107M004A(1)E040	40	8	40	1800	3	105
4	100	B/3528-21	T520B107M004A(1)E070	40	8	70	1300	3	105
4	100	U/6032-15	T520U107M004A(1)E055	40	8	55	1600	3	105
4	150	B/3528-21	T520B157M004A(1)E015	60	8	15	2900	3	105
4	150	B/3528-21	T520B157M004A(1)E018	60	8	18	2700	3	105
4	150	B/3528-21	T520B157M004A(1)E025	60	8	25	2300	3	105
4	150	B/3528-21	T520B157M004A(1)E030	60	8	30	2100	3	105
4	150	B/3528-21	T520B157M004A(1)E035	60	8	35	1900	3	105
4	150	B/3528-21	T520B157M004A(1)E040	60	8	40	1800	3	105
4	150	B/3528-21	T520B157M004A(1)E070	60	8	70	1300	3	105
4	150	U/6032-15	T520U157M004A(1)E055	60	8	55	1600	3	105
4	150	C/6032-28	T520C157M004A(1)E015	60	8	15	3300	3	105
4	150	C/6032-28	T520C157M004A(1)E025	60	8	25	2600	3	105
4	150	C/6032-28	T520C157M004A(1)E045	60	8	45	1900	3	105
4	150	C/6032-28	T520C157M004A(1)E100	60	8	100	1300	3	105
4	150	V/7343-19	T520V157M004A(1)E007	60	10	7	5200	3	105
4	150	V/7343-19	T520V157M004A(1)E009	60	10	9	4600	3	105
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin.

Refer to Ordering Information for additional detail. (Sn), M = Non-Magnetic (SnPb)

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.

**Blue color text denotes "Under Development"**

**Bold text denotes black epoxy product**

\* Part numbers with an asterisk are not recommended for new designs. Please use the T521 version of these part numbers.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
4	150	V/7343-19	T520V157M004A(1)E012	60	10	12	3900	3	105
4	150	V/7343-19	T520V157M004A(1)E015	60	10	15	3500	3	105
4	150	V/7343-19	T520V157M004A(1)E025	60	10	25	2700	3	105
4	150	D/7343-31	T520D157M004A(1)E007	60	10	7	5700	3	105
4	220	B/3528-21	T520B227M004A(1)E035	88	8	35	1900	3	105
4	220	B/3528-21	T520B227M004A(1)E045	88	8	45	1700	3	105
4	220	B/3528-21	T520B227M004A(1)E070	88	8	70	1300	3	105
4	220	C/6032-28	T520C227M004A(1)E015	88	8	15	3300	3	105
4	220	C/6032-28	T520C227M004A(1)E018	88	8	18	3000	3	105
4	220	C/6032-28	T520C227M004A(1)E025	88	8	25	2600	3	105
4	220	C/6032-28	T520C227M004A(1)E045	88	8	45	1900	3	105
4	220	C/6032-28	T520C227M004A(1)E055	88	8	55	1700	3	105
4	220	L/6032-19	T520L227M004A(1)E012	88	8	12	3500	3	105
4	220	L/6032-19	T520L227M004A(1)E025	88	8	25	2400	3	105
4	220	W/7343-15	T520W227M004A(1)E025	88	10	25	2700	3	105
4	220	W/7343-15	T520W227M004A(1)E040	88	10	40	2100	3	105
4	220	V/7343-19	T520V227M004A(1)E006	88	10	6	5600	3	105
4	220	V/7343-19	T520V227M004A(1)E007	88	10	7	5200	3	105
4	220	V/7343-19	T520V227M004A(1)E009	88	10	9	4600	3	105
4	220	V/7343-19	T520V227M004A(1)E012	88	10	12	3900	3	105
4	220	V/7343-19	T520V227M004A(1)E015	88	10	15	3500	3	105
4	220	V/7343-19	T520V227M004A(1)E018	88	10	18	3200	3	105
4	220	V/7343-19	T520V227M004A(1)E025	88	10	25	2700	3	105
4	220	V/7343-19	T520V227M004A(1)E040	88	10	40	2200	3	105
4	220	V/7343-19	T520V227M004A(1)E045	88	10	45	2000	3	105
4	220	D/7343-31	T520D227M004A(1)E006	88	10	6	6100	3	105
4	220	D/7343-31	T520D227M004A(1)E007	88	10	7	5700	3	105
4	220	D/7343-31	T520D227M004A(1)E012	88	10	12	4300	3	105
4	220	D/7343-31	T520D227M004A(1)E065	88	10	65	1900	3	105
4	330	C/6032-28	T520C337M004A(1)E025	132	8	25	2600	3	105
4	330	C/6032-28	T520C337M004A(1)E045	132	8	45	1900	3	105
4	330	V/7343-19	T520V337M004A(1)E007	132	10	7	5200	3	105
4	330	V/7343-19	T520V337M004A(1)E009	132	10	9	4600	3	105
4	330	V/7343-19	T520V337M004A(1)E012	132	10	12	3900	3	105
4	330	V/7343-19	T520V337M004A(1)E018	132	10	18	3200	3	105
4	330	V/7343-19	T520V337M004A(1)E025	132	10	25	2700	3	105
4	330	V/7343-19	T520V337M004A(1)E040	132	10	40	2200	3	105
4	330	D/7343-31	T520D337M004A(1)E006	132	10	6	6100	3	105
4	330	D/7343-31	T520D337M004A(1)E007	132	10	7	5700	3	105
4	330	D/7343-31	T520D337M004A(1)E009	132	10	9	5000	3	105
4	330	D/7343-31	T520D337M004A(1)E012	132	10	12	4300	3	105
4	330	D/7343-31	T520D337M004A(1)E015	132	10	15	3900	3	105
4	330	D/7343-31	T520D337M004A(1)E040	132	10	40	2400	3	105
4	330	D/7343-31	T520D337M004A(1)E045	132	10	45	2200	3	105
4	470	D/7343-31	T520D477M004A(1)E010	188	10	10	4700	3	105
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin.

Refer to Ordering Information for additional detail. (Sn), M = Non-Magnetic (SnPb)

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.

**Blue color text denotes "Under Development"**

**Bold text denotes black epoxy product**

\* Part numbers with an asterisk are not recommended for new designs. Please use the T521 version of these part numbers.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
4	470	D/7343-31	T520D477M004A(1)E012	188	10	12	4300	3	105
4	470	D/7343-31	T520D477M004A(1)E015	188	10	15	3900	3	105
4	470	D/7343-31	T520D477M004A(1)E018	188	10	18	3500	3	105
4	470	D/7343-31	T520D477M004A(1)E025	188	10	25	3000	3	105
4	470	D/7343-31	T520D477M004A(1)E040	188	10	40	2400	3	105
4	680	D/7343-31	T520D687M004A(1)E012	272	10	12	4300	3	105
4	680	D/7343-31	T520D687M004A(1)E015	272	10	15	3900	3	105
4	680	D/7343-31	T520D687M004A(1)E025	272	10	25	3000	3	105
4	680	Y/7343-40	T520Y687M004A(1)E010	272	10	10	4900	3	105
4	680	Y/7343-40	T520Y687M004A(1)E015	272	10	15	4000	3	105
4	680	Y/7343-40	T520Y687M004A(1)E025	272	10	25	3100	3	105
4	680	X/7343-43	T520X687M004A(1)E010	272	10	10	5000	3	105
4	680	X/7343-43	T520X687M004A(1)E015	272	10	15	4100	3	105
4	680	X/7343-43	T520X687M004A(1)E035	272	10	35	2700	3	105
6.3	15	T/3528-12	T520T156M006A(1)E100	9	8	100	1000	3	105
6.3	22	A/3216-18	T520A226M006A(1)E090	14	8	90	1100	3	105
6.3	22	A/3216-18	T520A226M006A(1)E100	14	8	100	1100	3	105
6.3	22	T/3528-12	T520T226M006A(1)E100	14	8	100	1000	3	105
6.3	33	A/3216-18	T520A336M006A(1)E070	21	8	70	1300	3	105
6.3	33	A/3216-18	T520A336M006A(1)E080	21	8	80	1200	3	105
6.3	33	A/3216-18	T520A336M006A(1)E120	21	8	120	1000	3	105
6.3	33	T/3528-12	T520T336M006A(1)E070	21	8	70	1200	3	105
6.3	33	B/3528-21	T520B336M006A(1)E025	21	8	25	2300	3	105
6.3	33	B/3528-21	T520B336M006A(1)E035	21	8	35	1900	3	105
6.3	33	B/3528-21	T520B336M006A(1)E040	21	8	40	1800	3	105
6.3	33	B/3528-21	T520B336M006A(1)E070	21	8	70	1300	3	105
6.3	33	C/6032-28	T520C336M006A(1)E100	21	8	100	1300	3	105
6.3	47	A/3216-18	T520A476M006A(1)E150	30	8	150	900	3	105
6.3	47	T/3528-12	T520T476M006A(1)E040	30	8	40	1600	3	105
6.3	47	T/3528-12	T520T476M006A(1)E070	30	8	70	1200	3	105
6.3	47	B/3528-21	T520B476M006A(1)E025	30	8	25	2300	3	105
6.3	47	B/3528-21	T520B476M006A(1)E035	30	8	35	1900	3	105
6.3	47	B/3528-21	T520B476M006A(1)E040	30	8	40	1800	3	105
6.3	47	B/3528-21	T520B476M006A(1)E070	30	8	70	1300	3	105
6.3	68	A/3216-18	T520A686M006A(1)E150	43	8	150	900	3	105
6.3	68	T/3528-12	T520T686M006A(1)E070	43	8	70	1200	3	105
6.3	68	T/3528-12	T520T686M006A(1)E150	43	8	150	800	3	105
6.3	68	B/3528-21	T520B686M006A(1)E025	43	8	25	2300	3	105
6.3	68	B/3528-21	T520B686M006A(1)E035	43	8	35	1900	3	105
6.3	68	B/3528-21	T520B686M006A(1)E040	43	8	40	1800	3	105
6.3	68	B/3528-21	T520B686M006A(1)E070	43	8	70	1300	3	105
6.3	68	U/6032-15	T520U686M006A(1)E055	43	8	55	1600	3	105
6.3	68	U/6032-15	T520U686M006A(1)E070	43	8	70	1400	3	105
6.3	68	C/6032-28	T520C686M006A(1)E100	43	8	100	1300	3	105
6.3	100	A/3216-18	T520A107M006ATE070	63	8	70	1035	3	105
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin.

Refer to Ordering Information for additional detail. (Sn), M = Non-Magnetic (SnPb)

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.

**Blue color text denotes "Under Development"**

**Bold text denotes black epoxy product**

\* Part numbers with an asterisk are not recommended for new designs. Please use the T521 version of these part numbers.



Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
6.3	100	T/3528-12	T520T107M006A(1)E070	63	8	70	1200	3	105
6.3	100	B/3528-21	T520B107M006A(1)E015	63	8	15	2900	3	105
6.3	100	B/3528-21	T520B107M006A(1)E018	63	8	18	2700	3	105
6.3	100	B/3528-21	T520B107M006A(1)E025	63	8	25	2300	3	105
6.3	100	B/3528-21	T520B107M006A(1)E035	63	8	35	1900	3	105
6.3	100	B/3528-21	T520B107M006A(1)E040	63	8	40	1800	3	105
6.3	100	B/3528-21	T520B107M006A(1)E045	63	8	45	1700	3	105
6.3	100	B/3528-21	T520B107M006A(1)E070	63	8	70	1300	3	105
6.3	100	U/6032-15	T520U107M006A(1)E055	63	8	55	1600	3	105
6.3	100	W/7343-15	T520W107M006A(1)E040	63	10	40	2100	3	105
6.3	100	V/7343-19	T520V107M006A(1)E009	63	10	9	4600	3	105
6.3	100	V/7343-19	T520V107M006A(1)E012	63	10	12	3900	3	105
6.3	100	V/7343-19	T520V107M006A(1)E015	63	10	15	3500	3	105
6.3	100	V/7343-19	T520V107M006A(1)E045	63	10	45	2000	3	105
6.3	100	C/6032-28	T520C107M006A(1)E025	63	8	25	2600	3	105
6.3	100	C/6032-28	T520C107M006A(1)E045	63	8	45	1900	3	105
6.3	120	B/3528-21	T520B127M006A(1)E035	76	8	35	1900	3	105
6.3	150	M/3528-15	T520M157M006A(1)E035	95	8	35	1900	3	105
6.3	150	M/3528-15	T520M157M006A(1)E070	95	8	70	1300	3	105
6.3	150	M/3528-15	T520M157M006A(1)E150	95	8	150	900	3	105
6.3	150	M/3528-15	T520M157M006A(1)E200	95	8	200	800	3	105
6.3	150	B/3528-21	T520B157M006A(1)E025	95	8	25	2300	3	105
6.3	150	B/3528-21	T520B157M006A(1)E035	95	8	35	1900	3	105
6.3	150	B/3528-21	T520B157M006A(1)E045	95	8	45	1700	3	105
6.3	150	B/3528-21	T520B157M006A(1)E070	95	8	70	1300	3	105
6.3	150	C/6032-28	T520C157M006A(1)E015	95	8	15	3300	3	105
6.3	150	C/6032-28	T520C157M006A(1)E025	95	8	25	2600	3	105
6.3	150	C/6032-28	T520C157M006A(1)E045	95	8	45	1900	3	105
6.3	150	C/6032-28	T520C157M006A(1)E055	95	8	55	1700	3	105
6.3	150	U/6032-15	T520U157M006A(1)E045	95	8	45	1700	3	105
6.3	150	U/6032-15	T520U157M006A(1)E055	95	8	55	1600	3	105
6.3	150	L/6032-19	T520L157M006A(1)E012	95	8	12	3500	3	105
6.3	150	L/6032-19	T520L157M006A(1)E025	95	8	25	2400	3	105
6.3	150	W/7343-15	T520W157M006A(1)E025	95	10	25	2700	3	105
6.3	150	W/7343-15	T520W157M006A(1)E040	95	10	40	2100	3	105
6.3	150	V/7343-19	T520V157M006A(1)E006	95	10	6	5600	3	105
6.3	150	V/7343-19	T520V157M006A(1)E007	95	10	7	5200	3	105
6.3	150	V/7343-19	T520V157M006A(1)E009	95	10	9	4600	3	105
6.3	150	V/7343-19	T520V157M006A(1)E012	95	10	12	3900	3	105
6.3	150	V/7343-19	T520V157M006A(1)E015	95	10	15	3500	3	105
6.3	150	V/7343-19	T520V157M006A(1)E018	95	10	18	3200	3	105
6.3	150	V/7343-19	T520V157M006A(1)E025	95	10	25	2700	3	105
6.3	150	V/7343-19	T520V157M006A(1)E040	95	10	40	2200	3	105
6.3	150	V/7343-19	T520V157M006A(1)E045	95	10	45	2000	3	105
6.3	150	D/7343-31	T520D157M006A(1)E006	95	10	6	6100	3	105
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin.

Refer to Ordering Information for additional detail. (Sn), M = Non-Magnetic (SnPb)

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.

**Blue color text denotes "Under Development"**

**Bold text denotes black epoxy product**

\* Part numbers with an asterisk are not recommended for new designs. Please use the T521 version of these part numbers.



Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
6.3	150	D/7343-31	T520D157M006A(1)E007	95	10	7	5700	3	105
6.3	150	D/7343-31	T520D157M006A(1)E015	95	10	15	3900	3	105
6.3	150	D/7343-31	T520D157M006A(1)E025	95	10	25	3000	3	105
6.3	150	D/7343-31	T520D157M006A(1)E055	95	10	55	2000	3	105
6.3	220	B/3528-21	T520B227M006A(1)E025	139	8	25	2300	3	105
6.3	220	B/3528-21	T520B227M006A(1)E035	139	8	35	1900	3	105
6.3	220	B/3528-21	T520B227M006A(1)E045	139	8	45	1700	3	105
6.3	220	B/3528-21	T520B227M006A(1)E070	139	8	70	1300	3	105
6.3	220	C/6032-28	T520C227M006A(1)E015	139	8	15	3300	3	105
6.3	220	C/6032-28	T520C227M006A(1)E018	139	8	18	3000	3	105
6.3	220	C/6032-28	T520C227M006A(1)E025	139	8	25	2600	3	105
6.3	220	C/6032-28	T520C227M006A(1)E045	139	8	45	1900	3	105
6.3	220	V/7343-19	T520V227M006A(1)E007	139	10	7	5200	3	105
6.3	220	V/7343-19	T520V227M006A(1)E009	139	10	9	4600	3	105
6.3	220	V/7343-19	T520V227M006A(1)E012	139	10	12	3900	3	105
6.3	220	V/7343-19	T520V227M006A(1)E015	139	10	15	3500	3	105
6.3	220	V/7343-19	T520V227M006A(1)E018	139	10	18	3200	3	105
6.3	220	V/7343-19	T520V227M006A(1)E025	139	10	25	2700	3	105
6.3	220	V/7343-19	T520V227M006A(1)E040	139	10	40	2200	3	105
6.3	220	D/7343-31	T520D227M006A(1)E006	139	10	6	6100	3	105
6.3	220	D/7343-31	T520D227M006A(1)E007	139	10	7	5700	3	105
6.3	220	D/7343-31	T520D227M006A(1)E009	139	10	9	5000	3	105
6.3	220	D/7343-31	T520D227M006A(1)E015	139	10	15	3900	3	105
6.3	220	D/7343-31	T520D227M006A(1)E018	139	10	18	3500	3	105
6.3	220	D/7343-31	T520D227M006A(1)E025	139	10	25	3000	3	105
6.3	220	D/7343-31	T520D227M006A(1)E040	139	10	40	2400	3	105
6.3	220	D/7343-31	T520D227M006A(1)E050	139	10	50	2100	3	105
6.3	330	V/7343-19	T520V337M006A(1)E015	208	10	15	3500	3	105
6.3	330	V/7343-19	T520V337M006A(1)E018	208	10	18	3200	3	105
6.3	330	V/7343-19	T520V337M006A(1)E025	208	10	25	2700	3	105
6.3	330	V/7343-19	T520V337M006A(1)E040	208	10	40	2200	3	105
6.3	330	V/7343-19	T520V337M006A(1)E045	208	10	45	2000	3	105
6.3	330	D/7343-31	T520D337M006A(1)E009	208	10	9	5000	3	105
6.3	330	D/7343-31	T520D337M006A(1)E010	208	10	10	4700	3	105
6.3	330	D/7343-31	T520D337M006A(1)E015	208	10	15	3900	3	105
6.3	330	D/7343-31	T520D337M006A(1)E018	208	10	18	3500	3	105
6.3	330	D/7343-31	T520D337M006A(1)E025	208	10	25	3000	3	105
6.3	330	D/7343-31	T520D337M006A(1)E040	208	10	40	2400	3	105
6.3	330	D/7343-31	T520D337M006A(1)E045	208	10	45	2200	3	105
6.3	330	Y/7343-40	T520Y337M006A(1)E010	208	10	10	4900	3	105
6.3	330	Y/7343-40	T520Y337M006A(1)E015	208	10	15	4000	3	105
6.3	330	Y/7343-40	T520Y337M006A(1)E025	208	10	25	3100	3	105
6.3	330	Y/7343-40	T520Y337M006A(1)E040	208	10	40	2500	3	105
6.3	470	W/7343-15	T520W477M006A(1)E055	296	10	55	1800	3	85
6.3	470	W/7343-15	T520W477M006A(1)E035	296	9	35	2300	3	85
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin.

Refer to Ordering Information for additional detail. (Sn), M = Non-Magnetic (SnPb)

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.

**Blue color text denotes "Under Development"**

**Bold text denotes black epoxy product**

\* Part numbers with an asterisk are not recommended for new designs. Please use the T521 version of these part numbers.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
6.3	470	V/7343-19	T520V477M006A(1)E055	296	10	55	1800	3	105
6.3	470	V/7343-19	T520V477M006A(1)E035	296	10	35	2300	3	105
6.3	470	Y/7343-40	T520Y477M006A(1)E010	296	10	10	4900	3	105
6.3	470	Y/7343-40	T520Y477M006A(1)E015	296	10	15	4000	3	105
6.3	470	Y/7343-40	T520Y477M006A(1)E018	296	10	18	3700	3	105
6.3	470	Y/7343-40	T520Y477M006A(1)E025	296	10	25	3100	3	105
6.3	470	Y/7343-40	T520Y477M006A(1)E035	296	10	35	2600	3	105
6.3	470	D/7343-31	T520D477M006A(1)E015	296	10	15	3900	3	105
6.3	470	D/7343-31	T520D477M006A(1)E025	296	10	25	3000	3	105
6.3	470	D/7343-31	T520D477M006A(1)E030	296	10	30	2700	3	105
6.3	470	X/7343-43	T520X477M006A(1)E010	296	10	10	5000	3	105
6.3	470	X/7343-43	T520X477M006A(1)E018	296	10	18	3700	3	105
6.3	470	X/7343-43	T520X477M006A(1)E035	296	10	35	2700	3	105
6.3	470	X/7343-43	T520X477M006A(1)E040	296	10	40	2500	3	105
6.3	680	X/7343-43	T520X687M006A(1)E025	428	10	25	3100	3	105
6.3	1000	H/7260-20	T520H108M006A(1)E055	630	20	55	1800	3	85
6.3	1500	H/7260-20	T520H158M006A(1)E055	945	20	55	1800	3	85
8	22	T/3528-12	T520T226M008A(1)E070	18	8	70	1200	3	105
8	33	T/3528-12	T520T336M008A(1)E070	26	8	70	1200	3	105
8	33	T/3528-12	T520T336M008A(1)E080	26	8	80	1100	3	105
8	33	B/3528-21	T520B336M008A(1)E025	26	8	25	2300	3	105
8	33	B/3528-21	T520B336M008A(1)E035	26	8	35	1900	3	105
8	33	B/3528-21	T520B336M008A(1)E040	26	8	40	1800	3	105
8	33	B/3528-21	T520B336M008A(1)E070	26	8	70	1300	3	105
8	33	U/6032-15	T520U336M008A(1)E070	26	8	70	1400	3	105
8	47	B/3528-21	T520B476M008A(1)E035	38	8	35	1900	3	105
8	47	B/3528-21	T520B476M008A(1)E070	38	8	70	1300	3	105
8	82	C/6032-28	T520C826M008A(1)E025	66	8	25	2600	3	105
8	82	C/6032-28	T520C826M008A(1)E045	66	8	45	1900	3	105
8	150	D/7343-31	T520D157M008A(1)E025	120	10	25	3000	3	105
8	150	D/7343-31	T520D157M008A(1)E040	120	10	40	2400	3	105
8	150	D/7343-31	T520D157M008A(1)E055	120	10	55	2000	3	105
8	150	V/7343-19	T520V157M008A(1)E040	120	10	40	2200	3	105
10	10	A/3216-18	T520A106M010A(1)E080	10	8	80	1200	3	105
10	15	A/3216-18	T520A156M010A(1)E080	15	8	80	1200	3	105
10	22	A/3216-18	T520A226M010A(1)E080	22	8	80	1200	3	105
10	33	T/3528-12	T520T336M010A(1)E040	33	8	40	1600	3	105
10	33	T/3528-12	T520T336M010A(1)E070	33	8	70	1200	3	105
10	33	T/3528-12	T520T336M010A(1)E080	33	8	80	1100	3	105
10	33	B/3528-21	T520B336M010A(1)E025	33	8	25	2300	3	105
10	33	B/3528-21	T520B336M010A(1)E035	33	8	35	1900	3	105
10	33	B/3528-21	T520B336M010A(1)E040	33	8	40	1800	3	105
10	33	B/3528-21	T520B336M010A(1)E070	33	8	70	1300	3	105
10	33	U/6032-15	T520U336M010A(1)E070	33	8	70	1400	3	105
10	47	B/3528-21	T520B476M010A(1)E035	47	8	35	1900	3	105
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin.

Refer to Ordering Information for additional detail. (Sn), M = Non-Magnetic (SnPb)

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.

**Blue color text denotes "Under Development"**

**Bold text denotes black epoxy product**

\* Part numbers with an asterisk are not recommended for new designs. Please use the T521 version of these part numbers.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
10	47	B/3528-21	T520B476M010A(1)E070	47	8	70	1300	3	105
10	47	U/6032-15	T520U476M010A(1)E055	47	8	55	1600	3	105
10	47	C/6032-28	T520C476M010A(1)E100	47	8	100	1300	3	105
10	68	U/6032-15	T520U686M010A(1)E055	68	8	55	1600	3	105
10	68	W/7343-15	T520W686M010A(1)E025	68	10	25	2700	3	105
10	68	W/7343-15	T520W686M010A(1)E040	68	10	40	2100	3	105
10	68	C/6032-28	T520C686M010A(1)E045	68	8	45	1900	3	105
10	68	V/7343-19	T520V686M010A(1)E025	68	10	25	2700	3	105
10	68	V/7343-19	T520V686M010A(1)E040	68	10	40	2200	3	105
10	68	V/7343-19	T520V686M010A(1)E045	68	10	45	2000	3	105
10	68	V/7343-19	T520V686M010A(1)E060	68	10	60	1800	3	105
10	68	V/7343-19	T520V686M010A(1)E100	68	10	100	1400	3	105
10	68	D/7343-31	T520D686M010A(1)E100	68	10	100	1500	3	105
10	100	C/6032-28	T520C107M010A(1)E025	100	8	25	2600	3	105
10	100	C/6032-28	T520C107M010A(1)E045	100	8	45	1900	3	105
10	100	L/6032-19	T520L107M010A(1)E025	100	8	25	2400	3	105
10	100	W/7343-15	T520W107M010A(1)E040	100	10	40	2100	3	105
10	100	V/7343-19	T520V107M010A(1)E018	100	10	18	3200	3	105
10	100	V/7343-19	T520V107M010A(1)E025	100	10	25	2700	3	105
10	100	V/7343-19	T520V107M010A(1)E045	100	10	45	2000	3	105
10	100	V/7343-19	T520V107M010A(1)E050	100	10	50	1900	3	105
10	100	V/7343-19	T520V107M010A(1)E055	100	10	55	1800	3	105
10	100	D/7343-31	T520D107M010A(1)E018	100	10	18	3500	3	105
10	100	D/7343-31	T520D107M010A(1)E055	100	10	55	2000	3	105
10	100	D/7343-31	T520D107M010A(1)E080	100	10	80	1700	3	105
10	150	C/6032-28	T520C157M010A(1)E055	150	8	55	1700	3	105
10	150	V/7343-19	T520V157M010A(1)E018	150	10	18	3200	3	105
10	150	V/7343-19	T520V157M010A(1)E025	150	10	25	2700	3	105
10	150	V/7343-19	T520V157M010A(1)E040	150	10	40	2200	3	105
10	150	D/7343-31	T520D157M010A(1)E015	150	10	15	3900	3	105
10	150	D/7343-31	T520D157M010A(1)E018	150	10	18	3500	3	105
10	150	D/7343-31	T520D157M010A(1)E025	150	10	25	3000	3	105
10	150	D/7343-31	T520D157M010A(1)E040	150	10	40	2400	3	105
10	150	D/7343-31	T520D157M010A(1)E055	150	10	55	2000	3	105
10	150	Y/7343-40	T520Y157M010A(1)E015	150	10	15	4000	3	105
10	150	Y/7343-40	T520Y157M010A(1)E018	150	10	18	3700	3	105
10	150	Y/7343-40	T520Y157M010A(1)E025	150	10	25	3100	3	105
10	220	V/7343-19	T520V227M010A(1)E045	220	10	45	2000	3	105
10	220	V/7343-19	T520V227M010A(1)E025	220	10	25	2700	3	105
10	220	D/7343-31	T520D227M010A(1)E018	220	10	18	3500	3	105
10	220	D/7343-31	T520D227M010A(1)E025	220	10	25	3000	3	105
10	220	D/7343-31	T520D227M010A(1)E040	220	10	40	2400	3	105
10	220	Y/7343-40	T520Y227M010A(1)E040	220	10	40	2500	3	105
10	330	Y/7343-40	T520Y337M010A(1)E015	330	10	15	4000	3	105
10	330	Y/7343-40	T520Y337M010A(1)E035	330	10	35	2600	3	105
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin.

Refer to Ordering Information for additional detail. (Sn), M = Non-Magnetic (SnPb)

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.

**Blue color text denotes "Under Development"**

**Bold text denotes black epoxy product**

\* Part numbers with an asterisk are not recommended for new designs. Please use the T521 version of these part numbers.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
10	330	X/7343-43	T520X337M010A(1)E010	330	10	10	5000	3	105
10	330	X/7343-43	T520X337M010A(1)E025	330	10	25	3100	3	105
10	330	X/7343-43	T520X337M010A(1)E040	330	10	40	2500	3	105
11	47	Q/7343-12	T520Q476M011A(1)E040	52	10	40	4500	3	105
12.5	10	T/3528-12	T520T106M12RA(1)E150	13	8	150	800	3	105
12.5	15	T/3528-12	T520T156M12RA(1)E080	19	8	80	1100	3	105
16	10	B/3528-21	T520B106M016A(1)E100*	16	8	100	1100	3	105
16	22	C/6032-28	T520C226M016A(1)E080	35	8	80	1400	3	105
16	33	W/7343-15	T520W336M016A(1)E045	53	10	45	2000	3	105
16	33	V/7343-19	T520V336M016A(1)E045	53	10	45	2000	3	105
16	33	V/7343-19	T520V336M016A(1)E060	53	10	60	1800	3	105
16	33	V/7343-19	T520V336M016A(1)E070	53	10	70	1600	3	105
16	47	W/7343-15	T520W476M016A(1)E045*	75	10	45	2000	3	105
16	47	V/7343-19	T520V476M016A(1)E045	75	10	45	2000	3	105
16	47	V/7343-19	T520V476M016A(1)E070*	75	10	70	1600	3	105
16	47	D/7343-31	T520D476M016A(1)E035	75	10	35	2500	3	105
16	47	D/7343-31	T520D476M016A(1)E070*	75	10	70	1800	3	105
16	68	D/7343-31	T520D686M016A(1)E050	109	10	50	2100	3	105
16	150	X/7343-43	T520X157M016A(1)E040	240	10	40	2500	3	105
20	22	V/7343-19	T520V226M020A(1)E040	44	10	40	2200	3	105
20	22	V/7343-19	T520V226M020A(1)E045	44	10	45	2000	3	105
20	22	V/7343-19	T520V226M020A(1)E090*	44	10	90	1400	3	105
25	15	V/7343-19	T520V156M025A(1)E090*	38	10	90	1400	3	105
25	15	D/7343-31	T520D156M025A(1)E060	38	10	60	1900	3	105
25	15	D/7343-31	T520D156M025A(1)E080	38	10	80	1700	3	105
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin. Refer to Ordering Information for additional detail. (Sn), M = Non-Magnetic (SnPb)  
 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.

**Blue color text denotes "Under Development"**

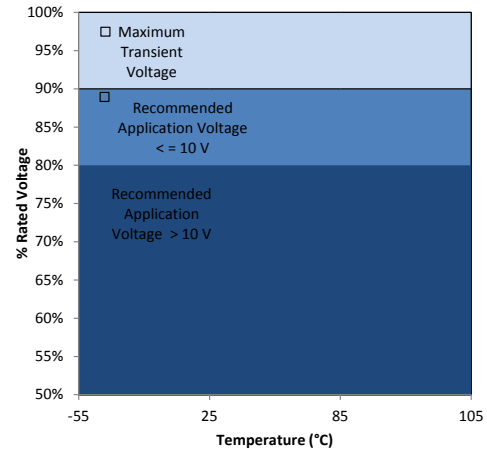
**Bold text denotes black epoxy product**

\* Part numbers with an asterisk are not recommended for new designs. Please use the T521 version of these part numbers.

## Derating Guidelines

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 μs)
-55°C to 105°C		
$2. V \leq V_R \leq 10 V$	90% of $V_R$	$V_R$
$12.5 V \leq V_R \leq 25 V$	80% of $V_R$	$V_R$

$V_R$  = 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.

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		
$T \leq 45^\circ C$	$45^\circ C < T \leq 85^\circ C$	$85^\circ C < T \leq 125^\circ C$
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)

KEMET Series and Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts @ 45°C with +30°C Rise
T520T	3528-12	105
T520M	3528-15	120
T520A	3216-18	112
T520B	3528-21	127
T520U	6032-15	135
T520L	6032-19	150
T520C	6032-28	165
T520W	7343-15	180
T520V / T522V	7343-19	187
T520Q	7343-12	170
T520D	7343-31	225
T520Y/T522Y	7343-40	241
T520X	7343-43	247
T520H	7360-20	187

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

## Reverse Voltage

Polymer tantalum 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
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
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
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
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	7343-20	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 <sup>1</sup>	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 <sup>1</sup>	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

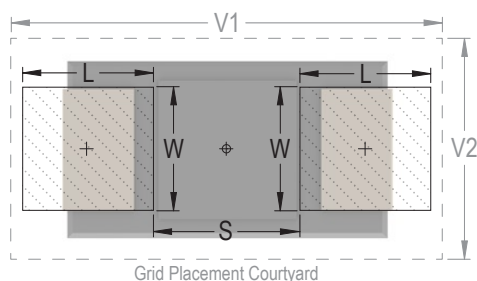
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.





## 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.

\*Case Size D, E, P, Y, and X

\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z

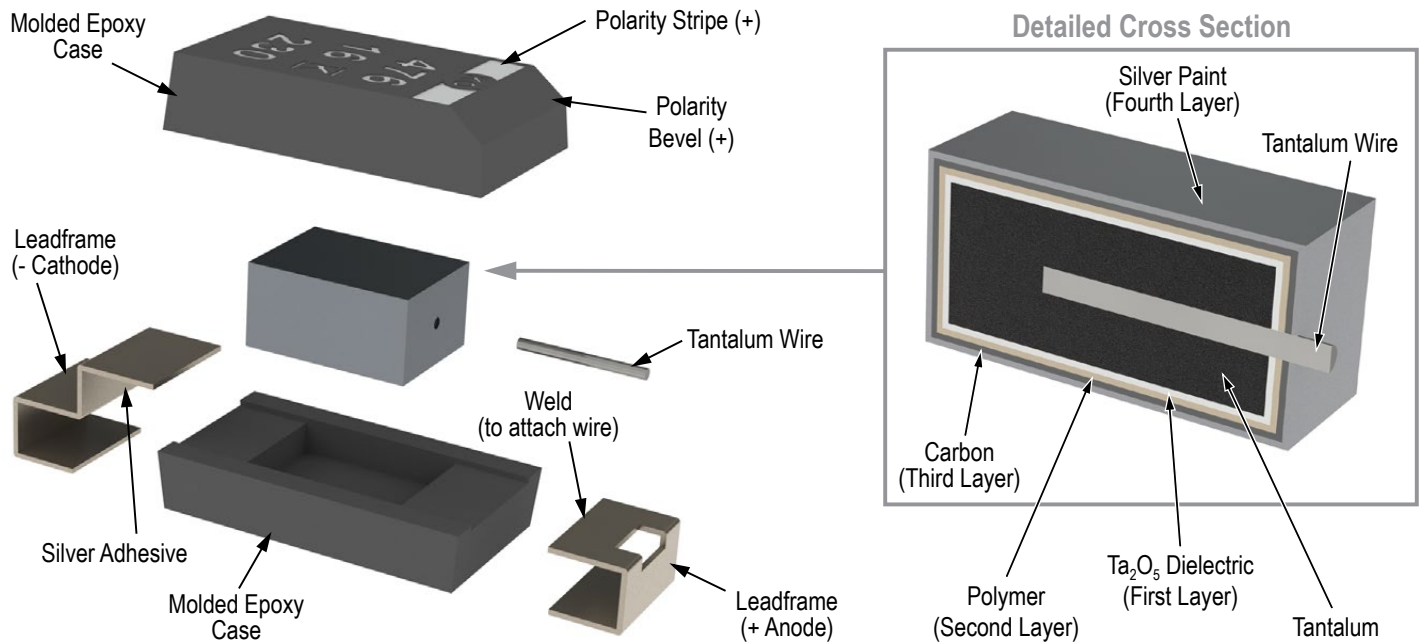


## Storage

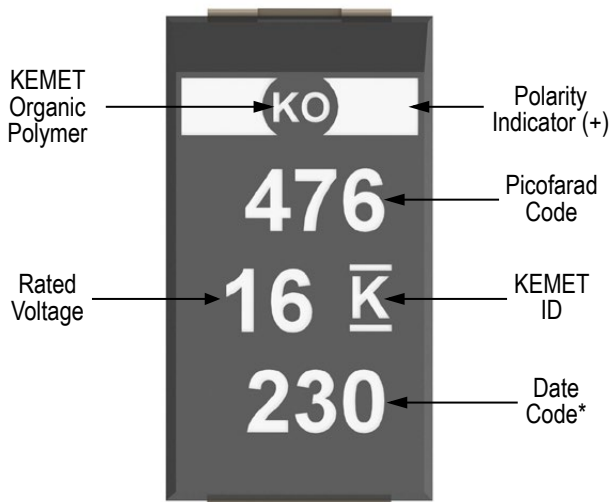
All KO-CAP series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 40°C and humidity not in excess of 90% RH.



## Construction



## Capacitor Marking

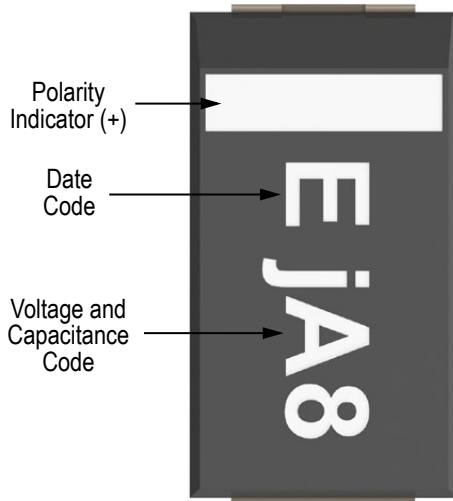


\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

## Capacitor Marking cont'd

### Black Epoxy



Date Code *												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	A	B	C	D	E	F	G	H	J	K	L	M
2014	N	P	Q	R	S	T	U	V	W	X	Y	Z
2015	a	b	c	d	e	f	g	h	j	k	l	m
2016	n	p	q	r	s	t	u	v	w	x	y	z

Code	e	g	j	A
Rated Voltage	2.5 V	4 V	6 V	10 V

Code	J7	N7	S7	W7	A8	N8
Capacitance	22	33	47	68	100	330

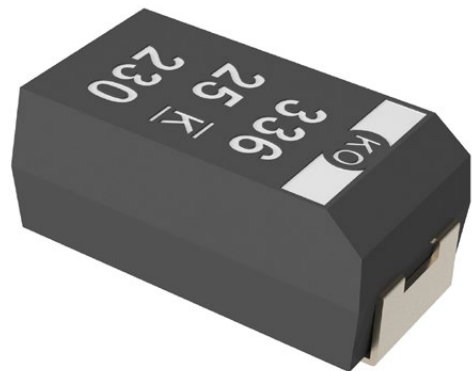
## Overview

The KEMET Organic Capacitor (KO-CAP) is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The KO-CAP also exhibits a benign failure mode which eliminates the ignition failures that can occur in standard MnO<sub>2</sub> tantalum types. KO-CAPs may also be operated at voltages up to 90% of rated voltage for part types with rated voltages of ≤ 10 volts and up to 80% of rated voltage for part types > 10 volts with equivalent or better reliability than traditional MnO<sub>2</sub> tantalum capacitors operated at 50% of rated voltage.

The T521 Series High Voltage Polymer Tantalum is designed for higher application voltages such as 12 V, 24 V, 28 V, and 48 V input rails. This series demonstrates excellent high voltage handling capabilities and reliability and is commonly selected as a replacement for other high capacitance dielectrics such as MnO<sub>2</sub> tantalum and aluminum electrolytic capacitors. The T521 Series can be safely operated at 80% of the rated voltages and can withstand transient conditions up to the rated voltage of the component. This series offers higher capacitance for a given application voltage when compared to multilayer ceramic and tantalum MnO<sub>2</sub> devices. The T521 Series also offers superior ESR performance over tantalum MnO<sub>2</sub> and aluminum electrolytic capacitors and a much lower profile than aluminum polymer and aluminum electrolytic capacitors.

## Benefits

- Voltage ratings to 63 V
- Volumetric efficiency
- Stable temperature characteristics
- Up to 330 µF capacitance value
- High ripple current capability
- Low ESR
- High reliability
- 100% surge current tested
- Low profile design
- Benign failure mode
- Pb Free when ordered with 100% Sn termination
- RoHS Compliant and Halogen Free



## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Applications

Typical applications include DC/DC converters, power supply input and higher voltage applications such as 12 V to 50 V power input rails in the military/aerospace and industrial markets.

## Ordering Information

T	521	V	226	M	025	A	T	E060	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	ESR Code	Packaging (C-Spec)
T = Tantalum	521 = High Voltage Polymer	B, T, D, Q, V, W, X	First two digits represent significant figures. Third digit specifies number of zeros.	M = $\pm 20\%$	016 = 16 V 020 = 20 V 025 = 25 V 035 = 35 V 050 = 50 V 063 = 63 V	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 m $\Omega$ . (060 = 60 m $\Omega$ )	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	4.7 – 330 $\mu$ F @ 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	16 – 63 V
DF (120 Hz)	$\leq 10\%$ - Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	$\leq 0.1$ CV ( $\mu$ A) at rated voltage after 5 minutes

## Qualification

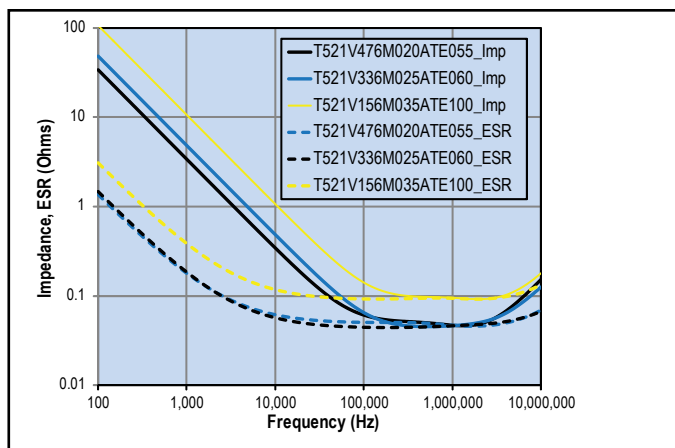
Test	Condition	Characteristics				
Endurance	105°C @ rated voltage, 2,000 hours 125°C @ 2/3 rated voltage, 2,000 hours**	Δ C/C	Within -20%/+10% of initial value			
		DF	Within initial limits			
		DCL	IL @ 105°C, 2 x IL @ 125°C			
		ESR	2 x Initial Limit			
Storage Life	105°C @ 0 volts, 2,000 hours 125°C @ 0 voltage, 2,000 hours**	Δ C/C	Within -20%/+10% of initial value			
		DF	Within initial limits			
		DCL	IL @ 105°C, 2 x IL @ 125°C			
		ESR	2 x Initial Limit			
Humidity	60° C, 90% RH, 500 hours, No Load	Δ C/C	Within -5%/+35% of initial value			
		DF	Within initial limits			
		DCL	Within 3.0 x initial limit			
Temperature Stability	Extreme temperature exposure at a succession of continuous steps at +25°C, -55°C, +25°C, +85°C, +105°/125°C, +25°C	+25°C	-55°C	+85°C	+105°/125°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	
		Δ C/C	Within -20%/+10% of initial value			
		DF	Within initial limits			
Surge Voltage	105°C, 1.32 x rated voltage, 33 Ω Resistance, 1,000 cycles	DCL	Within initial limits			
		ESR	Within initial limits			
		Δ C/C	Within ±10% of initial value			
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	DF	Within initial limits			
		DCL	Within initial limits			

\*IL = Initial limit

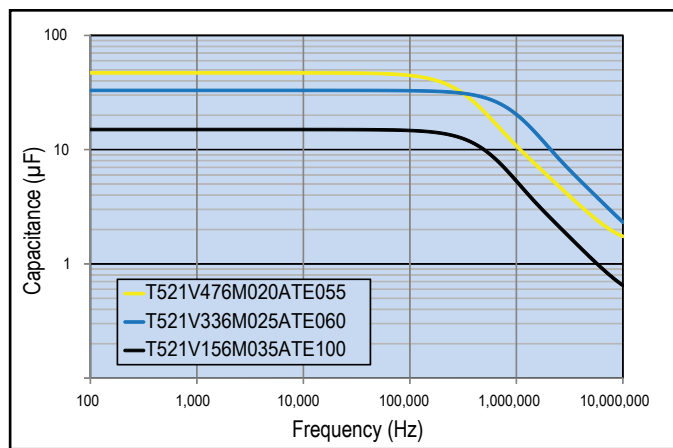
\*\*Refer to part number specifications for individual temperature classification.

## Electrical Characteristics

ESR vs. Frequency



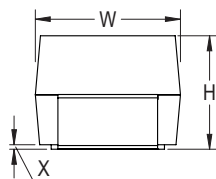
Capacitance vs. Frequency



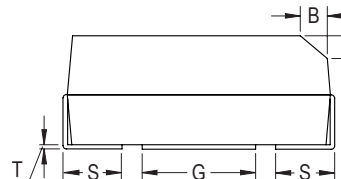
## Dimensions – Millimeters (Inches)

Metric will govern

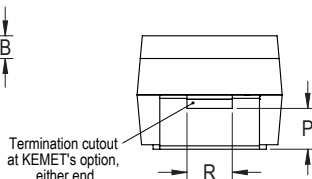
CATHODE (-) END VIEW



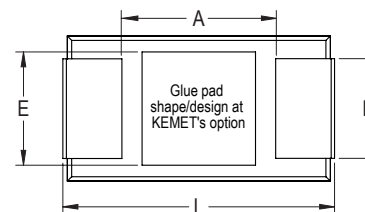
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component												
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)
B	3528-21	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)	1.8 (0.071)	2.2 (0.087)
T	3528-12	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.2 (0.047)	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)	1.8 (0.071)	2.2 (0.087)
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)
Q	7343-12	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.2 Maximum	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)
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)
W	7343-15	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.5 (0.059)	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)
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)

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions

**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 @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Max/5 Min	% @ 25°C 120 Hz Max	mΩ @ 25°C 100 kHz Max	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
16	10	B/3528-21	T521B106M016A(1)E100	16.0	8	100	1100.0	3	125
16	15	B/3528-21	T521B156M016A(1)E090	24.0	8	90	1200.0	3	105
16	33	Q/7343-12	T521Q336M016A(1)E040	52.8	10	40	2500.0	3	105
16	47	W/7343-15	T521W476M016A(1)E045	75.2	10	45	2000.0	3	105
16	47	V/7343-20	T521V476M016A(1)E070	75.2	10	70	1600.0	3	105
16	47	V/7343-20	T521V476M016A(1)E080	75.2	10	80	1500.0	3	105
16	47	D/7343-31	T521D476M016A(1)E045	75.2	10	45	2200.0	3	105
16	47	D/7343-31	T521D476M016A(1)E055	75.2	10	55	2000.0	3	105
16	47	D/7343-31	T521D476M016A(1)E070	75.2	10	70	1800.0	3	105
16	47	D/7343-31	T521D476M016A(1)E090	75.2	10	90	1600.0	3	105
16	68	V/7343-20	T521V686M016A(1)E050	108.8	10	50	1900.0	3	105
16	68	V/7343-20	T521V686M016A(1)E090	108.8	10	90	1400.0	3	105
16	100	V/7343-20	T521V107M016A(1)E050	160.0	10	50	1900.0	3	125
16	100	D/7343-31	T521D107M016A(1)E050	160.0	10	50	2100.0	3	105
16	150	D/7343-31	T521D157M016A(1)E050	240.0	10	50	2100.0	3	105
16	150	X/7343-43	T521X157M016A(1)E080	240.0	10	80	1800.0	3	105
16	220	X/7343-43	T521X227M016A(1)E035	352.0	10	35	2700.0	3	125
16	220	X/7343-43	T521X227M016A(1)E050	352.0	10	50	2200.0	3	125
16	330	X/7343-43	T521X337M016A(1)E025	528.0	10	25	3100.0	3	125
16	330	X/7343-43	T521X337M016A(1)E050	528.0	10	50	2200.0	3	125
20	10	B/3528-21	T521B106M020A(1)E100	20.0	8	100	1100.0	3	105
20	15	B/3528-21	T521B156M020A(1)E090	30.0	10	90	1200.0	3	105
20	22	V/7343-20	T521V226M020A(1)E090	44.0	10	90	1400.0	3	125
20	47	W/7343-15	T521W476M020A(1)E045	94.0	9	45	2000.0	3	105
20	47	V/7343-20	T521V476M020A(1)E090	94.0	10	90	1400.0	3	125
20	47	V/7343-20	T521V476M020A(1)E080	94.0	10	80	1500.0	3	125
20	47	V/7343-20	T521V476M020A(1)E055	94.0	10	55	1800.0	3	125
20	47	D/7343-31	T521D476M020A(1)E055	94.0	10	55	2000.0	3	125
20	100	D/7343-31	T521D107M020A(1)E055	200.0	10	55	2000.0	3	105
25	10	B/3528-21	T521B106M025A(1)E100	25.0	8	100	1100.0	3	105
25	10	T/3528-12	T521T106M025A(1)E100	25.0	8	100	1000.0	3	125
25	15	<b>V/7343-20</b>	<b>T521V156M025A(1)E090</b>	<b>37.5</b>	<b>10</b>	<b>90</b>	<b>1400.0</b>	<b>3</b>	<b>105</b>
25	22	V/7343-20	T521V226M025A(1)E045	55.0	10	45	2000.0	3	105
25	22	V/7343-20	T521V226M025A(1)E060	55.0	10	60	1800.0	3	105
25	22	V/7343-20	T521V226M025A(1)E090	55.0	10	90	1400.0	3	105
25	33	V/7343-20	T521V336M025A(1)E060	82.5	10	60	1800.0	3	105
25	33	V/7343-20	T521V336M025A(1)E040	82.5	10	40	2200.0	3	105
25	33	D/7343-31	T521D336M025A(1)E060	82.5	10	60	1900.0	3	105
25	100	X/7343-43	T521X107M025A(1)E060	250.0	10	60	2000.0	3	105
35	10	V/7343-20	T521V106M035A(1)E120	35.0	10	120	1200.0	3	125
35	15	V/7343-20	T521V156M035A(1)E100	52.5	10	100	1400.0	3	125
35	15	V/7343-20	T521V156M035A(1)E125	52.5	10	125	1200.0	3	125
35	33	D/7343-31	T521D336M035A(1)E065	115.5	10	65	1900.0	3	125
35	47	X/7343-43	T521X476M035A(1)E030	164.5	10	30	2900.0	3	125
35	47	X/7343-43	T521X476M035A(1)E070	164.5	10	70	1900.0	3	125
50	5.6	D/7343-31	T521D565M050A(1)E070	28	10	70	1800	3	125
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Max/5 Min	% @ 25°C 120 Hz Max	mΩ @ 25°C 100 kHz Max	mA @ +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.

**Bold text denotes black epoxy product**



**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Max/5 Min	% @ 25°C 120 Hz Max	mΩ @ 25°C 100 kHz Max	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
50	5.6	D/7343-31	T521D565M050A(1)E090	28	10	90	1600	3	125
50	5.6	V/7343-20	T521V565M050A(1)E070	28	10	70	1800	3	125
50	5.6	V/7343-20	T521V565M050A(1)E090	28	10	90	1600	3	125
50	6.8	D/7343-31	T521D685M050A(1)E070	34.0	10	70	1800.0	3	125
50	6.8	D/7343-31	T521D685M050A(1)E090	34.0	10	90	1600.0	3	125
50	6.8	V/7343-20	T521V685M050A(1)E070	34.0	10	70	1800.0	3	125
50	6.8	V/7343-20	T521V685M050A(1)E090	34.0	10	90	1600.0	3	125
50	10	D/7343-31	T521D106M050A(1)E090	50.0	10	90	1600.0	3	125
50	10	D/7343-31	T521D106M050A(1)E120	50.0	10	120	1369.0	3	125
50	10	V/7343-20	T521V106M050A(1)E090	50.0	10	90	1600.0	3	125
50	18	X/7343-43	T521X186M050A(1)E070	90.0	10	70	1900.0	3	125
50	18	X/7343-43	T521X186M050A(1)E050	90.0	10	50	2200.0	3	125
50	22	X/7343-43	T521X226M050A(1)E075	110.0	10	75	1815.0	3	125
50	22	X/7343-43	T521X226M050A(1)E050	110.0	10	50	2200.0	3	125
50	33	X/7343-43	T521X336M050A(1)E075	165.0	10	75	1815.0	3	125
50	33	X/7343-43	T521X336M050A(1)E050	165.0	10	50	2200.0	3	125
63	4.7	D/7343-31	T521D475M063A(1)E300	29.6	10	300	900.0	3	125
63	4.7	D/7343-31	T521D475M063A(1)E075	29.6	10	75	1700.0	3	125
63	10	X/7343-43	T521X106M063A(1)E050	63.0	10	50	2200.0	3	125
63	15	X/7343-43	T521X156M063A(1)E035	94.5	10	35	2600.0	3	125
63	15	X/7343-43	T521X156M063A(1)E150	94.5	10	150	1300.0	3	125
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Max/5 Min	% @ 25°C 120 Hz Max	mΩ @ 25°C 100 kHz Max	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
<b>Rated Voltage</b>	<b>Rated Capacitance</b>	<b>Case Code/ Case Size</b>	<b>KEMET Part Number</b>	<b>DC Leakage</b>	<b>DF</b>	<b>ESR</b>	<b>Maximum Allowable Ripple Current</b>	<b>MSL</b>	<b>Maximum Operating Temp</b>

Other part number options:

1- Standard with tin terminations (14th character = T). Tin/lead terminations is also available (14th character = H).

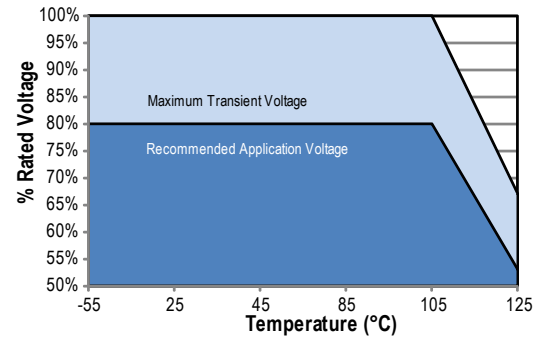
Also available on large (13 inch) reels. Add 7280 to the end of the part number.

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	Maximum Recommended Transient Voltage (1 ms – 1 μs)
-55°C to 105°C		
$16\text{ V} \leq V_R \leq 63\text{ V}$	80% of $V_R$	$V_R$
105°C to 125°C		
$16\text{ V} \leq V_R \leq 63\text{ V}$	54% of $V_R$	67% 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		
$T \leq 45^\circ\text{C}$	$45^\circ\text{C} < T \leq 85^\circ\text{C}$	$85^\circ\text{C} < T \leq 125^\circ\text{C}$
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)

Case Code	EIA Case Code	Maximum Power Dissipation ( $P_{max}$ ) mWatts @ 45°C with +30°C Rise
T	3528-12	105
M	3528-15	120
A	3216-18	112
B	3528-21	127
U	6032-15	135
L	6032-19	150
C	6032-28	165
W	7343-15	180
V	7343-20	187
D	7343-31	225
Q	7343-12	170
Y	7343-40	241
X	7343-43	247
H	7360-20	187
I	3216-10	95

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

## Reverse Voltage

Polymer tantalum 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)				
		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
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 <sup>1</sup>	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

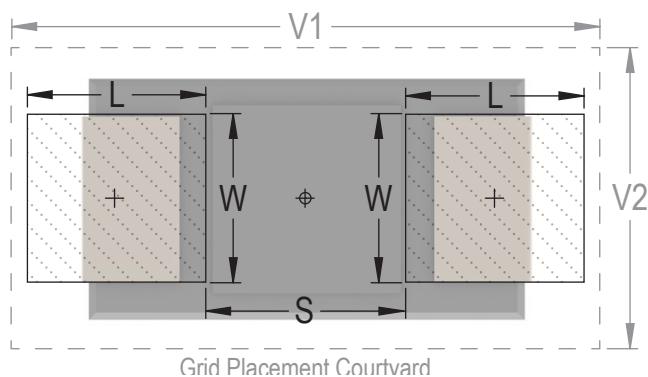
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## 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.

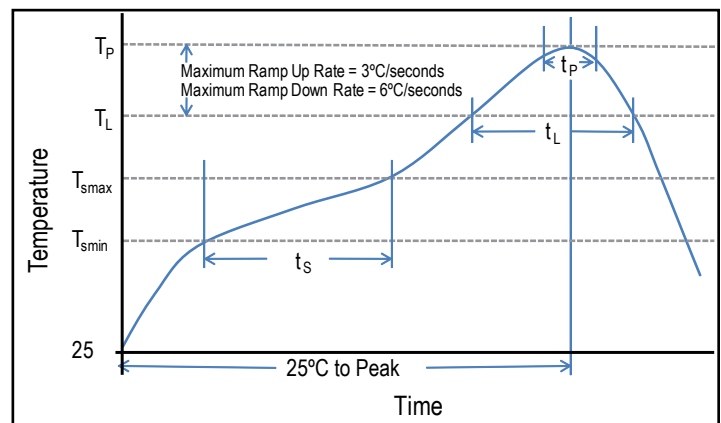
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

Profile Feature	SnPb Assembly	Pb-Free Assembly
<b>Preheat/Soak</b>		
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.

\*Case Size D, E, P, Y, and X

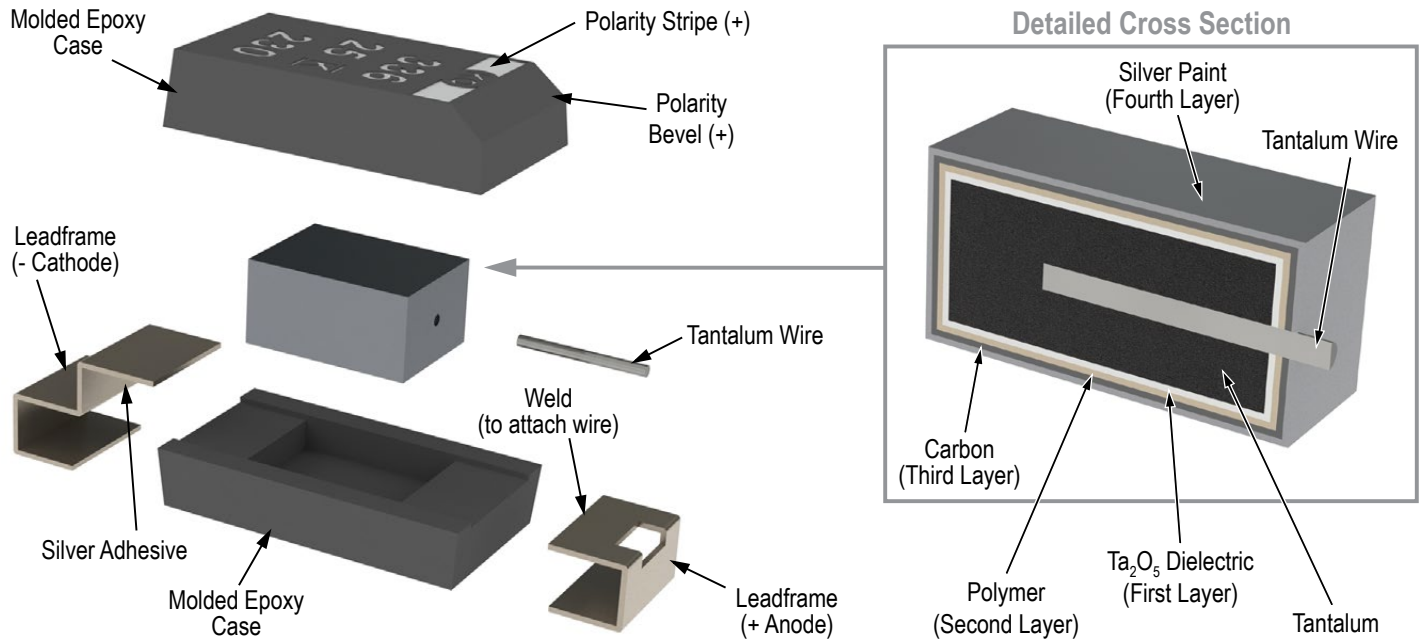
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



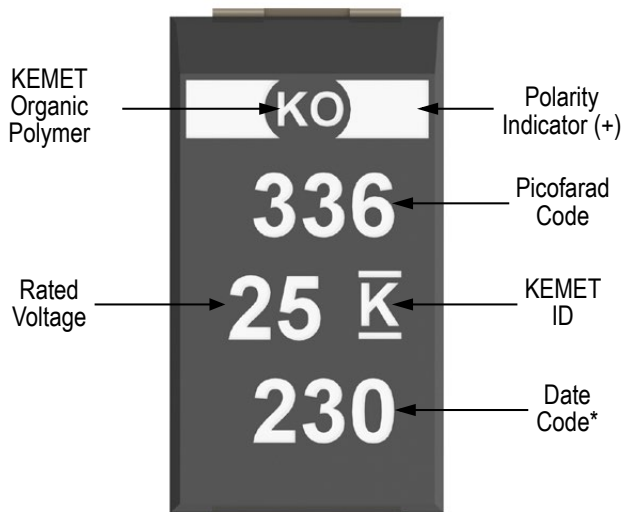
## Storage

All KO-CAP series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 40°C and humidity not in excess of 90% RH.

## Construction



## Capacitor Marking



\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

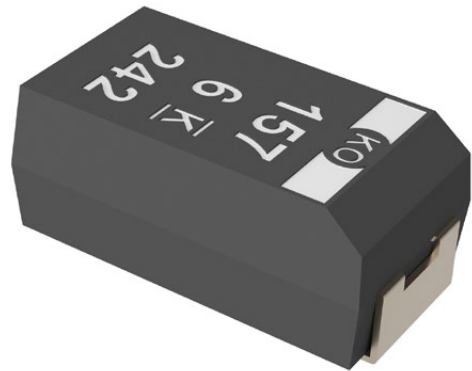
## Overview

The KEMET Organic Capacitor (KO-CAP) is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The KO-CAP also exhibits a benign failure mode which eliminates the ignition failures that can occur in standard MnO<sub>2</sub> tantalum types.

KO-CAPs may also be operated at steady state voltages up to 90% of rated voltage for part types with rated voltages of ≤ 10. The T522 Series Reduced Leakage Polymer Tantalum is designed to meet the needs of leakage-sensitive applications such as battery supported circuits. The T522 Series offers the lowest leakage values available in polymer tantalum capacitors with upper leakage limits that are up to 70% lower than other polymer series.

## Benefits

- ESR: 25 to 40 mΩ
- -55°C to 105°C operating temperature range
- Polymer cathode technology
- High frequency capacitance retention
- Non-ignition failure mode
- Capacitance: 150 to 470 μF
- Voltage: 6.3 V
- 100% accelerated steady state aging
- 100% surge current tested
- Low profile designs
- Volumetric efficiency
- Self-healing mechanism
- EIA standard case sizes



## 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 (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

T	522	V	157	M	006	A	T	E025	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	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 V	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 uF @ 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



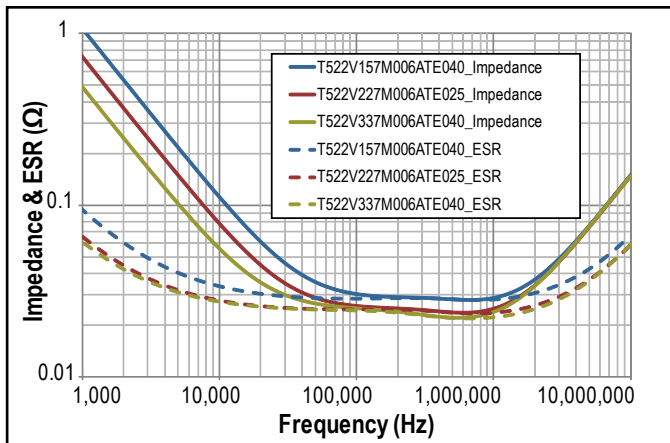
## Qualification

Test	Condition	Characteristics				
Endurance	105°C @ rated voltage, 2,000 hours	Δ C/C	Within -20/+10% of initial value			
		DF	Within initial limits			
		DCL	Within 1.5 x initial limit			
		ESR	Within 2.0 x initial limit			
Storage Life	105°C @ 0 volts, 2,000 hours	Δ C/C	Within -20/+10% of initial value			
		DF	Within initial limits			
		DCL	Within 1.5 x initial limit			
		ESR	Within 2.0 x initial limit			
Humidity	60°C, 90% RH, 500 hours, rated voltage	Δ C/C	Within -5%/+35% of initial value			
		DF	Within initial limits			
		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 +25°C, -55°C, +25°C, +85°C, +105°/125°C, +25°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, 33 Ω Resistance, 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			

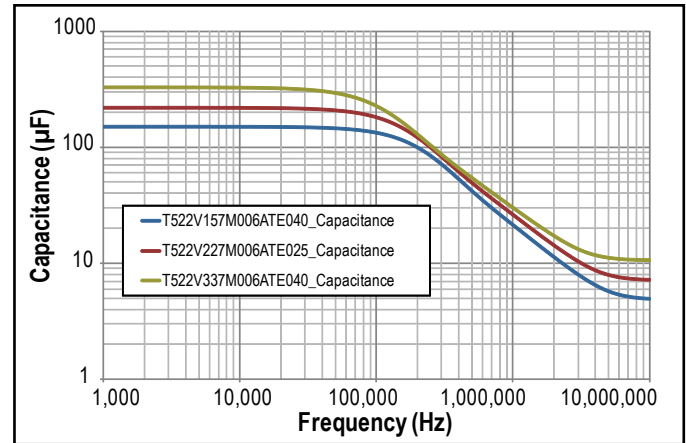
\*IL = Initial limit

## Electrical Characteristics

Impedance & ESR vs. Frequency



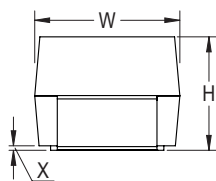
Capacitance vs. Frequency



## Dimensions – Millimeters (Inches)

Metric will govern

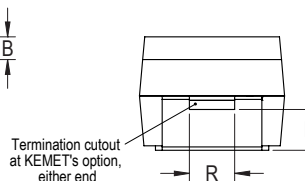
CATHODE (-) END VIEW



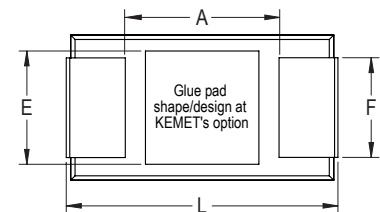
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component												
KEMET	EIA	L*	W*	H*	F* ± 0.1 ± (0.004)	S* ± 0.3 ± (0.012)	B* ± 0.15 (Ref) ± .006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Min)	G (Ref)	E (Ref)
V	7343-19	7.3 ± 0.3 (0.287 ± 0.012)	4.3 ± 0.3 (0.169 ± 0.012)	1.9 (0.075)	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)
Y	7343-40	7.3 ± 0.3 (0.287 ± 0.012)	4.3 ± 0.3 (0.169 ± 0.012)	4.0 (0.157) maximum	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)

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions

**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 @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Max/10 Min.	% @ +25°C 120 Hz Max	mΩ @ +25°C 100 kHz Max	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
6.3	150	V/7343-19	T522V157M006A(1)E025	28	10	25	2700	3	105
6.3	150	V/7343-19	T522V157M006A(1)E040	28	10	40	2200	3	105
6.3	220	V/7343-19	T522V227M006A(1)E025	42	10	25	2700	3	105
6.3	220	V/7343-19	T522V227M006A(1)E040	42	10	40	2200	3	105
6.3	330	V/7343-19	T522V337M006A(1)E040	62	10	40	2200	3	105
6.3	470	Y/7343-40	T522Y477M006A(1)E035	89	10	35	2600	3	105

(1) Standard with tin terminations (14th character = T). Tin/lead terminations is also available (14th character = H).

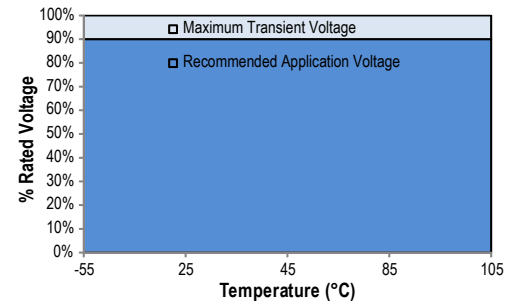
Also available on large (13 inch) reels. Add 7280 to the end of the part number.

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

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 μs)
-55°C to 105°C		
6.3 V	90% of $V_R$	$V_R$

$V_R$  = 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.

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		
$T \leq 45^\circ\text{C}$	$45^\circ\text{C} < T \leq 85^\circ\text{C}$	$85^\circ\text{C} < T \leq 125^\circ\text{C}$
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)

KEMET Series and Case Code	EIA Case Code	Maximum Power Dissipation ( $P_{max}$ ) mWatts @ 45°C with +30°C Rise
T520T	3528-12	105
T520M	3528-15	120
T520A	3216-18	112
T520B	3528-21	127
T520U	6032-15	135
T520L	6032-19	150
T520C	6032-28	165
T520W	7343-15	180
T520V / T522V	7343-19	187
T520Q	7343-12	170
T520D	7343-31	225
T520Y/T522Y	7343-40	241
T520X	7343-43	247
T520H	7360-20	187

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

## Reverse Voltage

Polymer tantalum 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
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 <sup>1</sup>	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

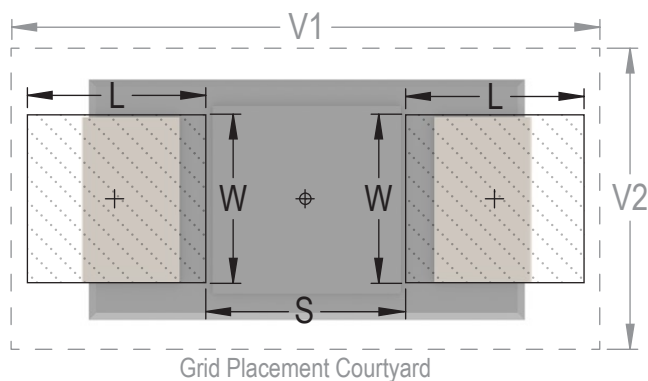
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## 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.

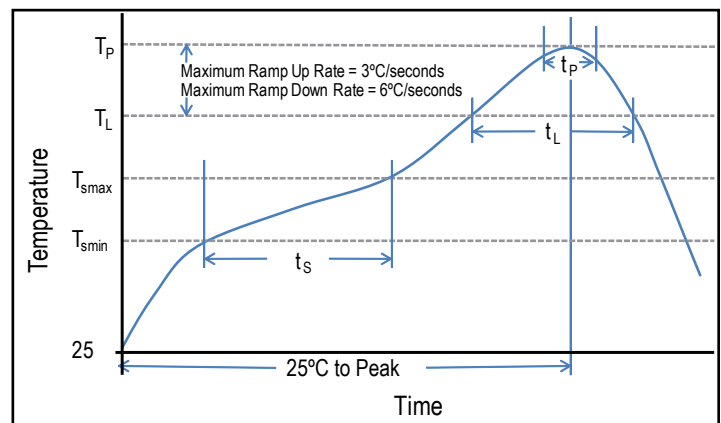
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

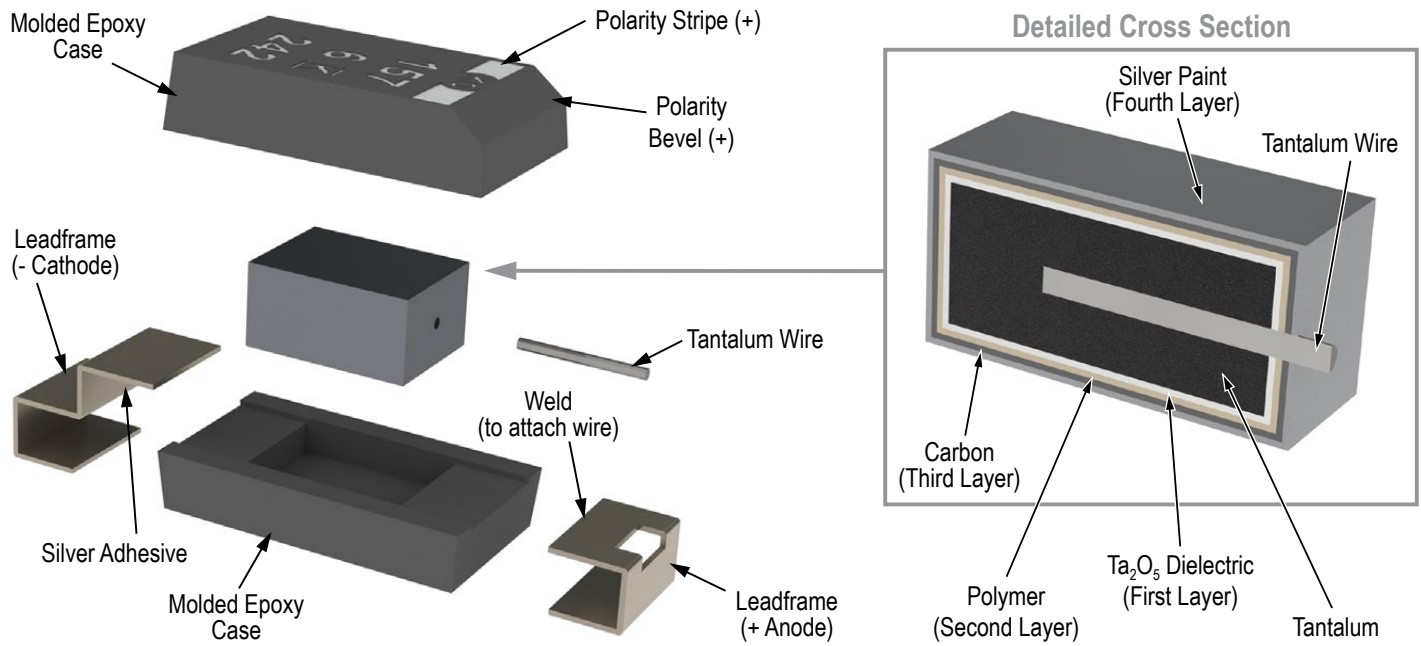
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



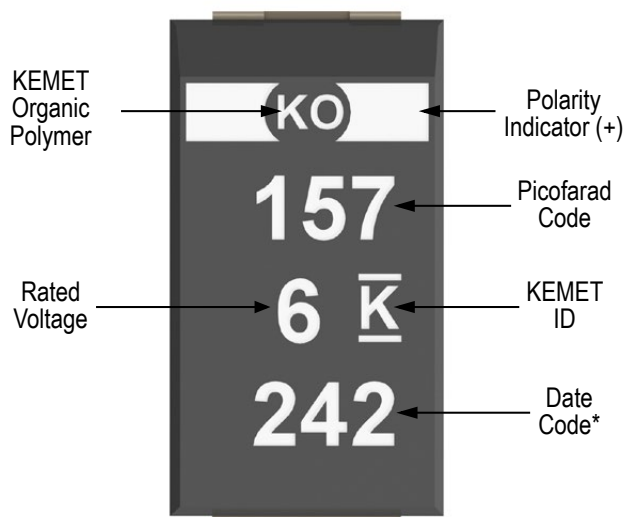
## Storage

All KO-CAP Series are shipped in moisture barrier bags with a desiccant and moisture indicator card. This series is classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 40°C and humidity not in excess of 90% RH.

## Construction



## Capacitor Marking



\* 242 = 42<sup>nd</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year



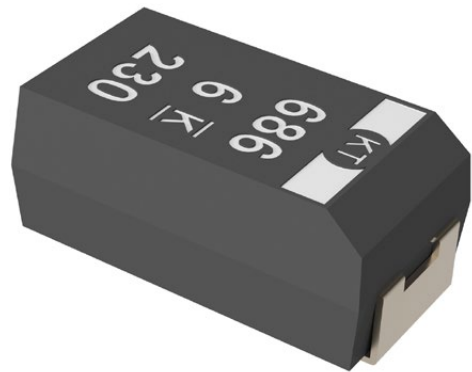
## Overview

The KEMET Organic Capacitor (KO-CAP) is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The KO-CAP also exhibits a benign failure mode which eliminates the ignition failures that can occur in standard MnO<sub>2</sub> tantalum types. KO-CAPs may also be operated at steady state voltages up to 90% of rated voltage for part types with rated voltages of ≤ 10 volts

and up to 80% of rated voltage for part types > 10 volts with equivalent or better reliability than traditional MnO<sub>2</sub> tantalum capacitors operated at 50% of rated voltage. The T525 Series KO-CAP Low ESR Polymer is KEMET's 125°C rated tantalum polymer capacitor. This part offers the same advantages as the T520 Series such as low ESR, high frequency capacitance retention and a benign failure mode. The T525 Series is often the series of choice when considering automotive or industrial type applications.

## Benefits

- Polymer cathode technology
- 125°C maximum operating temperature
- High frequency capacitance retention
- Non-ignition failure mode
- Capacitance: 10 µF to 680 µF
- Voltage: 2.5 V to 16 V
- Use up to 90% of rated voltage (10% derating) for part types ≤ 10 V
- Use up to 80% of rated voltage (20% derating) for part types > 10 V
- 100% surge current tested
- Self-healing mechanism
- Volumetrically efficient
- EIA standard case sizes
- RoHS Compliant and Halogen Free



## Applications

Typical applications include automotive, industrial and military.

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

T	525	D	337	M	006	A	T	E025	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	ESR	Packaging (C-Spec)
T = Tantalum	525 = 125°C Rated Polymer	A, B, D, T, Y	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	2R5 = 2.5 V 003 = 3 V 004 = 4 V 006 = 6.3 V 008 = 8 V 010 = 10 V 016 = 16 V	A = N/A	T = 100% Matte Tin (Sn) Plated H = Tin/Lead (SnPb) Solder Coated (5% Pb minimum)	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 125°C
Rated Capacitance Range	10 – 680 µF @ 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2.5 – 16 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

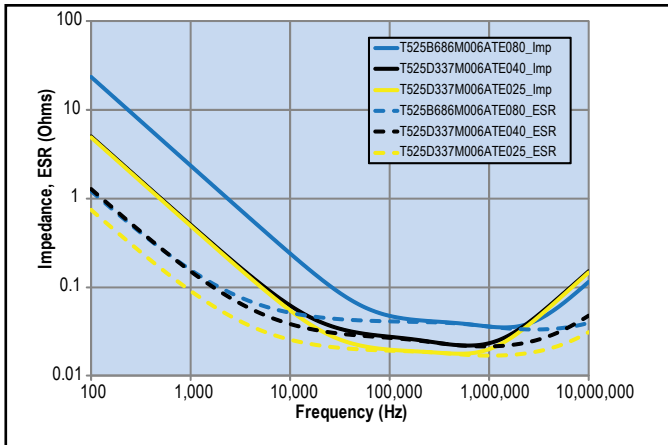
## Qualification

Test	Condition	Characteristics				
Endurance	125°C @ 2/3 rated voltage, 2,000 hours	Δ C/C	Within -20%/+10% of initial value			
		DF	≤ Initial Limit			
		DCL	2 x IL @ 125°C			
		ESR	2 x Initial Limit			
Storage Life	125°C @ 0 volts, 2,000 hours	Δ C/C	Within -20%/+10% of initial value			
		DF	Within initial limits			
		DCL	Within 2.0 x initial limit			
		ESR	Within initial limit			
Humidity	60°C, 90% RH, 1,000 hours, No Load	Δ C/C	Within -5%/+35% of initial value			
		DF	≤ Initial Limit			
		DCL	Within 3.0 x initial limit			
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	+125°C
		Δ C/C	IL*	±20%	±20%	±30%
		DF	IL	IL	1.2 x IL	1.5 x IL
Surge Voltage	105°C, 1.32 x rated voltage, 33 Ω Resistance, 1,000 cycles	DCL	10 x IL			
		ESR	10 x IL			
		Δ C/C	Within -20%/+10% of initial value			
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	DF	Within initial limits			
		DCL	Within initial limits			
		Δ C/C	Within ±10% of initial value			

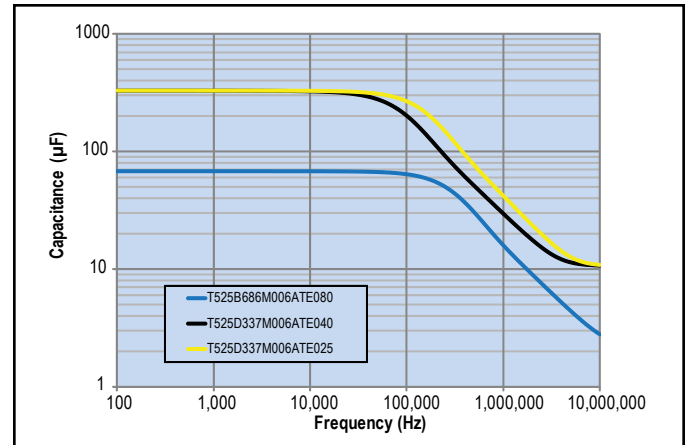
\*IL = Initial Limit

## Electrical Characteristics

ESR vs. Frequency



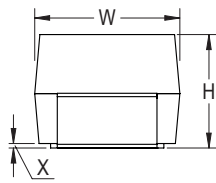
Capacitance vs. Frequency



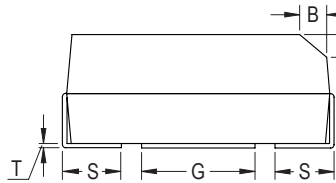
## Dimensions – Millimeters (Inches)

Metric will govern

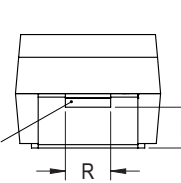
CATHODE (-) END VIEW



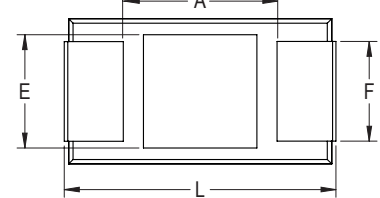
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Termination cutout at KEMET's option, either end

Case Size		Component												
KEMET	EIA	L*	W*	H*	F* ±0.1 ±(0.004)	S* ±0.3 ±(0.012)	B* ±0.15 (Ref) ±.006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Min)	G (Ref)	E (Ref)
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 (.016)	0.13 (.005)	0.8 (.31)	1.1 (.043)	1.3 (.051)
B	3528-21	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 (.039)	0.13 (.005)	1.1 (.043)	1.8 (.071)	2.2 (.087)
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 (.039)	0.13 (.005)	3.8 (.150)	3.5 (.138)	3.5 (.138)
T	3528-12	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.2 (0.047)	2.2 (0.087)	0.8 (0.031)	n/a	0.05 (0.002)	n/a	n/a	0.13 (.005)	1.1 (.043)	1.8 (.071)	2.2 (.087)
Y	7343-40	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	4.0 (0.157)	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 (.039)	0.13 (.005)	3.8 (.150)	3.5 (.138)	3.5 (.138)

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions

**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
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @+25°C Max/5 Min	% @ +25°C 120 Hz Max	mΩ @ +25°C 100 kHz Max	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
2.5	100	T/3528-12	T525T107M2R5A(1)E080	25.0	10	80	1100.0	3	125
2.5	330	D/7343-31	T525D337M2R5A(1)E025	82.5	10	25	3000.0	3	125
2.5	470	D/7343-31	T525D477M2R5A(1)E025	117.5	10	25	3000.0	3	125
2.5	680	D/7343-31	T525D687M2R5A(1)E025	170.0	10	25	3000.0	3	125
3	100	B/3528-21	T525B107M003A(1)E080	30.0	8	80	1300.0	3	125
3	150	B/3528-21	T525B157M003A(1)E080	45.0	8	80	1300.0	3	125
3	330	D/7343-31	T525D337M003A(1)E025	99.0	10	25	3000.0	3	125
3	470	D/7343-31	T525D477M003A(1)E025	141.0	10	25	3000.0	3	125
3	680	D/7343-31	T525D687M003A(1)E025	204.0	10	25	3000.0	3	125
4	68	B/3528-21	T525B686M004A(1)E080	27.2	8	80	1300.0	3	125
4	100	B/3528-21	T525B107M004A(1)E080	40.0	8	80	1300.0	3	125
4	220	D/7343-31	T525D227M004A(1)E025	88.0	10	25	3000.0	3	125
4	330	D/7343-31	T525D337M004A(1)E025	132.0	10	25	3000.0	3	125
4	470	D/7343-31	T525D477M004A(1)E025	188.0	10	25	3000.0	3	125
4	470	D/7343-31	T525D477M004A(1)E040	188.0	10	40	2400.0	3	125
6.3	33	B/3528-21	T525B336M006A(1)E080	20.8	8	80	1300.0	3	125
6.3	47	T/3528-12	T525T476M006A(1)E080	29.6	8	80	1100.0	3	125
6.3	47	B/3528-21	T525B476M006A(1)E070	29.6	8	70	1300.0	3	125
6.3	47	B/3528-21	T525B476M006A(1)E080	29.6	8	80	1300.0	3	125
6.3	68	B/3528-21	T525B686M006A(1)E080	42.8	8	80	1300.0	3	125
6.3	150	D/7343-31	T525D157M006A(1)E025	94.5	10	25	3000.0	3	125
6.3	220	D/7343-31	T525D227M006A(1)E025	138.6	10	25	3000.0	3	125
6.3	330	D/7343-31	T525D337M006A(1)E025	207.9	10	25	3000.0	3	125
6.3	330	D/7343-31	T525D337M006A(1)E040	207.9	10	40	2400.0	3	125
6.3	470	Y/7343-40	T525Y477M006A(1)E035	296.1	10	35	2600.0	3	125
8	33	T/3528-12	T525T336M008A(1)E080	26.4	8	80	1100.0	3	125
10	10	A/3216-18	T525A106M010A(1)E080	10.0	8	80	1200.0	3	125
10	22	B/3528-21	T525B226M010A(1)E080	22.0	8	80	1300.0	3	125
10	33	T/3528-12	T525T336M010A(1)E080	33.0	8	80	1100.0	3	125
10	33	B/3528-21	T525B336M010A(1)E080	33.0	8	80	1300.0	3	125
10	100	D/7343-31	T525D107M010A(1)E025	100.0	10	25	3000.0	3	125
10	100	D/7343-31	T525D107M010A(1)E055	100.0	10	55	2000.0	3	125
10	150	D/7343-31	T525D157M010A(1)E025	150.0	10	25	3000.0	3	125
10	150	D/7343-31	T525D157M010A(1)E055	150.0	10	55	2000.0	3	125
10	220	D/7343-31	T525D227M010A(1)E025	220.0	10	25	3000.0	3	125
10	330	Y/7343-40	T525Y337M010A(1)E035	330.0	10	35	2600.0	3	125
16	47	D/7343-31	T525D476M016A(1)E035	75.2	10	35	2500.0	3	125
16	47	D/7343-31	T525D476M016A(1)E065	75.2	10	65	1900.0	3	125
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @+25°C Max/5 Min	% @ +25°C 120 Hz Max	mΩ @ +25°C 100 kHz Max	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(1) To complete KEMET part number, insert T = standard Tin terminations or H = Tin/lead terminations

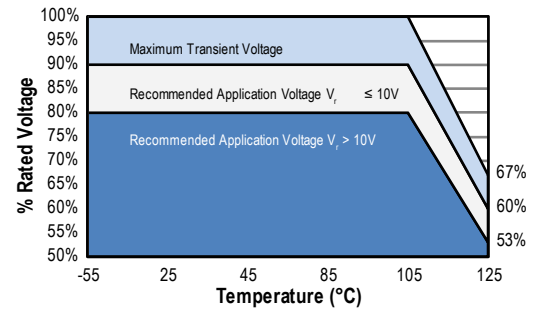
Refer to Ordering Information for additional detail.

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. Substitutions can include better than series.

## Derating Guidelines

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1ms – 1µs)
-55°C to 105°C		
$2.5\text{ V} \leq V_R \leq 10\text{ V}$	90% of $V_R$	$V_R$
$12.5\text{ V} \leq V_R \leq 16\text{ V}$	80% of $V_R$	$V_R$
105°C to 125°C		
$2.5\text{ V} \leq V_R \leq 10\text{ V}$	60% of $V_R$	67% of $V_R$
$12.5\text{ V} \leq V_R \leq 16\text{ V}$	54% of $V_R$	67% 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		
$T \leq 45^\circ\text{C}$	$45^\circ\text{C} < T \leq 85^\circ\text{C}$	$85^\circ\text{C} < T \leq 125^\circ\text{C}$
1.00	0.70	0.25

$T$  = Environmental Temperature

Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts @ 45°C with +30°C Rise
T	3528-12	105
M	3528-15	120
A	3216-18	112
B	3528-21	127
U	6032-15	135
L	6032-19	150
C	6032-28	165
W	7343-15	180
V	7343-20	187
D	7343-31	225
Y	7343-40	241
X	7343-43	247
H	7360-20	187
I	3216-10	95

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

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

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

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

$I$  = rms ripple current (amperes)

$R$  = ESR at specified frequency (ohms)

$E$  = rms ripple voltage (volts)

$Z$  = Impedance at specified frequency (ohms)

$P \text{ max}$  = maximum power dissipation (watts)

## Reverse Voltage

Polymer tantalum 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)				
		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
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
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
Y <sup>1</sup>	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

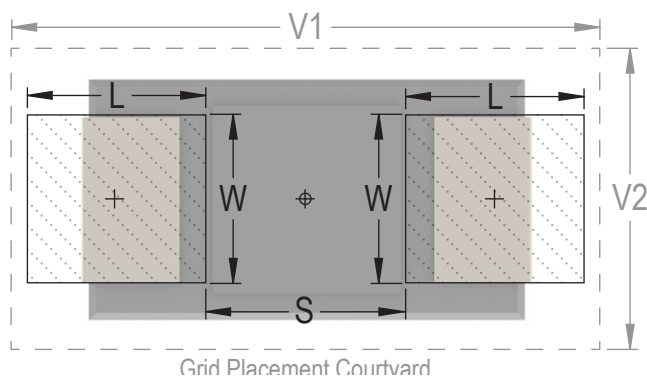
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.





## 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.

\*Case Size D, E, P, Y, and X

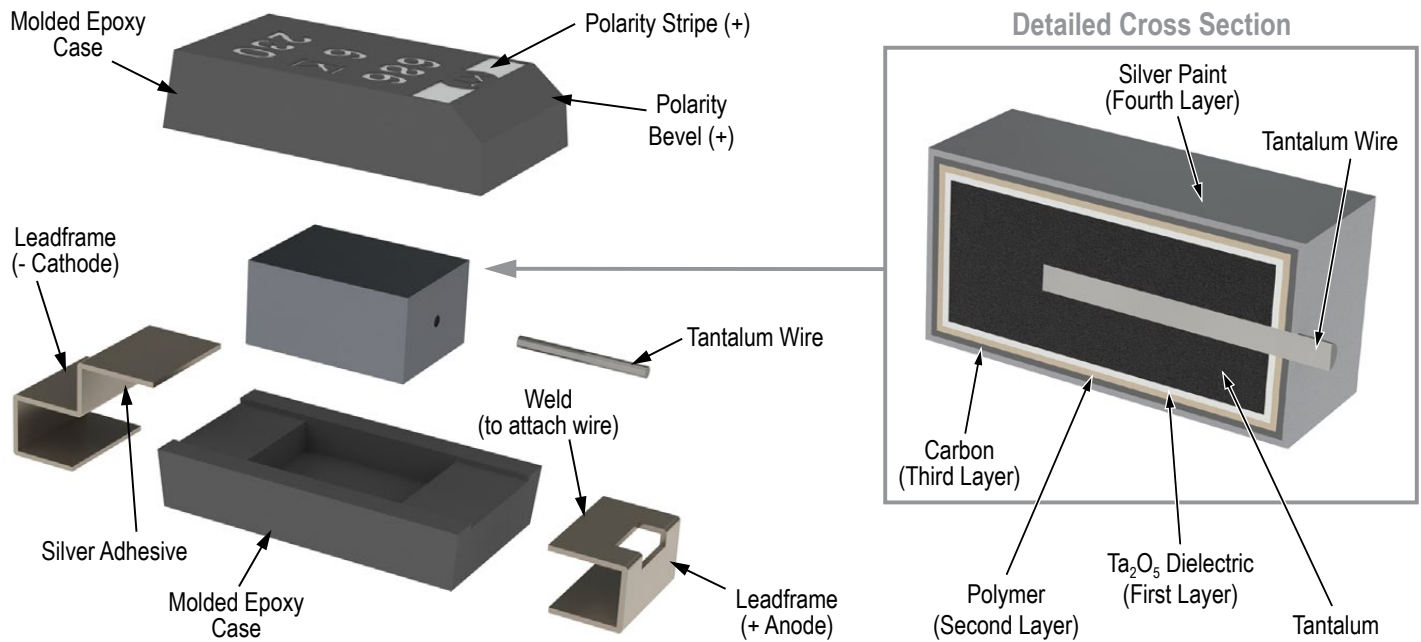
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



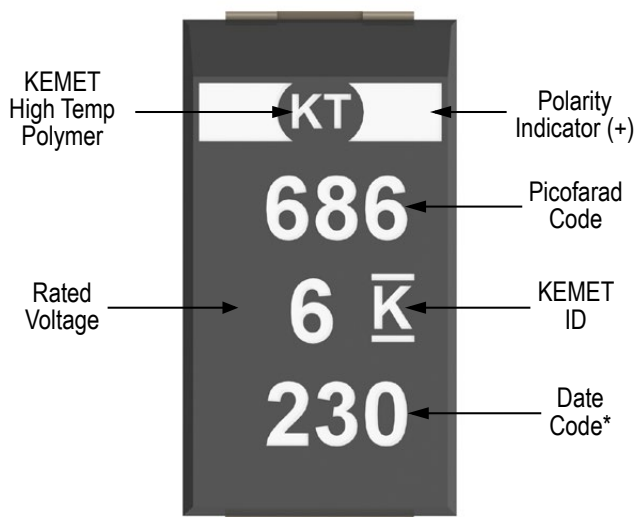
## Storage

All KO-CAP series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 40°C and humidity not in excess of 90% RH.

## Construction



## Capacitor Marking



\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

## Overview

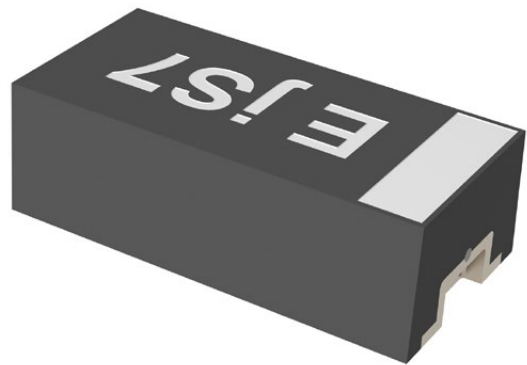
The KEMET Low ESR Polymer Series is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The KO-CAP also exhibits a benign failure mode which eliminates the ignition failures that can occur in standard MnO<sub>2</sub> tantalum types. KO-CAPs may also be operated at voltages up to 90% of rated voltage for part types with rated voltages of ≤ 10 volts and up to 80% of rated voltage for part types > 10 volts with equivalent or

better reliability than traditional MnO<sub>2</sub> tantalum capacitors operated at 50% of rated voltage.

The T527 Series KO-CAP combines improved packaging efficiency with a low profile design through the use of facedown terminal technology. This series offers high capacitance in a 3216-10 (3.2 mm (L) x 1.6 mm (W) x 1.0 mm (H)) package size. The T527 Series is ideal for use in densely populated circuits such as smart phones and digital cameras where space restrictions do not allow for larger and more commonly available case sizes.

## Benefits

- Polymer cathode technology
- EIA Case Size: 3216 (1206 MLCC Equivalent)
- Low Profile: 1.0 mm maximum
- Non-ignition failure mode
- Improved volumetric efficiency
- Self-healing mechanism
- Capacitance: 22 – 100 µF
- Use up to 90% of rated voltage (10% derating)
- Voltage: 4 V – 10 V
- RoHS Compliant and Halogen Free
- 105°C maximum temperature capability
- Lead free 260°C reflow capable



## Applications

Typical applications include densely populated circuits where space restrictions do not allow for larger and more commonly available case sizes such as smart phones, digital cameras, MP3 players, GPS navigation systems, WiFi modules, analytical and test equipment, and audio/sound circuits.

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC. Halogen free.



RoHS Compliant



Halogen Free

## Ordering Information

T	527	I	476	M	006	A	T	E200
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/ Design	Lead Material	ESR Code
T = Tantalum	527 = Facedown Terminal Polymer	I = 3216	First two digits represent significant figures. Third digit specifies number of zeros. e.g., 476 = 47 $\mu$ F	M = $\pm$ 20%	004 = 4 V 006 = 6.3 V 010 = 10 V	A = N/A	T = 100% Tin (Sn)	E = ESR Last three digits specify ESR in m $\Omega$ (200 = 200 m $\Omega$ )

## Performance Characteristics

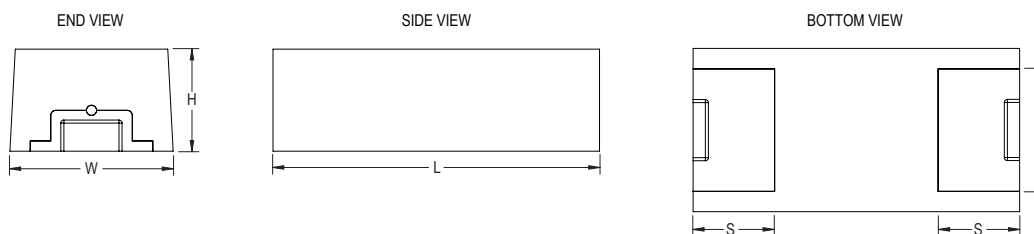
Item	Specifications
Operating Temperature	-55°C to 105°C
Rated Capacitance Range	22 $\mu$ F to 100 $\mu$ F @ 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	4 – 10 V
DF (120 Hz)	Refer to Part Number Electrical Specification Table
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	Refer to Part Number Electrical Specification Table

## Qualification

Test	Condition/Characteristics				
Endurance	85°C @ rated voltage, 1,000 hours	$\Delta C/C$	Within initial $\Delta C/C$ limits		
		DF	Within 1.5 x initial limits		
		DCL	Within initial limits		
Damp Heat Steady State	40°C, 90 to 95% RH, 500 hours	$\Delta C/C$	-30% to +20% of initial $\Delta C/C$ limit		
		DF	Within 1.5 x initial limits		
		DCL	Within initial limits		
Temperature Stability	Extreme temperature exposure at -55°C and +105°C	$\Delta C/C$	+25°C	-55°C	+105°C
		DF	IL*	-20% to 0% of $\Delta C/C$	-50% - 0% of $\Delta C/C$
		DCL	IL	IL	IL
Surge Voltage	1.3 Vr, 85°C, 1,000 $\Omega$ resistor, 1,000 cycles	$\Delta C/C$	Within initial $\Delta C/C$ limits		
		DF	Within initial limit		
		DCL	Within initial limit		
Mechanical Shock	100 G, Saw-Tooth wave	$\Delta C/C$	Within initial $\Delta C/C$ limits		
		DF	Within initial limit		
		DCL	Within initial limit		
Vibration	Frequency: 10 to 2 kHz, Sweep: 1 minute, Amplitude of vibration: 1.5 mm, Vibration Time: Each plane shall be 2 hours for a total of 4 hours.	$\Delta C/C$	Within initial $\Delta C/C$ limits		
		DF	Within initial limit		
		DCL	Within initial limit		
Terminal strength	Strength: 4.9 N, Time: 10 $\pm$ 0.5 seconds (two directions)	Visual	No evidence of mechanical damage		

\*IL = Initial limit

## Dimensions – Millimeters



Case Size		Component				
KEMET	EIA	L	W	H	F	S
I	3216-10	3.2 $\pm$ 0.2	1.6 $\pm$ 0.2	1.0 Maximum	1.2 $\pm$ 0.1	0.8 $\pm$ 0.2

**Table 1 – Ratings & Part Number Reference**

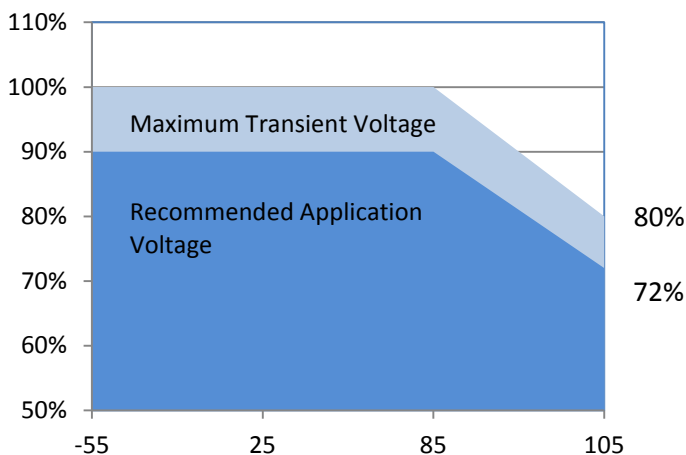
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/ 5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ +25°C 100 kHz Maximum	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
4	100	I/3216-10	T5271107M004ATE200	40.0	8	200	775	3	105
6.3	47	I/3216-10	T5271476M006ATE200	29.6	6	200	632	3	105
6.3	100	I/3216-10	T5271107M006ATE100	63.0	8	100	775	3	105
6.3	100	I/3216-10	T5271107M006ATE070	63.0	8	70	1134	3	105
10	22	I/3216-10	T5271226M010ATE200	22.0	8	200	548	3	105
10	33	I/3216-10	T5271336M010ATE200	33.0	6	200	548	3	105
10	47	I/3216-10	T5271476M010ATE200	47.0	6	200	548	3	105

Refer to Ordering Information for additional detail.

## Derating Guidelines

Voltage Rating	-55°C to 85°C		85°C to 105°C	
	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 µs)	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 µs)
≤ 10 V	90% of $V_R$	$V_R$	See Chart	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:

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 ≤ 105°C
1.00	0.90	0.40

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)

Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts @ 45°C with +30°C Rise
I	3216	60
P	2012	25

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



## Reverse Voltage

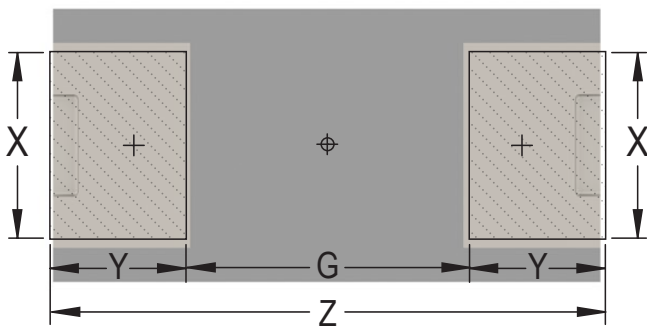
Polymer tantalum capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a small degree of transient voltage reversal for short periods as shown in the below table.

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 Case	Metric Size Code EIA	Dimensions in mm			
		G Maximum	Z Minimum	X Minimum	Y ref
I	3216-10	1.65	3.25	1.10	0.80
P	2012-10	1.05	2.05	0.80	0.50



## 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.

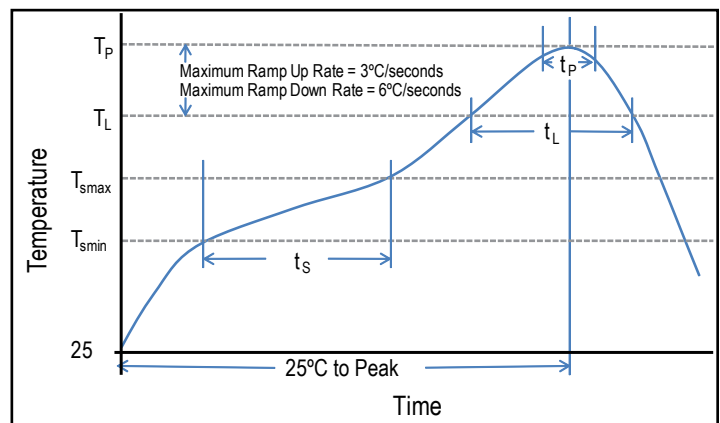
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

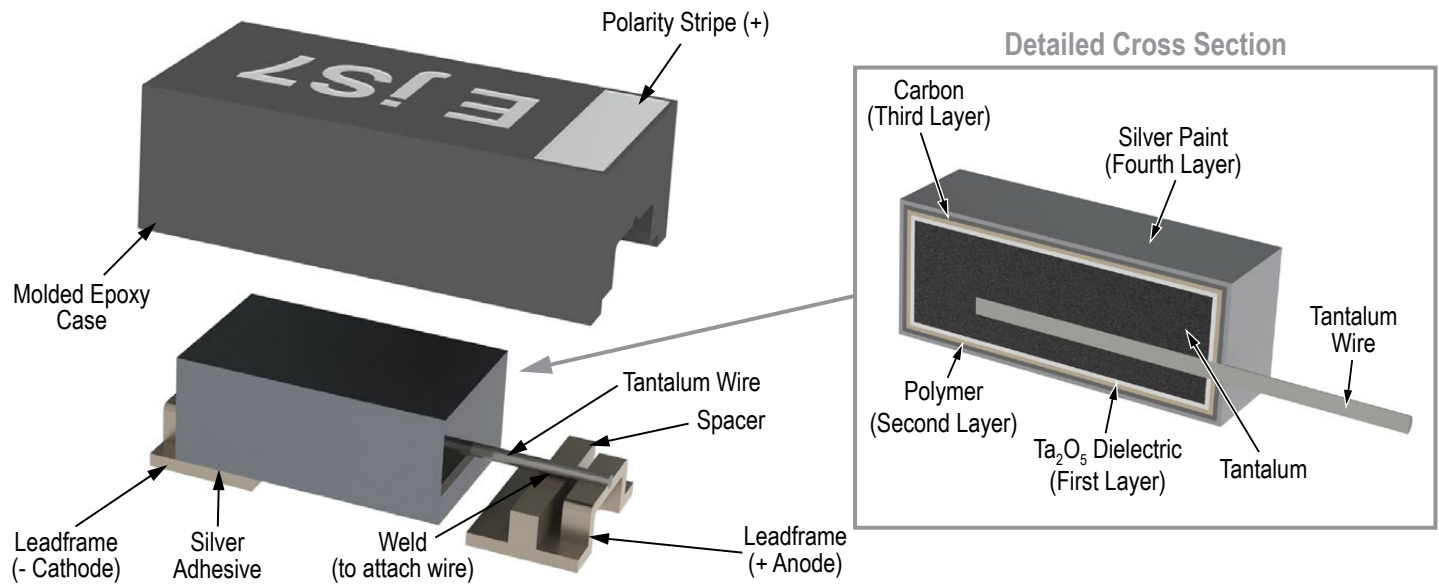
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



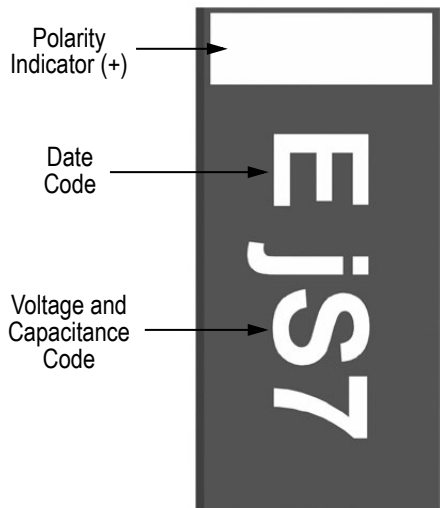
## Storage

All KO-CAP Series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 30°C and humidity not in excess of 60% RH.

## Construction



## Capacitor Marking



Code	g	j	A
Rated Voltage	4 V	6 V	10 V

Code	J7	N7	S7	W7	A8
Capacitance	22	33	47	68	100

Date Code *												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	A	B	C	D	E	F	G	H	J	K	L	M
2014	N	P	Q	R	S	T	U	V	W	X	Y	Z
2015	a	b	c	d	e	f	g	h	j	k	l	m
2016	n	p	q	r	s	t	u	v	w	x	y	z

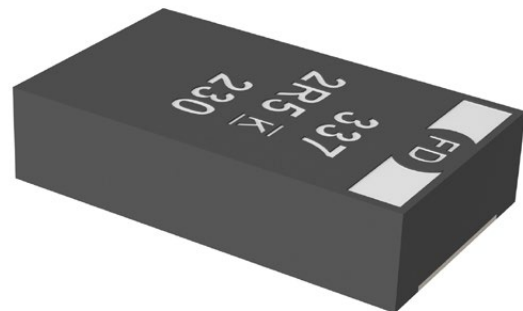
## Overview

The KEMET Organic Capacitor (KO-CAP) is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The KO-CAP also exhibits a benign failure mode which eliminates the ignition failures that can occur in standard MnO<sub>2</sub> tantalum types. KO-CAPs may also be operated at steady state voltages up to 90% of rated voltage for part types with rated voltages of ≤ 10 volts and up to 80% of rated voltage for part types > 10 volts with equivalent or better reliability than traditional MnO<sub>2</sub> tantalum capacitors operated at 50% of rated voltage.

The T528 Series KO-CAP combines ultra-low ESR and high capacitance in a package design that offers the lowest ESL in the market for this type of product. This series offers exceptional performance for high-speed server and microprocessor decoupling – designs that are driving the demand for low inductance chips. The T528 uses a different termination design that allows for a reduction in the inductance loop area and comes in a low profile 1.7 mm case height. These product features offer the advantage of improved capacitance retention at frequencies of up to 1 MHz.

## Benefits

- Polymer cathode technology
- 100% accelerated steady state aging
- Low ESL <0.7 nH @ 20 MHz
- 100% surge current tested
- High frequency capacitance retention
- Non-ignition failure mode
- Improved volumetric efficiency
- Self-healing mechanism
- Capacitance: 33 µF to 470 µF
- Use up to 90% of rated voltage (10% derating)
- Voltage: 2 V to 6.3 V
- RoHS compliant and Halogen Free
- 105°C maximum temperature capability
- Lead free 260°C reflow capable



## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn Solder



RoHS Compliant

## Applications

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

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

T	528	Z	337	M	2R5	A	T	E009	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	ESR Code	Packaging (C-Spec)
T = Tantalum	528 = Low ESL Facedown Terminal Polymer	B = 3528-21 K = 3528-10 W = 7343-15 Z = 7343-17	First two digits represent significant figures. Third digit specifies number of zeros.	M = $\pm 20\%$	002 = 2 V 2R5 = 2.5 V 004 = 4 V 006 = 6.3 V	A = N/A	T = 100% Matte Tin (Sn) Plated P = Ni-Pd-Au Plated	E = ESR Last three digits specify ESR in m $\Omega$ (009 = 9 m $\Omega$ )	Blank = 7" Reel 7280 = 13" Reel

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 105°C
Rated Capacitance Range	33 – 470 $\mu$ F @ 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2 – 6.3 V
DF (120 Hz)	$\leq 10\%$
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	$\leq 0.1$ CV ( $\mu$ A) at rated voltage after 5 minutes

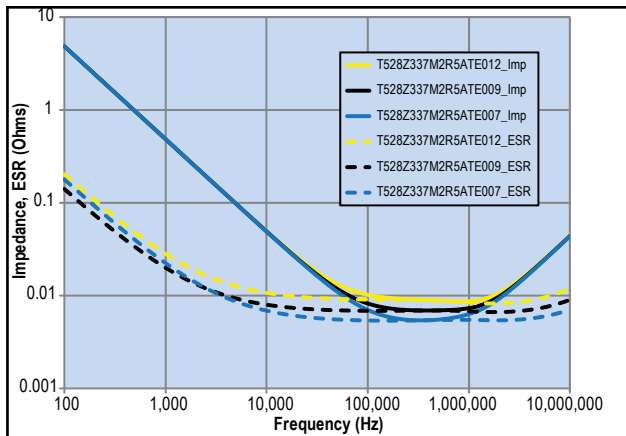
## Qualification

Test	Condition	Characteristics				
Endurance	105°C @ 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 @ 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, 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 +25°C, -55°C, +25°C, +85°C, +105°C, +25°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			

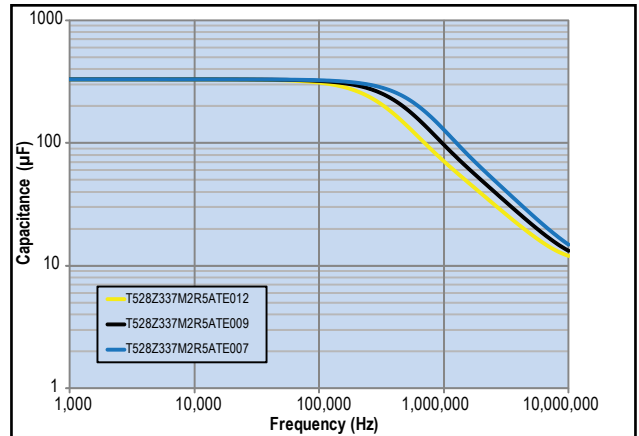
\*IL = Initial limit

## Electrical Characteristics

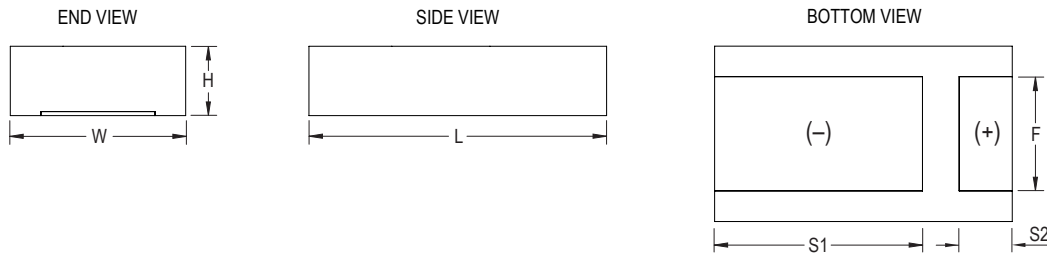
ESR vs. Frequency



Capacitance vs. Frequency



## Dimensions – Millimeters



Case Size		Component					
KEMET	EIA	L	W	H	F ±0.2	S1 ±0.2	S2 ±0.2
K	3528-10	3.5 ±0.3	2.8 ±0.3	1.0 Maximum	2	1.2	0.6
B	3528-20	3.5 ±0.2	2.8 ±0.2	2.0 Maximum	2.2	0.8	0.8
W	7343-15	7.3 ±0.4	4.3 ±0.3	1.5 Maximum	2.8	5.1	1.3
Z	7343-17	7.3 ±0.4	4.3 ±0.3	1.7 Maximum	2.8	5.1	1.3



**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 @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/ 5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ +25°C 100 kHz Maximum	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
<b>2</b>	<b>270</b>	<b>B/3528-21</b>	<b>T528B277M002APE006</b>	<b>54.0</b>	<b>8</b>	<b>6</b>	<b>3900</b>	<b>3</b>	<b>105</b>
<b>2</b>	<b>270</b>	<b>B/3528-21</b>	<b>T528B277M002APE009</b>	<b>54.0</b>	<b>8</b>	<b>9</b>	<b>3200</b>	<b>3</b>	<b>105</b>
2.5	220	Z/7343-17	T528Z227M2R5ATE006	55.0	10	6	7400	3	105
2.5	330	W/7343-15	T528W337M2R5ATE009	82.5	10	9	6000	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE005	82.5	10	5	8100	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE006	82.5	10	6	7400	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE007	82.5	10	7	6800	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE008	82.5	10	8	6400	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE009	82.5	10	9	6000	3	105
2.5	330	Z/7343-17	T528Z337M2R5ATE012	82.5	10	12	5200	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE005	117.5	10	5	8100	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE006	117.5	10	6	7400	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE008	117.5	10	8	6400	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE009	117.5	10	9	6000	3	105
2.5	470	Z/7343-17	T528Z477M2R5ATE012	117.5	10	12	5200	3	105
4	220	K/3528-10	T528K227M004ATE100	88.0	10	100	1200	3	105
4	220	Z/7343-17	T528Z227M004ATE007	88.0	10	7	6800	3	105
4	220	Z/7343-17	T528Z227M004ATE008	88.0	10	8	6400	3	105
4	220	Z/7343-17	T528Z227M004ATE009	88.0	10	9	6000	3	105
4	220	Z/7343-17	T528Z227M004ATE012	88.0	10	12	5200	3	105
4	330	Z/7343-17	T528Z337M004ATE009	132.0	10	9	6000	3	105
4	330	Z/7343-17	T528Z337M004ATE012	132.0	10	12	5200	3	105
6.3	150	K/3528-10	T528K157M006ATE100	94.5	10	100	1200	3	105
6.3	150	K/3528-10	T528K157M006ATE200	94.5	10	200	900	3	105
6.3	150	Z/7343-17	T528Z157M006ATE007	94.5	10	7	6800	3	105
6.3	150	Z/7343-17	T528Z157M006ATE008	94.5	10	8	6400	3	105
6.3	150	Z/7343-17	T528Z157M006ATE009	94.5	10	9	6000	3	105
6.3	150	Z/7343-17	T528Z157M006ATE012	94.5	10	12	5200	3	105
6.3	220	Z/7343-17	T528Z227M006ATE009	138.6	10	9	6000	3	105
6.3	220	Z/7343-17	T528Z227M006ATE012	138.6	10	12	5200	3	105
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/ 5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ +25°C 100 kHz Maximum	mA +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.

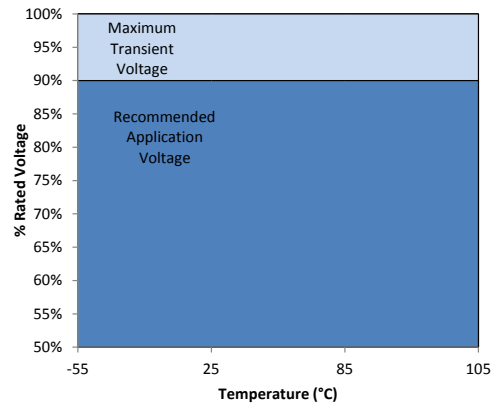
Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitutions will be marked with the higher voltage rating. Substitutions can include better than series.

**Bold text denotes black epoxy product**

## Derating Guidelines

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 μs)
-55°C to 105°C		
$2 V \leq V_R \leq 6.3 V$	90% of $V_R$	$V_R$

$V_R$  = 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.

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 (P max) mWatts @ 45°C with +30°C Rise
K	3528-10	162
B	3528-20	127
W	7343-15	325
Z	7343-17	325
D	7343-31	255
Y	7343-40	263
X	7443-43	270

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

Temperature Compensation Multipliers for Maximum Ripple Current		
$T \leq 45^\circ\text{C}$	$45^\circ\text{C} < T \leq 85^\circ\text{C}$	$85^\circ\text{C} < T \leq 125^\circ\text{C}$
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.

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

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

$I$  = rms ripple current (amperes)

$E$  = rms ripple voltage (volts)

$P \text{ max}$  = maximum power dissipation (watts)

$R$  = ESR at specified frequency (ohms)

$Z$  = Impedance at specified frequency (ohms)

## Reverse Voltage

Polymer tantalum 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			
I <sup>1</sup>	3216-10	2.34	2.04	1.44	0.17	0.47	6.02	2.80	1.94	1.64	1.32	0.27	0.57	4.92	2.30	1.56	1.26	1.22	0.35	0.65	4.06	2.04			
K	3258-10	2.62	2.02	2.24	0.09	0.69	6.42	4.10	2.22	1.62	2.12	0.19	0.79	5.32	3.60	1.84	1.24	2.02	0.27	0.87	4.46	3.34			
W <sup>2</sup>	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 <sup>2</sup>	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			

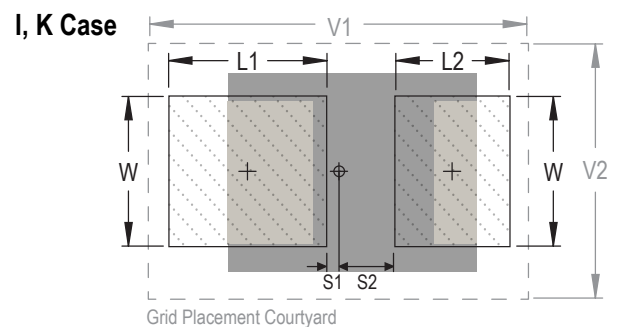
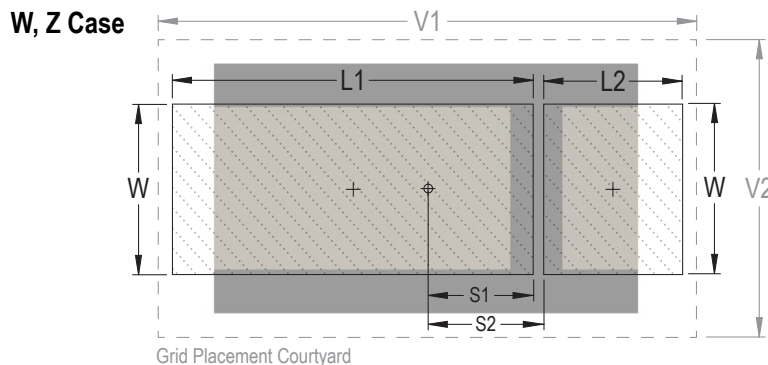
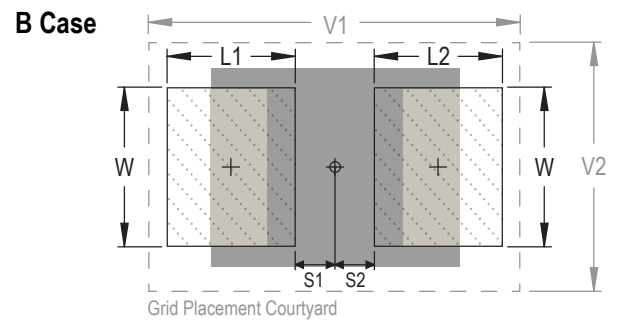
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Land pattern geometry is too small for silkscreen outline.

<sup>2</sup> Negative values of S1 mean that pad lies at the center's right side.



## 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.

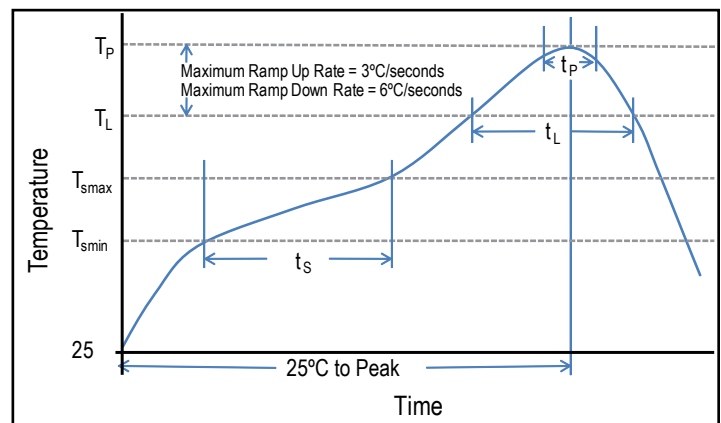
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

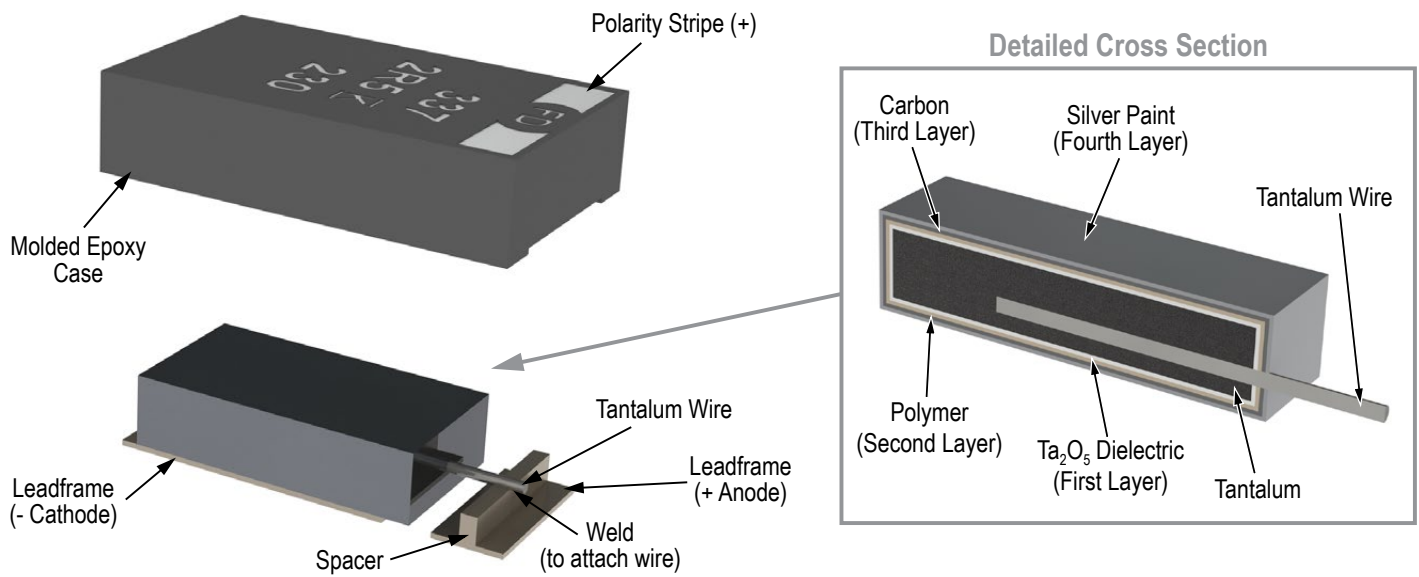
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



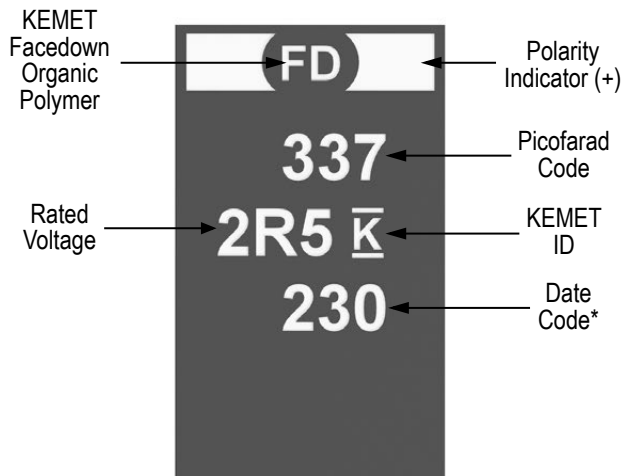
## Storage

All KO-CAP series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 40°C and humidity not in excess of 90% RH.

## Construction



## Capacitor Marking



\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

# T529 Series Small Case Size Substrate Terminal Polymer Tantalum

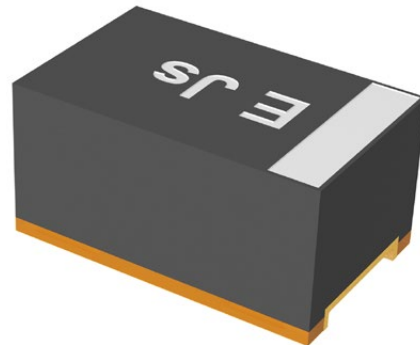
## Overview

The KEMET Low ESR Polymer Series is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The KO-CAP also exhibits a benign failure mode which eliminates the ignition failures that can occur in standard MnO<sub>2</sub> tantalum types. KO-CAPs may also be operated at voltages up to 90% of rated voltage for part types with rated voltages of ≤ 10 volts and up to 80% of rated voltage for part types > 10 volts with equivalent or better reliability than traditional MnO<sub>2</sub> tantalum capacitors operated at 50% of rated voltage.

The T529 Series KO-CAP uses a substrate termination design, which results in the most volumetrically efficient packaging technology available today in Polymer Tantalum Chip Capacitors. This series offers high capacitance values in a small 2012-10 (2.0 mm (L) x 1.2 mm (W) x 1.0 mm (H)) package size. The T529 Series is ideal for use in densely populated circuits such as smart phones and digital cameras where space restrictions do not allow for larger and more commonly available case sizes.

## Benefits

- Polymer cathode technology
- Substrate Termination
- EIA Case Size: 2012 (0805 MLCC Equivalent)
- Low Profile: 1.0 mm maximum
- Non-ignition failure mode
- Improved volumetric efficiency
- Self-healing mechanism
- Capacitance: 22 uF to 150 uF
- Use up to 90% of rated voltage (10% derating)
- Voltage: 6.3 V and 10 V
- RoHS Compliant and Halogen Free
- 105°C maximum temperature capability
- Lead free 260°C reflow capable



## Applications

Typical applications include densely populated circuits where space restrictions do not allow for larger and more commonly available case sizes such as smart phones, digital cameras, MP3 players, GPS navigation systems, WiFi modules, analytical and test equipment, and audio/sound circuits.

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC. Halogen free.



RoHS Compliant



## Ordering Information

T	529	P	476	M	006	A	A	E200
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	ESR Code
T = Tantalum	529 = Substrate Terminal Polymer	P = 2012-10 I = 3216-10	First two digits represent significant figures. Third digit specifies number of zeros. e.g., 476 = 47 $\mu$ F	M = $\pm$ 20%	006 = 6.3 V 010 = 10 V	A = N/A	A = Ni - Au	E = ESR Last three digits specify ESR in m $\Omega$ (200 = 200 m $\Omega$ )

## Performance Characteristics

Item	Specifications
Operating Temperature	-55°C to 105°C
Rated Capacitance Range	22 $\mu$ F to 150 $\mu$ F @ 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	6.3 V and 10 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

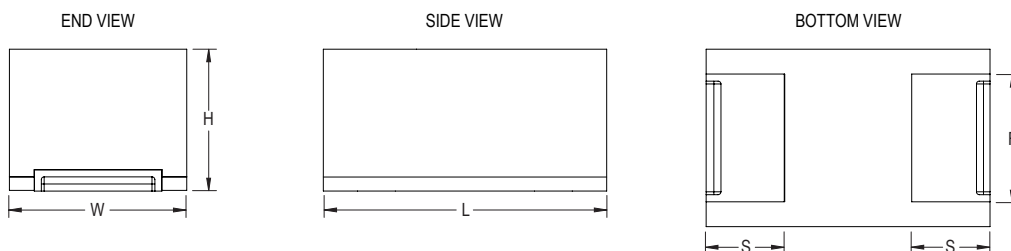


## Qualification

Test	Condition/Characteristics				
Endurance	85°C @ rated voltage, 1,000 hours		$\Delta C/C$	Within initial $\Delta C/C$ limits	
			DF	Within 1.5 x initial limits	
			DCL	Within 3.0 x initial limits	
Damp Heat Steady State	60°C, 90 to 95% RH, 500 hours		$\Delta C/C$	-20% to +30% of initial $\Delta C/C$ limit	
			DF	Within 1.5 x initial limits	
			DCL	Within 3.0 x initial limits	
Temperature Stability	Extreme temperature exposure at -55°C and +105°C	$\Delta C/C$	+25°C IL*	-55°C -20% to 0% of $\Delta C/C$	+105°C -50% - 0% of $\Delta C/C$
		DF	IL	IL	IL
		DCL	IL	IL	1.25 CV
Surge Voltage	1.3 Vr, 85°C, 1,000 $\Omega$ resistor, 1,000 cycles		$\Delta C/C$	Within initial $\Delta C/C$ limits	
			DF	Within initial limit	
			DCL	Within initial limit	
Mechanical Shock	100 G, Saw-Tooth wave		$\Delta C/C$	Within initial $\Delta C/C$ limits	
			DF	Within initial limit	
			DCL	Within initial limit	
Vibration	Frequency: 10 to 2 kHz, Sweep: 1 minute, Amplitude of vibration: 1.5 mm, Vibration Time: Each plane shall be 2 hours for a total of 4 hours.		$\Delta C/C$	Within initial $\Delta C/C$ limits	
			DF	Within initial limit	
			DCL	Within initial limit	
Terminal strength	Strength: 4.9 N, Time: 10 $\pm$ 0.5 seconds (two directions)		Visual	No evidence of mechanical damage	

\*IL = Initial limit

## Dimensions – Millimeters



Case Size		Component				
KEMET	EIA	L	W	H	F	S
P	2012-10	2.0 $\pm$ 0.1	1.25 $\pm$ 0.1	1.0 maximum	0.9 $\pm$ 0.1	0.55 $\pm$ 0.1
I	3216-10	3.2 $\pm$ 0.2	1.6 $\pm$ 0.2	1.0 maximum	1.2 $\pm$ 0.1	0.8 $\pm$ 0.1

**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 @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/ 5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ +25°C 100 kHz Maximum	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
6.3	22	P/2012-10	T529P226M006AAE200	22.0	6	200	548	3	105
6.3	47	P/2012-10	T529P476M006AAE200	29.6	6	200	510	3	105
6.3	47	P/2012-10	T529P476M006AAE150	29.6	6	150	590	3	105
6.3	150	I/3216-10	T529I157M006AAE200	283.5	10	200	548	3	105
6.3	150	I/3216-10	T529I157M006AAE100	283.5	10	100	775	3	105
6.3	150	I/3216-10	T529I157M006AAE070	283.5	10	70	926	3	105
10	22	P/2012-10	T529P226M010AAE200	33.0	6	200	354	3	105
10	47	P/2012-10	T529P476M010AAE200	141.0	6	200	510	3	105

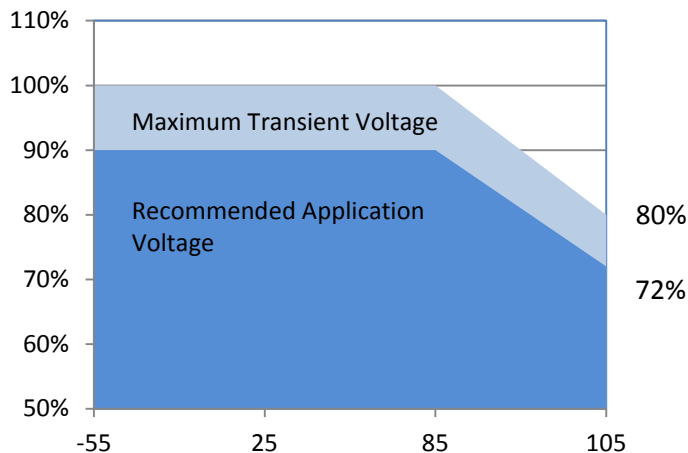
Refer to Ordering Information for additional detail.

**Under development**

## Derating Guidelines

Voltage Rating	-55°C to 85°C		85°C to 105°C	
	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 µs)	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 µs)
≤ 10 V	90% of $V_R$	$V_R$	See Chart	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:

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 ≤ 105°C
1.00	0.90	0.40

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)

Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts @ 45°C with +30°C Rise
I	3216	60
P	2012	25

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

## Reverse Voltage

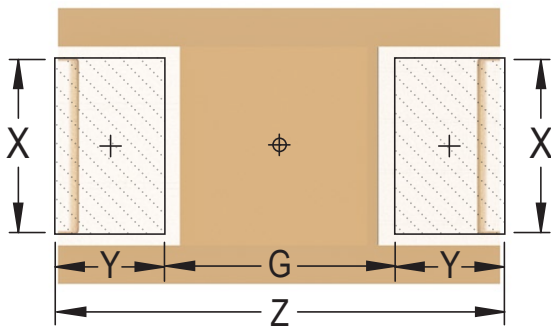
Polymer tantalum capacitors are polar devices and may be permanently damaged or destroyed if connected in the wrong polarity. These devices will withstand a small degree of transient voltage reversal for short periods as shown in the below table.

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	Dimensions in mm			
		G Maximum	Z Minimum	X Minimum	Y ref
Case I	3216-10	1.65	3.25	1.10	0.80
Case P	2012-10	1.05	2.05	0.80	0.50



## 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.

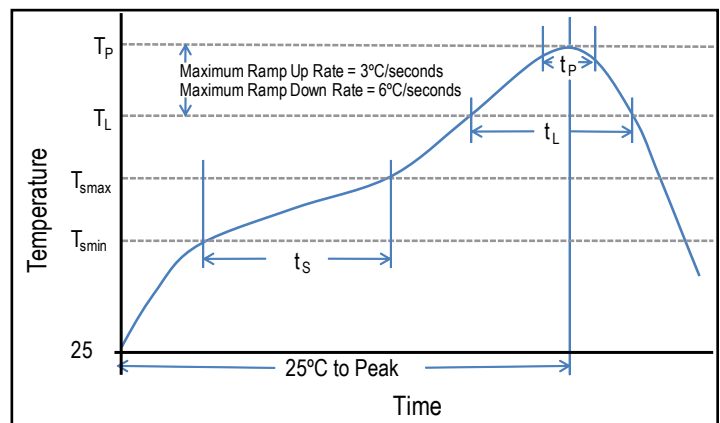
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

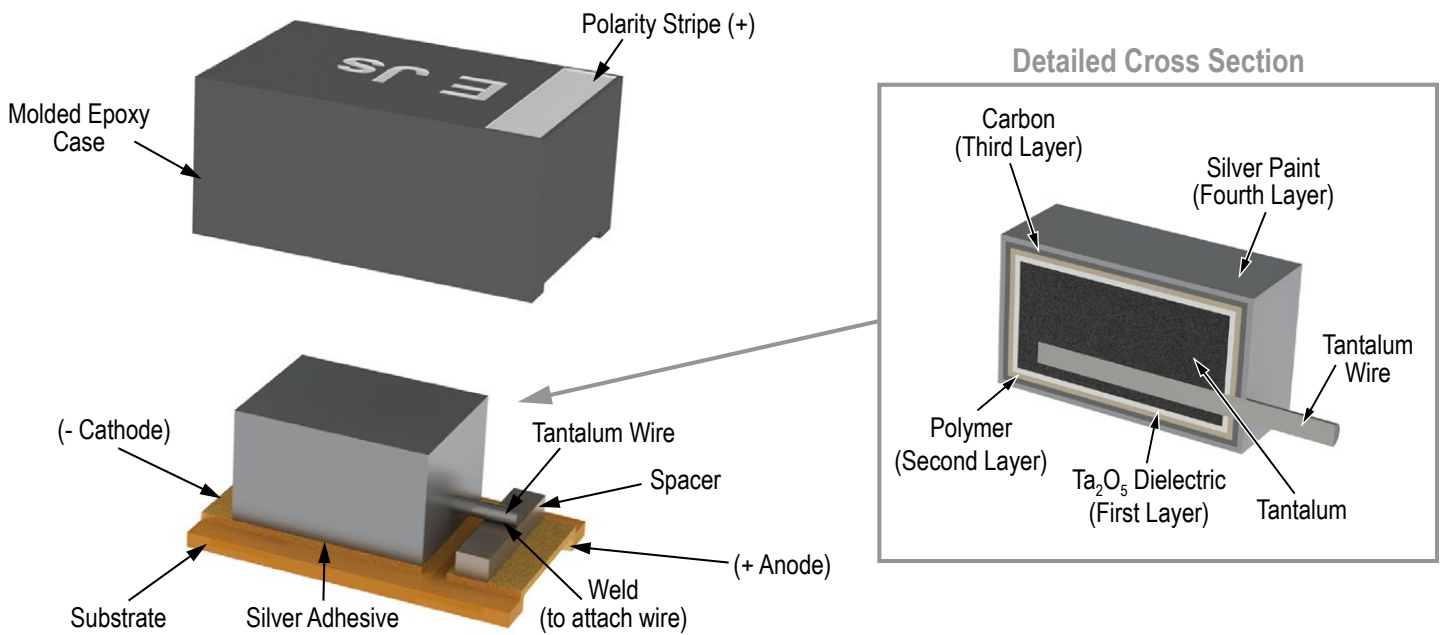
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



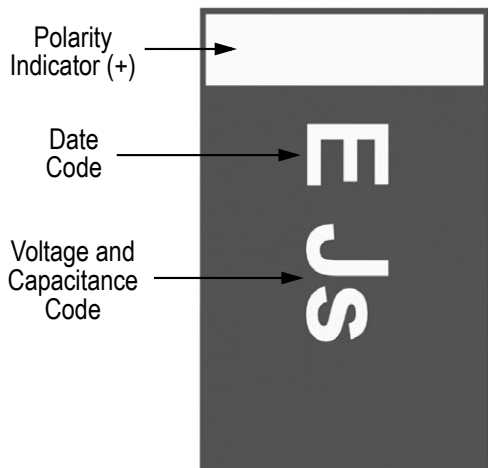
## Storage

All KO-CAP Series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 30°C and humidity not in excess of 60% RH.

## Construction



## Capacitor Marking



Code	J	A
Rated Voltage	6 V	10 V

Code	j	s	a
Capacitance	22	47	100

Date Code *												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	A	B	C	D	E	F	G	H	J	K	L	M
2014	N	P	Q	R	S	T	U	V	W	X	Y	Z
2015	a	b	c	d	e	f	g	h	j	k	l	m
2016	n	p	q	r	s	t	u	v	w	x	y	z

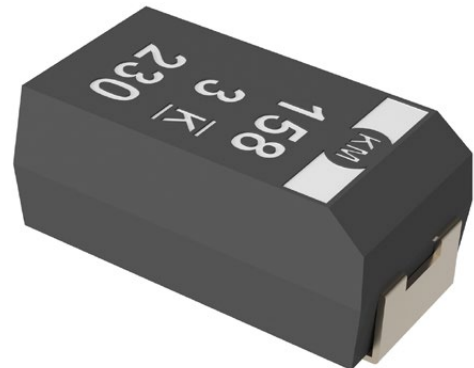
## Overview

The KEMET Organic Capacitor (KO-CAP) is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The KO-CAP also exhibits a benign failure mode which eliminates the ignition failures that can occur in standard MnO<sub>2</sub> tantalum types. KO-CAPs may also be operated at steady state voltages up to 90% of rated voltage for part types with rated voltages of ≤10 volts and up to 80% of rated voltage for part types >10 volts with equivalent or better reliability than traditional MnO<sub>2</sub> tantalum capacitors operated at 50% of rated voltage.

The T530 Series KO-CAP offers the same advantages as the T520 Series but also has the added advantages of higher capacitance, 125°C performance capability, higher ripple current handling capability and a lower ESR range. Packaged as multiple anodes to reduce the depth that the signal must penetrate, this parallel arrangement reduces the ESR further still to achieve the highest capacitance and lowest ESR of any other type of surface mount capacitor with typical ESR values as low as 4 mΩ. With reduced ESR, the enhanced capacitance retention at higher frequencies provides the lowest total capacitance and most economical solution for high power applications.

## Benefits

- ESR: 4 mΩ to 40 mΩ
- 125°C maximum operating temperature
- Polymer cathode technology
- High frequency capacitance retention
- Non-ignition failure mode
- Capacitance: 150 μF to 1,500 μF
- 100% accelerated steady state aging
- 100% surge current tested
- Utilizes multiple tantalum anode technology
- Volumetric efficiency
- Use up to 90% of rated voltage (10% derating) for part types ≤ 10 V
- Use up to 80% of rated voltage (20% derating) for part types > 10 V
- Self-healing mechanism
- EIA standard case sizes



## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn Solder



RoHS Compliant



## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Applications

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

## Ordering Information

T	530	X	337	M	010	A	T	E005	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/ Design	Lead Material	ESR Code	Packaging (C-Spec)
T = Tantalum	530 = High Capacitance 125°C Rated Polymer	D, X, Y	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	2R5 = 2.5 V 003 = 3 V 004 = 4 V 006 = 6.3 V 010 = 10 V 016 = 16 V	A = N/A	T = 100% Matte Tin (Sn) plated* H = Standard solder Coated (SnPb 5% Pb minimum)	E = ESR Last three digits specify ESR in mΩ (005 = 5 mΩ)	Blank = 7" Reel 7280 = 13" Reel

\* For gold plated termination please contact KEMET representative

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C
Rated Capacitance Range	150 – 1,500 µF @ 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2.5 – 16 V
DF (120 Hz)	8%
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.1 CV (µA) at rated voltage after 5 minutes

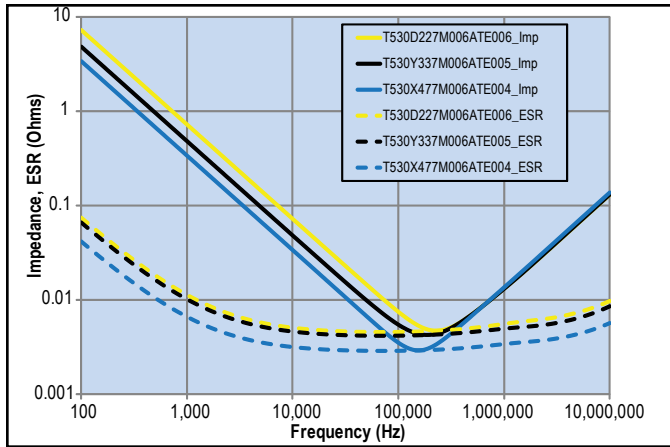
## Qualification

Test	Condition	Characteristics				
Endurance	105°C @ rated voltage, 2,000 hours 125°C @ 2/3 rated voltage, 2,000 hours	Δ C/C	Within -20%/+10% of initial value			
		DF	≤ initial limit			
		DCL	2 x initial limit @ 125°C			
		ESR	2 x initial limit			
Storage Life	125°C @ 0 volts, 2,000 hours	Δ C/C	Within -20%/+10% of initial value			
		DF	Within initial limits			
		DCL	Within 2.0 x initial limit			
		ESR	Within 2.0 x initial limit			
Humidity	60°C, 90% RH, 1,000 hours, No Load	Δ C/C	Within -5%/+35% of initial value			
		DF	≤ initial limit			
		DCL	Within 3.0 x initial limit			
Temperature Stability	Extreme temperature exposure at a succession of continuous steps at +25°C, -55°C, +25°C, +85°C, +105°C, +25°C		+25°C	-55°C	+85°C	+125°C
		Δ C/C	IL*	±20%	±20%	±30%
		DF	IL	IL	1.2 x IL	1.5 x IL
Surge Voltage	105°C, 1.32 x rated voltage, 33Ω Resistance, 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			

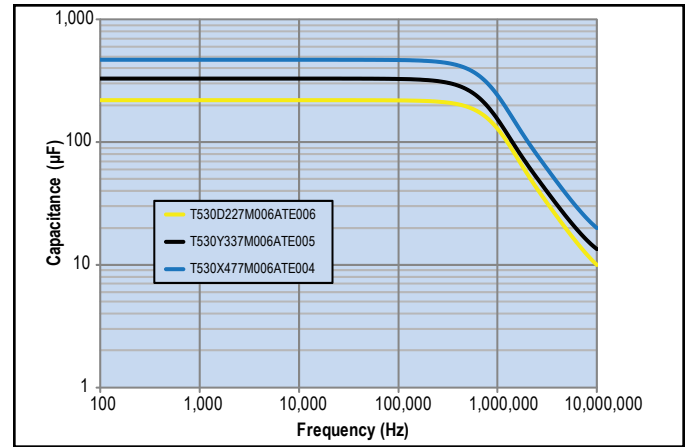
\*IL = Initial limit

## Electrical Characteristics

ESR vs. Frequency



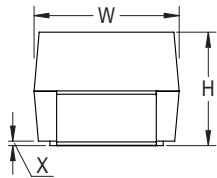
Capacitance vs. Frequency



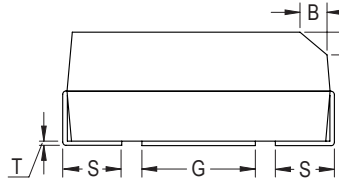
## Dimensions – Millimeters (Inches)

Metric will govern

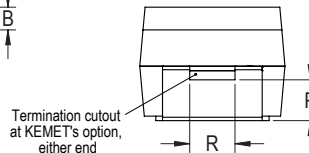
CATHODE (-) END VIEW



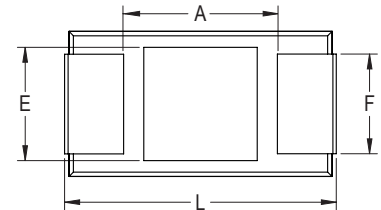
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component												
KEMET	EIA	L*	W*	H*	F* ±0.1 ±(0.004)	S* ±0.3 ±(0.012)	B* ±0.15 (Ref) ±.006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Min)	G (Ref)	E (Ref)
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)
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)
Y	7343-40	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	4.0 (0.157)	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)

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions

**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
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/ 5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ +25°C 100 kHz Maximum	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
2.5	470	D/7343-31	T530D477M2R5A(1)E005	118	8	5	7100	3	125
2.5	470	D/7343-31	T530D477M2R5A(1)E006	118	8	6	6500	3	125
2.5	470	D/7343-31	T530D477M2R5A(1)E010	118	8	10	5000	3	125
2.5	560	D/7343-31	T530D567M2R5A(1)E005	140	8	5	7100	3	125
2.5	680	Y/7343-40	T530Y687M2R5A(1)E005	170	8	5	7300	3	125
2.5	680	Y/7343-40	T530Y687M2R5A(1)E006	170	8	6	6600	3	125
2.5	680	Y/7343-40	T530Y687M2R5A(1)E007	170	8	7	6100	3	125
2.5	680	D/7343-31	T530D687M2R5A(1)E006	170	8	6	6500	3	125
2.5	680	D/7343-31	T530D687M2R5A(1)E010	170	8	10	5000	3	125
2.5	680	D/7343-31	T530D687M2R5A(1)E007	170	8	7	6000	3	125
2.5	680	X/7343-43	T530X687M2R5A(1)E006	170	8	6	6700	3	125
2.5	1000	Y/7343-40	T530Y108M2R5A(1)E005	250	8	5	7300	3	125
2.5	1000	Y/7343-40	T530Y108M2R5A(1)E006	250	8	6	6600	3	125
2.5	1000	X/7343-43	T530X108M2R5A(1)E004	250	8	4	8200	3	125
2.5	1000	X/7343-43	T530X108M2R5A(1)E005	250	8	5	7300	3	125
2.5	1000	X/7343-43	T530X108M2R5A(1)E006	250	8	6	6700	3	125
2.5	1500	X/7343-43	T530X158M2R5A(1)E005	375	8	5	7300	3	125
3	470	D/7343-31	T530D477M003A(1)E010	141	8	10	5000	3	125
3	680	D/7343-31	T530D687M003A(1)E010	204	8	10	5000	3	125
3	1000	X/7343-43	T530X108M003A(1)E010	300	8	10	5200	3	125
3	1500	X/7343-43	T530X158M003A(1)E008	450	8	8	5800	3	125
4	330	D/7343-31	T530D337M004A(1)E005	132	8	5	7100	3	125
4	330	D/7343-31	T530D337M004A(1)E006	132	8	6	6500	3	125
4	470	D/7343-31	T530D477M004A(1)E006	188	8	6	6500	3	125
4	470	D/7343-31	T530D477M004A(1)E010	188	8	10	5000	3	125
4	470	Y/7343-40	T530Y477M004A(1)E005	188	8	5	7300	3	125
4	470	Y/7343-40	T530Y477M004A(1)E006	188	8	6	6600	3	125
4	680	Y/7343-40	T530Y687M004A(1)E005	272	8	5	7300	3	125
4	680	X/7343-43	T530X687M004A(1)E004	272	8	4	8200	3	125
4	680	X/7343-43	T530X687M004A(1)E005	272	8	5	7300	3	125
4	680	X/7343-43	T530X687M004A(1)E006	272	8	6	6700	3	125
4	680	X/7343-43	T530X687M004A(1)E010	272	8	10	5200	3	125
4	1000	X/7343-43	T530X108M004A(1)E006	400	8	6	6700	3	125
6.3	220	D/7343-31	T530D227M006A(1)E005	139	8	5	7100	3	125
6.3	220	D/7343-31	T530D227M006A(1)E006	139	8	6	6500	3	125
6.3	330	D/7343-31	T530D337M006A(1)E006	208	8	6	6500	3	125
6.3	330	D/7343-31	T530D337M006A(1)E010	208	8	10	5000	3	125
6.3	330	Y/7343-40	T530Y337M006A(1)E005	208	8	5	7300	3	125
6.3	330	Y/7343-40	T530Y337M006A(1)E006	208	8	6	6600	3	125
6.3	330	Y/7343-40	T530Y337M006A(1)E010	208	8	10	5100	3	125
6.3	470	Y/7343-40	T530Y477M006A(1)E005	296	8	5	7300	3	125
6.3	470	X/7343-43	T530X477M006A(1)E004	296	8	4	8200	3	125
6.3	470	X/7343-43	T530X477M006A(1)E005	296	8	5	7300	3	125
6.3	470	X/7343-43	T530X477M006A(1)E006	296	8	6	6700	3	125
6.3	470	X/7343-43	T530X477M006A(1)E010	296	8	10	5200	3	125
6.3	680	X/7343-43	T530X687M006A(1)E010	428	8	10	5200	3	125
6.3	680	X/7343-43	T530X687M006A(1)E018	428	8	18	3900	3	125
10	150	D/7343-31	T530D157M010A(1)E005	150	8	5	7100	3	125
10	150	D/7343-31	T530D157M010A(1)E006	150	8	6	6500	3	125
10	150	D/7343-31	T530D157M010A(1)E010	150	8	10	5000	3	125
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/ 5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ +25°C 100 kHz Maximum	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp

(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.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/ 5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ +25°C 100 kHz Maximum	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
10	220	D/7343-31	T530D227M010A(1)E006	220	8	6	6500	3	125
10	220	D/7343-31	T530D227M010A(1)E010	220	8	10	5000	3	125
10	220	Y/7343-40	T530Y227M010A(1)E006	220	8	6	6600	3	125
10	330	X/7343-43	T530X337M010A(1)E004	330	8	4	8200	3	125
10	330	X/7343-43	T530X337M010A(1)E005	330	8	5	7300	3	125
10	330	X/7343-43	T530X337M010A(1)E006	330	8	6	6700	3	125
10	330	X/7343-43	T530X337M010A(1)E010	330	8	10	5200	3	125
16	150	X/7343-43	T530X157M016A(1)E015	240	8	15	4200	3	125
16	150	X/7343-43	T530X157M016A(1)E025	240	8	25	3300	3	125
16	150	X/7343-43	T530X157M016A(1)E040	240	8	40	2600	3	125
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/ 5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ +25°C 100 kHz Maximum	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
<b>Rated Voltage</b>	<b>Rated Cap</b>	<b>Case Code/ Case Size</b>	<b>KEMET Part Number</b>	<b>DC Leakage</b>	<b>DF</b>	<b>ESR</b>	<b>Maximum Allowable Ripple Current</b>	<b>MSL</b>	<b>Maximum Operating Temp</b>

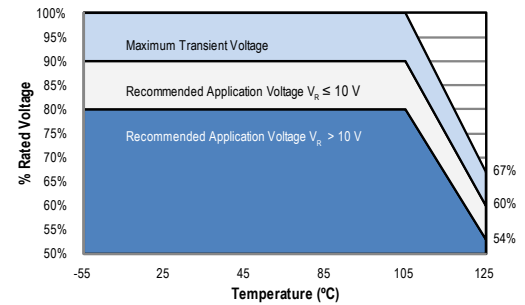
(1) Standard with tin terminations (14th character = T). Tin/lead terminations is also available (14th character = H).

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	Maximum Recommended Transient Voltage (1 ms – 1 μs)
-55°C to 105°C		
$2.5\text{ V} \leq V_R \leq 10\text{ V}$	90% of $V_R$	$V_R$
$V_R = 16\text{ V}$	80% of $V_R$	$V_R$
105°C to 125°C		
$2.5\text{ V} \leq V_R \leq 10\text{ V}$	60% of $V_R$	67% of $V_R$
$V_R = 16\text{ V}$	54% of $V_R$	67% 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 (P max) mWatts @ 45°C with +30°C Rise
W	7343-15	325
Z	7343-17	325
D	7343-31	255
Y	7343-40	263
X	7443-43	270

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

Temperature Compensation Multipliers for Maximum Ripple Current		
$T \leq 45^\circ\text{C}$	$45^\circ\text{C} < T \leq 85^\circ\text{C}$	$85^\circ\text{C} < T \leq 125^\circ\text{C}$
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.

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

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

$I$  = rms ripple current (amperes)

$E$  = rms ripple voltage (volts)

$P \text{ max}$  = maximum power dissipation (watts)

$R$  = ESR at specified frequency (ohms)

$Z$  = Impedance at specified frequency (ohms)

## Reverse Voltage

Polymer tantalum 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)				
		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
X <sup>1</sup>	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 <sup>1</sup>	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

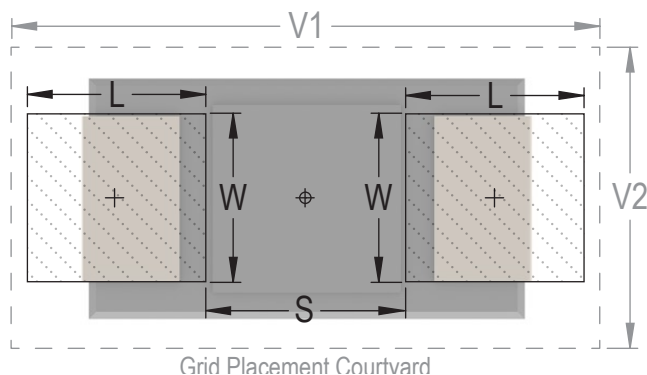
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.





## 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.

\*Case Size D, E, P, Y, and X

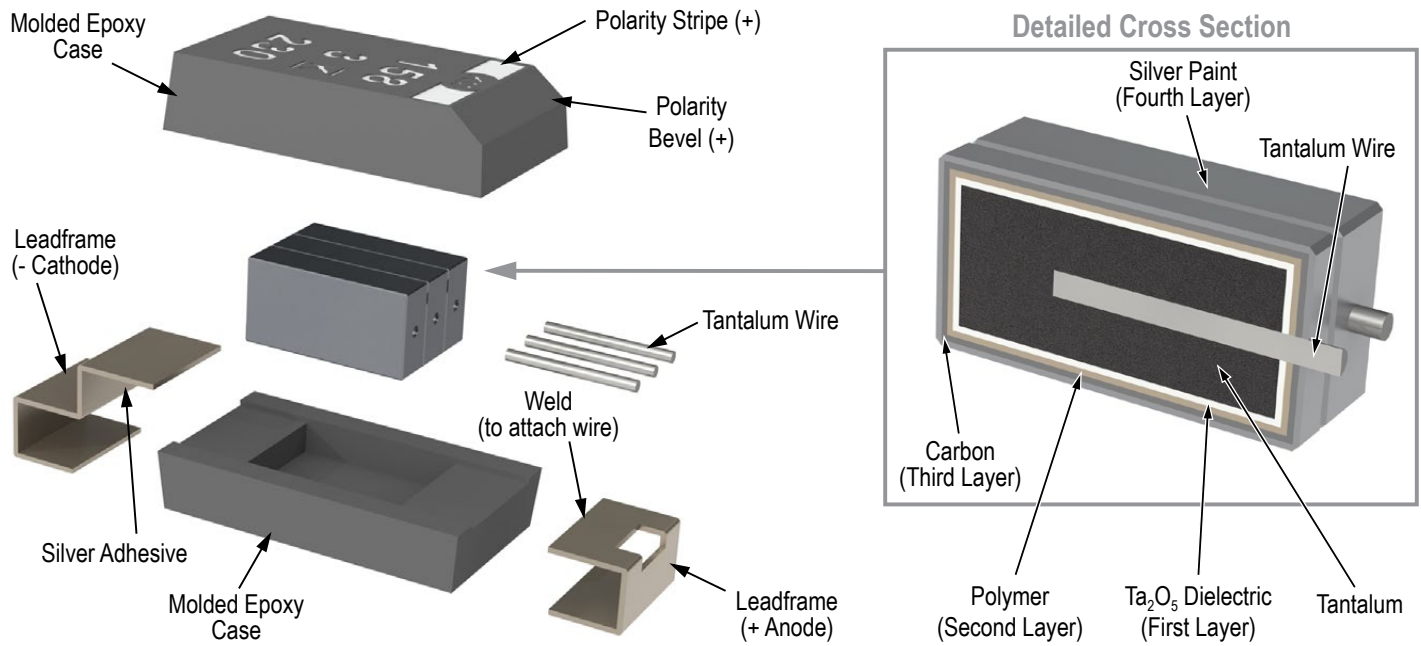
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



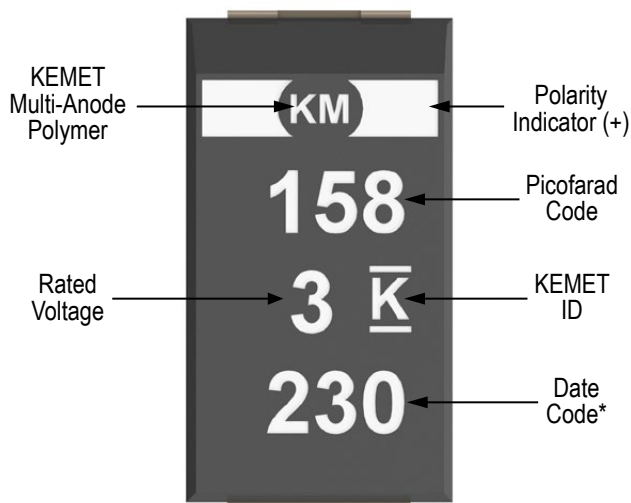
## Storage

All KO-CAP series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 40°C and humidity not in excess of 90% RH.

## Construction



## Capacitor Marking



\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

# T543 Series Commercial Off-The-Shelf (COTS) Polymer Tantalum

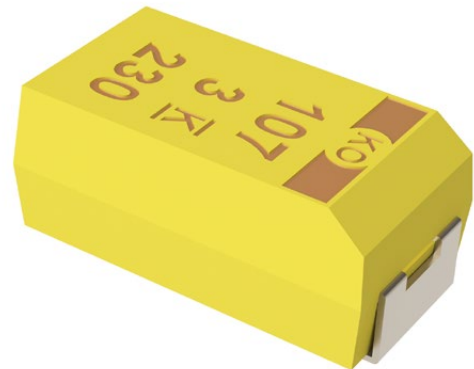
## Overview

The KEMET Organic Capacitor is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR, improved capacitance retention at high frequency and improved ripple current handling capability. The polymer technology also exhibits a benign failure mode which eliminates the ignition failures. Tantalum polymers may also be operated at voltages up to 90% of rated voltage for part types with rated voltages of ≤ 10 volts and up to 80% of rated voltage for part types > 10 volts with equivalent or better reliability than traditional MnO<sub>2</sub> tantalum capacitors operated at 50% of rated voltage.

The T543 Series Polymer COTS is an upscreened version of KEMET's commercial polymer product offering and captures the best features of multilayer ceramic capacitors (low ESR, high frequency capacitance retention), aluminum electrolytic capacitors (higher capacitance, benign failure mode), and proven solid tantalum technology (volumetric efficiency, surface mount capability, extremely long life). The T543 also offers an option for surge current testing (10 cycles at +25°C and 10 cycles at -55°C/+85°C) and termination finish (SnPb and 100% Sn).

## Benefits

- Extremely low ESR
- Operating temperature range of -55°C to 105°C
- Polymer cathode technology
- High frequency capacitance retention
- Non-ignition failure mode
- Capacitance up to 1,500 µF
- Enhanced derating
- 100% accelerated steady state aging
- 100% surge current tested
- Taped and reeled per EIA 481
- Volumetric efficiency and self-healing mechanism
- Termination options (SnPb and 100% Sn)
- Surge options at 25°C and -55°C/85°C
- EIA standard case sizes



## 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.

When extreme temperatures and humidity are taken into account, polymer tantalum capacitors offer a number of advantages over other types of capacitors. KEMET continues to investigate the behavior of polymer tantalum 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. You may also refer to “Considerations for Polymer Capacitors in Extreme Environments” located at [www.kemet.com/ExtremePolymerPaper](http://www.kemet.com/ExtremePolymerPaper).

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

T	543	D	156	K	035	A	H	E	100	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	Surge	ESR	Packaging (C-Spec)
T = Tantalum	Polymer Tantalum COTS	A, B, C, D, H, L, M, T, U, V, W, X, Y	First two digits represent significant figures. Third digit specifies number of zeros.	K = $\pm 10\%$ M = $\pm 20\%$	2R5 = 2.5 V 003 = 3 V 004 = 4 V 006 = 6.3 V 010 = 10 V 12R = 12.5 V 016 = 16 V 020 = 20 V 025 = 25 V 035 = 35 V 050 = 50 V 063 = 63 V	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

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 105°C
Rated Capacitance Range	4.7 – 1,500 $\mu\text{F}$ @ 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	$\leq 0.1 \text{ CV}$ ( $\mu\text{A}$ ) at rated voltage after 5 minutes

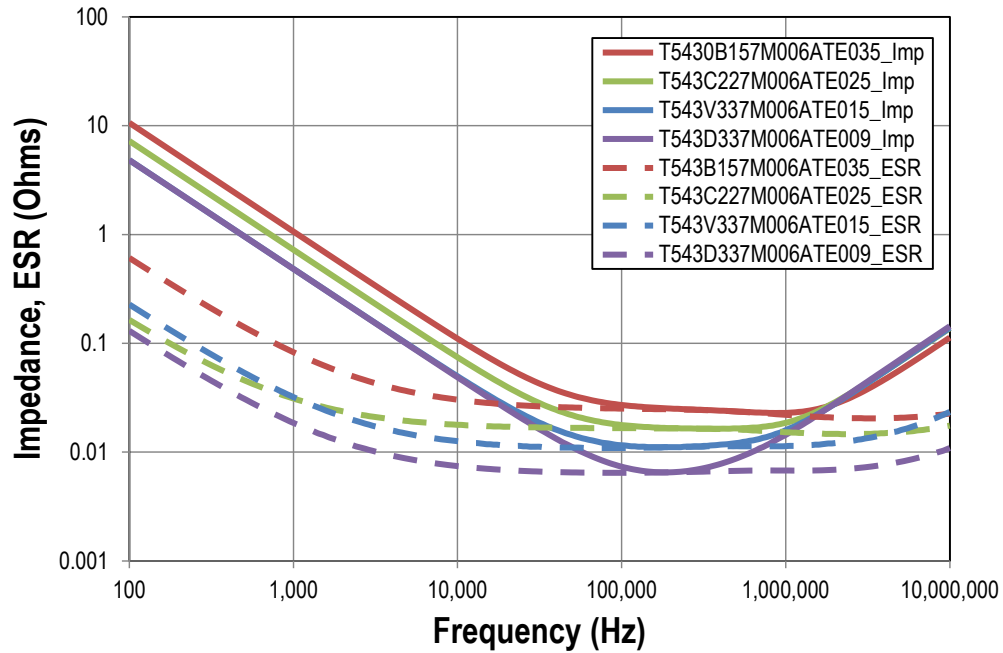
## Qualification

Test	Condition	Characteristics				
Endurance	105°C @ rated voltage, 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			
Storage Life	105°C @ 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, 500 hours	Δ C/C	Within -5%/+35% of initial value			
		DF	Within initial limits			
		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 +25°C, -55°C, +25°C, +85°C, +105°C, +25° 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			

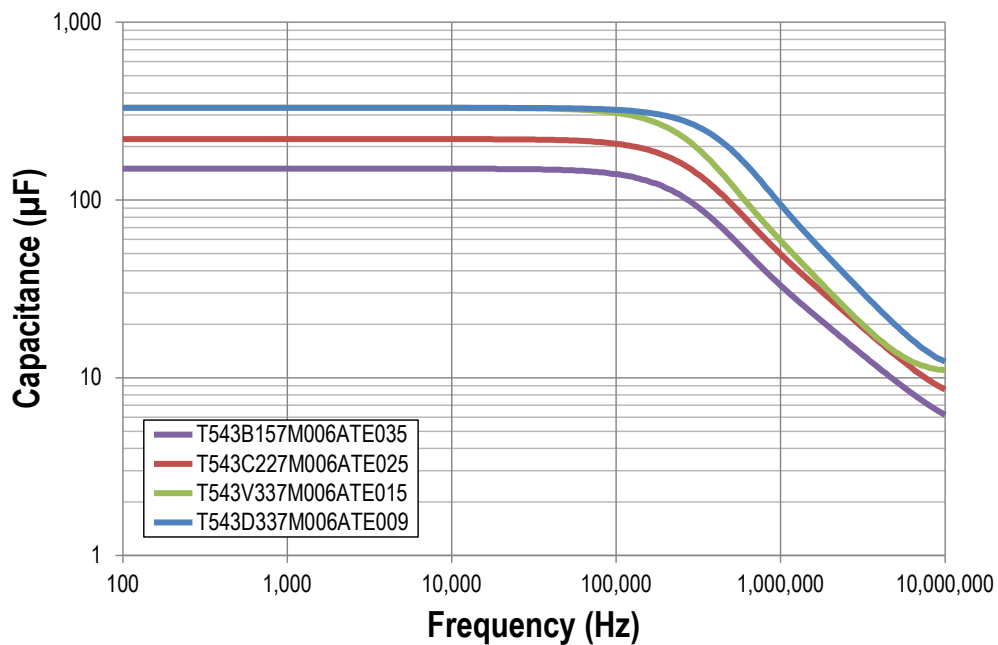
\*IL = Initial limit

## Electrical Characteristics

ESR vs. Frequency

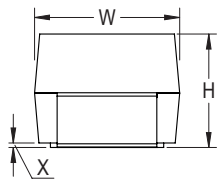


Capacitance vs. Frequency

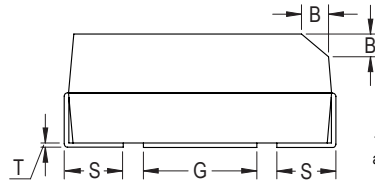


## Dimensions – Millimeters

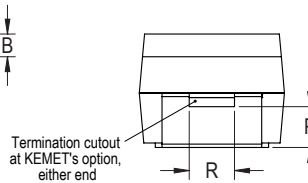
CATHODE (-) END VIEW



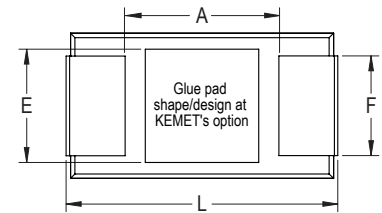
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component												
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)
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 (.016)	0.4 (0.016)	0.13 (0.005)	0.8 (.31)	1.1 (0.043)	1.3 (0.051)
B	3528-21	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 (.020)	1.0 (0.039)	0.13 (0.005)	1.1 (0.043)	1.8 (0.071)	2.2 (0.087)
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 (.035)	1.0 (0.039)	0.13 (0.005)	2.5 (.098)	2.8 (0.110)	2.4 (0.094)
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 (.150)	3.5 (0.138)	3.5 (0.138)
H	7360-20	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	2.0 (0.078) Maximum	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 (.130)	3.5 (0.138)	3.5 (0.138)
L	6032-19	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.2 (0.110 ±0.008)	1.9 (0.075)	2.2 (0.087)	1.3 (0.051)	n/a	0.05 (0.002)	n/a	n/a	0.13 (0.005)	2.5 (.098)	2.8 (0.110)	2.4 (0.094)
M	3528-15	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.5 (0.059)	2.2 (0.087)	0.8 (0.031)	n/a	0.05 (0.002)	n/a	n/a	0.13 (0.005)	1.1 (.043)	1.8 (0.071)	2.2 (0.087)
T	3528-12	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.2 (0.047)	2.2 (0.087)	0.8 (0.031)	n/a	0.05 (0.002)	n/a	n/a	0.13 (0.005)	1.1 (.043)	1.8 (0.071)	2.2 (0.087)
U	6032-15	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.2 (0.110 ±0.008)	1.5 (0.059)	2.2 (0.087)	1.3 (0.051)	n/a	0.05 (0.002)	n/a	n/a	0.13 (0.005)	2.5 (.098)	2.8 (0.110)	2.4 (0.094)
V	7343-20	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.0 (0.079)	2.4 (0.094)	1.3 (0.051)	n/a	0.05 (0.002)	n/a	n/a	0.13 (0.005)	3.8 (.150)	3.5 (0.138)	3.5 (0.138)
W	7343-15	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.5 (0.059)	2.4 (0.094)	1.3 (0.051)	n/a	0.05 (0.002)	n/a	n/a	0.13 (0.005)	3.8 (.150)	3.5 (0.138)	3.5 (0.138)
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 (.150)	3.5 (0.138)	3.5 (0.138)
Y	7343-40	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	4.0 (0.157)	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 (.150)	3.5 (0.138)	3.5 (0.138)

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions



**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	Maximum Operating Temp	MSL
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
2.5	47	A/3216-18	T543A476(1)2R5A(2)(3)090	12	8	90	1116	105	3
2.5	56	T/3528-12	T543T566(1)2R5A(2)(3)040	14	8	40	1620	105	3
2.5	56	T/3528-12	T543T566(1)2R5A(2)(3)070	14	8	70	1225	105	3
2.5	68	A/3216-18	T543A686(1)2R5A(2)(3)070	17	8	70	1265	105	3
2.5	68	A/3216-18	T543A686(1)2R5A(2)(3)080	17	8	80	1183	105	3
2.5	100	T/3528-12	T543T107(1)2R5A(2)(3)040	25	8	40	1620	105	3
2.5	100	T/3528-12	T543T107(1)2R5A(2)(3)070	25	8	70	1225	105	3
2.5	100	T/3528-12	T543T107(1)2R5A(2)(3)080	25	8	80	1146	105	3
2.5	100	B/3528-21	T543B107(1)2R5A(2)(3)025	25	8	25	2254	105	3
2.5	100	B/3528-21	T543B107(1)2R5A(2)(3)035	25	8	35	1905	105	3
2.5	100	B/3528-21	T543B107(1)2R5A(2)(3)040	25	8	40	1782	105	3
2.5	100	B/3528-21	T543B107(1)2R5A(2)(3)070	25	8	70	1347	105	3
2.5	150	U/6032-15	T543U157(1)2R5A(2)(3)055	38	8	55	1567	105	3
2.5	220	B/3528-21	T543B227(1)2R5A(2)(3)025	55	8	25	2254	105	3
2.5	220	B/3528-21	T543B227(1)2R5A(2)(3)030	55	8	30	2058	105	3
2.5	220	B/3528-21	T543B227(1)2R5A(2)(3)035	55	8	35	1905	105	3
2.5	220	B/3528-21	T543B227(1)2R5A(2)(3)055	55	8	55	1520	105	3
2.5	220	B/3528-21	T543B227(1)2R5A(2)(3)070	55	8	70	1347	105	3
2.5	220	U/6032-15	T543U227(1)2R5A(2)(3)055	55	8	55	1567	105	3
2.5	220	C/6032-25	T543C227(1)2R5A(2)(3)025	55	8	25	2569	105	3
2.5	220	C/6032-25	T543C227(1)2R5A(2)(3)045	55	8	45	1915	105	3
2.5	220	W/7343-15	T543W227(1)2R5A(2)(3)025	55	10	25	2683	105	3
2.5	220	V/7343-20	T543V227(1)2R5A(2)(3)015	55	10	15	3531	105	3
2.5	220	V/7343-20	T543V227(1)2R5A(2)(3)025	55	10	25	2735	105	3
2.5	220	V/7343-20	T543V227(1)2R5A(2)(3)045	55	10	45	2039	105	3
2.5	220	D-7343-31	T543D227(1)2R5A(2)(3)040	55	10	40	2372	105	3
2.5	330	B/3528-21	T543B337(1)2R5A(2)(3)035	83	8	35	1905	105	3
2.5	330	B/3528-21	T543B337(1)2R5A(2)(3)045	83	8	45	1680	105	3
2.5	330	B/3528-21	T543B337(1)2R5A(2)(3)070	83	8	70	1347	105	3
2.5	330	L/6032-19	T543L337(1)2R5A(2)(3)012	83	8	12	3536	105	3
2.5	330	L/6032-19	T543L337(1)2R5A(2)(3)025	83	8	25	2449	105	3
2.5	330	C/6032-25	T543C337(1)2R5A(2)(3)015	83	8	15	3317	105	3
2.5	330	C/6032-25	T543C337(1)2R5A(2)(3)018	83	8	18	3028	105	3
2.5	330	C/6032-25	T543C337(1)2R5A(2)(3)025	83	8	25	2569	105	3
2.5	330	C/6032-25	T543C337(1)2R5A(2)(3)045	83	8	45	1915	105	3
2.5	330	W/7343-15	T543W337(1)2R5A(2)(3)015	83	10	15	3464	105	3
2.5	330	W/7343-15	T543W337(1)2R5A(2)(3)025	83	10	25	2683	105	3
2.5	330	W/7343-15	T543W337(1)2R5A(2)(3)040	83	10	40	2121	105	3
2.5	330	V/7343-20	T543V337(1)2R5A(2)(3)015	83	10	15	3531	105	3
2.5	330	V/7343-20	T543V337(1)2R5A(2)(3)018	83	10	18	3223	105	3
2.5	330	V/7343-20	T543V337(1)2R5A(2)(3)025	83	10	25	2735	105	3
2.5	330	V/7343-20	T543V337(1)2R5A(2)(3)040	83	10	40	2162	105	3
2.5	330	D-7343-31	T543D337(1)2R5A(2)(3)006	83	10	6	6124	105	3
2.5	330	D-7343-31	T543D337(1)2R5A(2)(3)007	83	10	7	5669	105	3
2.5	330	D-7343-31	T543D337(1)2R5A(2)(3)025	83	10	25	3000	105	3
2.5	470	C/6032-25	T543C477(1)2R5A(2)(3)025	118	8	25	2569	105	3
2.5	470	C/6032-25	T543C477(1)2R5A(2)(3)045	118	8	45	1915	105	3
2.5	470	V/7343-20	T543V477(1)2R5A(2)(3)018	118	10	18	3223	105	3
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)005	118	10	5	6708	105	3
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)006	118	10	6	6124	105	3
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 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.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp	MSL
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)007	118	10	7	5669	105	3
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)009	118	10	9	5000	105	3
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)010	118	10	10	4743	105	3
2.5	470	D-7343-31	T543D477(1)2R5A(2)(3)025	118	10	25	3000	105	3
2.5	560	D-7343-31	T543D567(1)2R5A(2)(3)005	140	10	5	6708	105	3
2.5	680	D-7343-31	T543D687(1)2R5A(2)(3)006	170	10	6	6124	105	3
2.5	680	D-7343-31	T543D687(1)2R5A(2)(3)010	170	10	10	4743	105	3
2.5	680	D-7343-31	T543D687(1)2R5A(2)(3)015	170	10	15	3873	105	3
2.5	680	D-7343-31	T543D687(1)2R5A(2)(3)040	170	10	40	2372	105	3
2.5	680	Y/7343-40	T543Y687(1)2R5A(2)(3)005	170	10	5	6943	105	3
2.5	680	Y/7343-40	T543Y687(1)2R5A(2)(3)006	170	10	6	6338	105	3
2.5	680	Y/7343-40	T543Y687(1)2R5A(2)(3)010	170	10	10	4909	105	3
2.5	680	Y/7343-40	T543Y687(1)2R5A(2)(3)015	170	10	15	4008	105	3
2.5	680	Y/7343-40	T543Y687(1)2R5A(2)(3)025	170	10	25	3105	105	3
2.5	680	X/7343-43	T543X687(1)2R5A(2)(3)006	170	10	6	6416	105	3
2.5	1000	Y/7343-40	T543Y108(1)2R5A(2)(3)005	250	10	5	6943	105	3
2.5	1000	Y/7343-40	T543Y108(1)2R5A(2)(3)006	250	10	6	6338	105	3
2.5	1000	Y/7343-40	T543Y108(1)2R5A(2)(3)010	250	10	10	4909	105	3
2.5	1000	Y/7343-40	T543Y108(1)2R5A(2)(3)015	250	10	15	4008	105	3
2.5	1000	Y/7343-40	T543Y108(1)2R5A(2)(3)025	250	10	25	3105	105	3
2.5	1000	X/7343-43	T543X108(1)2R5A(2)(3)005	250	10	5	7029	105	3
2.5	1000	X/7343-43	T543X108(1)2R5A(2)(3)006	250	10	6	6416	105	3
2.5	1000	X/7343-43	T543X108(1)2R5A(2)(3)010	250	10	10	4970	105	3
2.5	1500	X/7343-43	T543X158(1)2R5A(2)(3)005	375	10	5	7029	105	3
2.5	1500	X/7343-43	T543X158(1)2R5A(2)(3)010	375	10	10	4970	105	3
3	100	B/3528-21	T543B107(1)003A(2)(3)035	30	8	35	1905	105	3
3	100	B/3528-21	T543B107(1)003A(2)(3)040	30	8	40	1782	105	3
3	100	B/3528-21	T543B107(1)003A(2)(3)070	30	8	70	1347	105	3
3	100	B/3528-21	T543B107(1)003A(2)(3)080	30	8	80	1260	105	3
3	150	B/3528-21	T543B157(1)003A(2)(3)035	45	8	35	1905	105	3
3	150	B/3528-21	T543B157(1)003A(2)(3)040	45	8	40	1782	105	3
3	150	B/3528-21	T543B157(1)003A(2)(3)070	45	8	70	1347	105	3
3	150	B/3528-21	T543B157(1)003A(2)(3)080	45	8	80	1260	105	3
3	330	V/7343-20	T543V337(1)003A(2)(3)015	99	10	15	3531	105	3
3	330	V/7343-20	T543V337(1)003A(2)(3)025	99	10	25	2735	105	3
3	330	D-7343-31	T543D337(1)003A(2)(3)025	99	10	25	3000	105	3
3	470	D-7343-31	T543D477(1)003A(2)(3)010	141	10	10	4743	105	3
3	470	D-7343-31	T543D477(1)003A(2)(3)025	141	10	25	3000	105	3
3	680	D-7343-31	T543D687(1)003A(2)(3)010	204	10	10	4743	105	3
3	680	D-7343-31	T543D687(1)003A(2)(3)015	204	10	15	3873	105	3
3	680	D-7343-31	T543D687(1)003A(2)(3)025	204	10	25	3000	105	3
3	680	D-7343-31	T543D687(1)003A(2)(3)040	204	10	40	2372	105	3
3	1000	X/7343-43	T543X108(1)003A(2)(3)010	300	10	10	4970	105	3
3	1000	X/7343-43	T543X108(1)003A(2)(3)015	300	10	15	4058	105	3
3	1000	X/7343-43	T543X108(1)003A(2)(3)030	300	10	30	2869	105	3
3	1500	X/7343-43	T543X158(1)003A(2)(3)008	450	10	8	5557	105	3
4	15	T/3528-12	T543T156(1)004A(2)(3)100	6	8	100	1025	105	3
4	33	A/3216-18	T543A336(1)004A(2)(3)070	13	8	70	1265	105	3
4	33	A/3216-18	T543A336(1)004A(2)(3)080	13	8	80	1183	105	3
4	47	A/3216-18	T543A476(1)004A(2)(3)070	19	8	70	1265	105	3
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 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.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp	MSL
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
4	47	A/3216-18	T543A476(1)004A(2)(3)080	19	8	80	1183	105	3
4	47	T/3528-12	T543T476(1)004A(2)(3)070	19	8	70	1225	105	3
4	68	T/3528-12	T543T686(1)004A(2)(3)070	27	8	70	1225	105	3
4	68	T/3528-12	T543T686(1)004A(2)(3)080	27	8	80	1146	105	3
4	68	B/3528-21	T543B686(1)004A(2)(3)035	27	8	35	1905	105	3
4	68	B/3528-21	T543B686(1)004A(2)(3)040	27	8	40	1782	105	3
4	68	B/3528-21	T543B686(1)004A(2)(3)070	27	8	70	1347	105	3
4	68	B/3528-21	T543B686(1)004A(2)(3)080	27	8	80	1260	105	3
4	68	U/6032-15	T543U686(1)004A(2)(3)055	27	8	55	1567	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	1225	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	1905	105	3
4	100	B/3528-21	T543B107(1)004A(2)(3)040	40	8	40	1782	105	3
4	100	B/3528-21	T543B107(1)004A(2)(3)070	40	8	70	1347	105	3
4	100	B/3528-21	T543B107(1)004A(2)(3)080	40	8	80	1260	105	3
4	100	U/6032-15	T543U107(1)004A(2)(3)055	40	8	55	1567	105	3
4	150	B/3528-21	T543B157(1)004A(2)(3)035	60	8	35	1905	105	3
4	150	B/3528-21	T543B157(1)004A(2)(3)040	60	8	40	1782	105	3
4	150	B/3528-21	T543B157(1)004A(2)(3)070	60	8	70	1347	105	3
4	150	U/6032-15	T543U157(1)004A(2)(3)055	60	8	55	1567	105	3
4	150	C/6032-25	T543C157(1)004A(2)(3)015	60	8	15	3317	105	3
4	150	C/6032-25	T543C157(1)004A(2)(3)025	60	8	25	2569	105	3
4	150	C/6032-25	T543C157(1)004A(2)(3)045	60	8	45	1915	105	3
4	150	C/6032-25	T543C157(1)004A(2)(3)100	60	8	100	1285	105	3
4	150	V/7343-20	T543V157(1)004A(2)(3)015	60	10	15	3531	105	3
4	150	V/7343-20	T543V157(1)004A(2)(3)025	60	10	25	2735	105	3
4	220	B/3528-21	T543B227(1)004A(2)(3)035	88	8	35	1905	105	3
4	220	B/3528-21	T543B227(1)004A(2)(3)045	88	8	45	1680	105	3
4	220	B/3528-21	T543B227(1)004A(2)(3)070	88	8	70	1347	105	3
4	220	L/6032-19	T543L227(1)004A(2)(3)012	88	8	12	3536	105	3
4	220	L/6032-19	T543L227(1)004A(2)(3)025	88	8	25	2449	105	3
4	220	C/6032-25	T543C227(1)004A(2)(3)015	88	8	15	3317	105	3
4	220	C/6032-25	T543C227(1)004A(2)(3)018	88	8	18	3028	105	3
4	220	C/6032-25	T543C227(1)004A(2)(3)025	88	8	25	2569	105	3
4	220	C/6032-25	T543C227(1)004A(2)(3)045	88	8	45	1915	105	3
4	220	C/6032-25	T543C227(1)004A(2)(3)055	88	8	55	1732	105	3
4	220	W/7343-15	T543W227(1)004A(2)(3)025	88	10	25	2683	105	3
4	220	W/7343-15	T543W227(1)004A(2)(3)040	88	10	40	2121	105	3
4	220	V/7343-20	T543V227(1)004A(2)(3)015	88	10	15	3531	105	3
4	220	V/7343-20	T543V227(1)004A(2)(3)018	88	10	18	3223	105	3
4	220	V/7343-20	T543V227(1)004A(2)(3)025	88	10	25	2735	105	3
4	220	V/7343-20	T543V227(1)004A(2)(3)040	88	10	40	2162	105	3
4	220	V/7343-20	T543V227(1)004A(2)(3)045	88	10	45	2039	105	3
4	220	D-7343-31	T543D227(1)004A(2)(3)025	88	10	25	3000	105	3
4	220	D-7343-31	T543D227(1)004A(2)(3)065	88	10	65	1861	105	3
4	330	C/6032-25	T543C337(1)004A(2)(3)025	132	8	25	2569	105	3
4	330	C/6032-25	T543C337(1)004A(2)(3)045	132	8	45	1915	105	3
4	330	V/7343-20	T543V337(1)004A(2)(3)018	132	10	18	3223	105	3
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 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.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp	MSL
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
4	330	V/7343-20	T543V337(1)004A(2)(3)025	132	10	25	2735	105	3
4	330	V/7343-20	T543V337(1)004A(2)(3)040	132	10	40	2162	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)005	132	10	5	6708	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)006	132	10	6	6124	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)007	132	10	7	5669	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)009	132	10	9	5000	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)010	132	10	10	4743	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)012	132	10	12	4330	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)015	132	10	15	3873	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)025	132	10	25	3000	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)040	132	10	40	2372	105	3
4	330	D-7343-31	T543D337(1)004A(2)(3)045	132	10	45	2236	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)006	188	10	6	6124	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)010	188	10	10	4743	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)012	188	10	12	4330	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)015	188	10	15	3873	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)018	188	10	18	3536	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)025	188	10	25	3000	105	3
4	470	D-7343-31	T543D477(1)004A(2)(3)040	188	10	40	2372	105	3
4	470	Y/7343-40	T543Y477(1)004A(2)(3)005	188	10	5	6943	105	3
4	470	Y/7343-40	T543Y477(1)004A(2)(3)006	188	10	6	6338	105	3
4	470	Y/7343-40	T543Y477(1)004A(2)(3)010	188	10	10	4909	105	3
4	470	Y/7343-40	T543Y477(1)004A(2)(3)025	188	10	25	3105	105	3
4	470	Y/7343-40	T543Y477(1)004A(2)(3)040	188	10	40	2455	105	3
4	680	D-7343-31	T543D687(1)004A(2)(3)025	272	10	25	3000	105	3
4	680	Y/7343-40	T543Y687(1)004A(2)(3)005	272	10	5	6943	105	3
4	680	Y/7343-40	T543Y687(1)004A(2)(3)010	272	10	10	4909	105	3
4	680	Y/7343-40	T543Y687(1)004A(2)(3)015	272	10	15	4008	105	3
4	680	Y/7343-40	T543Y687(1)004A(2)(3)025	272	10	25	3105	105	3
4	680	X/7343-43	T543X687(1)004A(2)(3)005	272	10	5	7029	105	3
4	680	X/7343-43	T543X687(1)004A(2)(3)006	272	10	6	6416	105	3
4	680	X/7343-43	T543X687(1)004A(2)(3)010	272	10	10	4970	105	3
4	680	X/7343-43	T543X687(1)004A(2)(3)015	272	10	15	4058	105	3
4	680	X/7343-43	T543X687(1)004A(2)(3)035	272	10	35	2657	105	3
4	1000	X/7343-43	T543X108(1)004A(2)(3)006	400	10	6	6416	105	3
4	1000	X/7343-43	T543X108(1)004A(2)(3)010	400	10	10	4970	105	3
6.3	15	T/3528-12	T543T156(1)006A(2)(3)100	9	8	100	1025	105	3
6.3	22	A/3216-18	T543A226(1)006A(2)(3)090	14	8	90	1116	105	3
6.3	22	A/3216-18	T543A226(1)006A(2)(3)100	14	8	100	1058	105	3
6.3	33	A/3216-18	T543A336(1)006A(2)(3)070	21	8	70	1265	105	3
6.3	33	A/3216-18	T543A336(1)006A(2)(3)080	21	8	80	1183	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	1225	105	3
6.3	33	B/3528-21	T543B336(1)006A(2)(3)025	21	8	25	2254	105	3
6.3	33	B/3528-21	T543B336(1)006A(2)(3)035	21	8	35	1905	105	3
6.3	33	B/3528-21	T543B336(1)006A(2)(3)040	21	8	40	1782	105	3
6.3	33	B/3528-21	T543B336(1)006A(2)(3)070	21	8	70	1347	105	3
6.3	33	B/3528-21	T543B336(1)006A(2)(3)080	21	8	80	1260	105	3
6.3	33	C/6032-25	T543C336(1)006A(2)(3)100	21	8	100	1285	105	3
6.3	47	A/3216-18	T543A476(1)006A(2)(3)150	30	8	150	864	105	3
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 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.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp	MSL
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
6.3	47	T/3528-12	T543T476(1)006A(2)(3)070	30	8	70	1225	105	3
6.3	47	T/3528-12	T543T476(1)006A(2)(3)080	30	8	80	1146	105	3
6.3	47	B/3528-21	T543B476(1)006A(2)(3)025	30	8	25	2254	105	3
6.3	47	B/3528-21	T543B476(1)006A(2)(3)035	30	8	35	1905	105	3
6.3	47	B/3528-21	T543B476(1)006A(2)(3)040	30	8	40	1782	105	3
6.3	47	B/3528-21	T543B476(1)006A(2)(3)070	30	8	70	1347	105	3
6.3	47	B/3528-21	T543B476(1)006A(2)(3)080	30	8	80	1260	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	1225	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	2254	105	3
6.3	68	B/3528-21	T543B686(1)006A(2)(3)035	43	8	35	1905	105	3
6.3	68	B/3528-21	T543B686(1)006A(2)(3)040	43	8	40	1782	105	3
6.3	68	B/3528-21	T543B686(1)006A(2)(3)070	43	8	70	1347	105	3
6.3	68	B/3528-21	T543B686(1)006A(2)(3)080	43	8	80	1260	105	3
6.3	68	U/6032-15	T543U686(1)006A(2)(3)055	43	8	55	1567	105	3
6.3	68	U/6032-15	T543U686(1)006A(2)(3)070	43	8	70	1389	105	3
6.3	68	C/6032-25	T543C686(1)006A(2)(3)100	43	8	100	1285	105	3
6.3	100	T/3528-12	T543T107(1)006A(2)(3)070	63	8	70	1225	105	3
6.3	100	B/3528-21	T543B107(1)006A(2)(3)025	63	8	25	2254	105	3
6.3	100	B/3528-21	T543B107(1)006A(2)(3)035	63	8	35	1905	105	3
6.3	100	B/3528-21	T543B107(1)006A(2)(3)040	63	8	40	1782	105	3
6.3	100	B/3528-21	T543B107(1)006A(2)(3)045	63	8	45	1680	105	3
6.3	100	B/3528-21	T543B107(1)006A(2)(3)070	63	8	70	1347	105	3
6.3	100	U/6032-15	T543U107(1)006A(2)(3)055	63	8	55	1567	105	3
6.3	100	C/6032-25	T543C107(1)006A(2)(3)025	63	8	25	2569	105	3
6.3	100	C/6032-25	T543C107(1)006A(2)(3)045	63	8	45	1915	105	3
6.3	100	W/7343-15	T543W107(1)006A(2)(3)040	63	10	40	2121	105	3
6.3	100	V/7343-20	T543V107(1)006A(2)(3)015	63	10	15	3531	105	3
6.3	100	V/7343-20	T543V107(1)006A(2)(3)045	63	10	45	2039	105	3
6.3	120	B/3528-21	T543B127(1)006A(2)(3)035	76	8	35	1905	105	3
6.3	150	M/3528-15	T543M157(1)006A(2)(3)070	95	8	70	1309	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	2254	105	3
6.3	150	B/3528-21	T543B157(1)006A(2)(3)035	95	8	35	1905	105	3
6.3	150	B/3528-21	T543B157(1)006A(2)(3)045	95	8	45	1680	105	3
6.3	150	B/3528-21	T543B157(1)006A(2)(3)070	95	8	70	1347	105	3
6.3	150	U/6032-15	T543U157(1)006A(2)(3)045	95	8	45	1732	105	3
6.3	150	U/6032-15	T543U157(1)006A(2)(3)055	95	8	55	1567	105	3
6.3	150	L/6032-19	T543L157(1)006A(2)(3)012	95	8	12	3536	105	3
6.3	150	L/6032-19	T543L157(1)006A(2)(3)025	95	8	25	2449	105	3
6.3	150	C/6032-25	T543C157(1)006A(2)(3)015	95	8	15	3317	105	3
6.3	150	C/6032-25	T543C157(1)006A(2)(3)025	95	8	25	2569	105	3
6.3	150	C/6032-25	T543C157(1)006A(2)(3)045	95	8	45	1915	105	3
6.3	150	C/6032-25	T543C157(1)006A(2)(3)055	95	8	55	1732	105	3
6.3	150	W/7343-15	T543W157(1)006A(2)(3)025	95	10	25	2683	105	3
6.3	150	W/7343-15	T543W157(1)006A(2)(3)040	95	10	40	2121	105	3
6.3	150	V/7343-20	T543V157(1)006A(2)(3)015	95	10	15	3531	105	3
6.3	150	V/7343-20	T543V157(1)006A(2)(3)018	95	10	18	3223	105	3
6.3	150	V/7343-20	T543V157(1)006A(2)(3)025	95	10	25	2735	105	3
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 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.



**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp	MSL
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
6.3	150	V/7343-20	T543V157(1)006A(2)(3)040	95	10	40	2162	105	3
6.3	150	V/7343-20	T543V157(1)006A(2)(3)045	95	10	45	2039	105	3
6.3	150	D-7343-31	T543D157(1)006A(2)(3)015	95	10	15	3873	105	3
6.3	150	D-7343-31	T543D157(1)006A(2)(3)025	95	10	25	3000	105	3
6.3	150	D-7343-31	T543D157(1)006A(2)(3)055	95	10	55	2023	105	3
6.3	220	B/3528-21	T543B227(1)006A(2)(3)035	139	8	35	1905	105	3
6.3	220	B/3528-21	T543B227(1)006A(2)(3)045	139	8	45	1680	105	3
6.3	220	B/3528-21	T543B227(1)006A(2)(3)070	139	8	70	1347	105	3
6.3	220	C/6032-25	T543C227(1)006A(2)(3)015	139	8	15	3317	105	3
6.3	220	C/6032-25	T543C227(1)006A(2)(3)018	139	8	18	3028	105	3
6.3	220	C/6032-25	T543C227(1)006A(2)(3)025	139	8	25	2569	105	3
6.3	220	C/6032-25	T543C227(1)006A(2)(3)045	139	8	45	1915	105	3
6.3	220	V/7343-20	T543V227(1)006A(2)(3)018	139	10	18	3223	105	3
6.3	220	V/7343-20	T543V227(1)006A(2)(3)025	139	10	25	2735	105	3
6.3	220	V/7343-20	T543V227(1)006A(2)(3)040	139	10	40	2162	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)005	139	10	5	6708	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)006	139	10	6	6124	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)007	139	10	7	5669	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)009	139	10	9	5000	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)010	139	10	10	4743	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)015	139	10	15	3873	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)018	139	10	18	3536	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)025	139	10	25	3000	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)040	139	10	40	2372	105	3
6.3	220	D-7343-31	T543D227(1)006A(2)(3)050	139	10	50	2121	105	3
6.3	330	V/7343-20	T543V337(1)006A(2)(3)015	208	10	15	3531	105	3
6.3	330	V/7343-20	T543V337(1)006A(2)(3)018	208	10	18	3223	105	3
6.3	330	V/7343-20	T543V337(1)006A(2)(3)025	208	10	25	2735	105	3
6.3	330	V/7343-20	T543V337(1)006A(2)(3)040	208	10	40	2162	105	3
6.3	330	V/7343-20	T543V337(1)006A(2)(3)045	208	10	45	2039	105	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)006	208	10	6	6124	105	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)009	208	10	9	5000	105	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)010	208	10	10	4743	105	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)015	208	10	15	3873	105	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)018	208	10	18	3536	105	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)025	208	10	25	3000	105	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)040	208	10	40	2372	105	3
6.3	330	D-7343-31	T543D337(1)006A(2)(3)045	208	10	45	2236	105	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)005	208	10	5	6943	105	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)006	208	10	6	6338	105	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)010	208	10	10	4909	105	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)015	208	10	15	4008	105	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)025	208	10	25	3105	105	3
6.3	330	Y/7343-40	T543Y337(1)006A(2)(3)040	208	10	40	2455	105	3
6.3	470	W/7343-15	T543W477(1)006A(2)(3)055	296	10	55	1809	85	3
6.3	470	V/7343-20	T543V477(1)006A(2)(3)055	296	10	55	1844	85	3
6.3	470	D-7343-31	T543D477(1)006A(2)(3)015	296	10	15	3873	105	3
6.3	470	D-7343-31	T543D477(1)006A(2)(3)025	296	10	25	3000	105	3
6.3	470	D-7343-31	T543D477(1)006A(2)(3)030	296	10	30	2739	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)005	296	10	5	6943	105	3
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 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.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp	MSL
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)010	296	10	10	4909	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)015	296	10	15	4008	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)018	296	10	18	3659	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)025	296	10	25	3105	105	3
6.3	470	Y/7343-40	T543Y477(1)006A(2)(3)035	296	10	35	2624	105	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)005	296	10	5	7029	105	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)006	296	10	6	6416	105	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)010	296	10	10	4970	105	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)018	296	10	18	3704	105	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)035	296	10	35	2657	105	3
6.3	470	X/7343-43	T543X477(1)006A(2)(3)040	296	10	40	2485	105	3
6.3	680	X/7343-43	T543X687(1)006A(2)(3)010	428	10	10	4970	105	3
6.3	680	X/7343-43	T543X687(1)006A(2)(3)018	428	10	18	3704	105	3
6.3	1000	H/7360-20	T543H108(1)006A(2)(3)055	630	20	55	1844	85	4
6.3	1500	H/7360-20	T543H158(1)006A(2)(3)055	945	20	55	1844	85	4
8	33	T/3528-12	T543T336(1)008A(2)(3)070	26	8	70	1225	105	3
8	33	T/3528-12	T543T336(1)008A(2)(3)080	26	8	80	1146	105	3
8	33	B/3528-21	T543B336(1)008A(2)(3)025	26	8	25	2254	105	3
8	33	B/3528-21	T543B336(1)008A(2)(3)035	26	8	35	1905	105	3
8	33	B/3528-21	T543B336(1)008A(2)(3)040	26	8	40	1782	105	3
8	33	B/3528-21	T543B336(1)008A(2)(3)070	26	8	70	1347	105	3
8	33	U/6032-15	T543U336(1)008A(2)(3)070	26	8	70	1389	105	3
8	47	B/3528-21	T543B476(1)008A(2)(3)035	38	8	35	1905	105	3
8	47	B/3528-21	T543B476(1)008A(2)(3)070	38	8	70	1347	105	3
8	150	V/7343-20	T543V157(1)008A(2)(3)040	120	10	40	2162	105	3
8	150	D-7343-31	T543D157(1)008A(2)(3)025	120	10	25	3000	105	3
8	150	D-7343-31	T543D157(1)008A(2)(3)040	120	10	40	2372	105	3
8	150	D-7343-31	T543D157(1)008A(2)(3)055	120	10	55	2023	105	3
10	10	A/3216-18	T543A106(1)010A(2)(3)080	10	8	80	1183	105	3
10	15	A/3216-18	T543A156(1)010A(2)(3)080	15	8	80	1183	105	3
10	22	A/3216-18	T543A226(1)010A(2)(3)080	22	8	80	1183	105	3
10	22	B/3528-21	T543B226(1)010A(2)(3)080	22	8	80	1260	105	3
10	33	T/3528-12	T543T336(1)010A(2)(3)070	33	8	70	1225	105	3
10	33	T/3528-12	T543T336(1)010A(2)(3)080	33	8	80	1146	105	3
10	33	B/3528-21	T543B336(1)010A(2)(3)025	33	8	25	2254	105	3
10	33	B/3528-21	T543B336(1)010A(2)(3)035	33	8	35	1905	105	3
10	33	B/3528-21	T543B336(1)010A(2)(3)040	33	8	40	1782	105	3
10	33	B/3528-21	T543B336(1)010A(2)(3)070	33	8	70	1347	105	3
10	33	B/3528-21	T543B336(1)010A(2)(3)080	33	8	80	1260	105	3
10	33	U/6032-15	T543U336(1)010A(2)(3)070	33	8	70	1389	105	3
10	47	B/3528-21	T543B476(1)010A(2)(3)035	47	8	35	1905	105	3
10	47	B/3528-21	T543B476(1)010A(2)(3)070	47	8	70	1347	105	3
10	47	U/6032-15	T543U476(1)010A(2)(3)055	47	8	55	1567	105	3
10	47	C/6032-25	T543C476(1)010A(2)(3)100	47	8	100	1285	105	3
10	68	U/6032-15	T543U686(1)010A(2)(3)055	68	8	55	1567	105	3
10	68	C/6032-25	T543C686(1)010A(2)(3)045	68	8	45	1915	105	3
10	68	W/7343-15	T543W686(1)010A(2)(3)025	68	10	25	2683	105	3
10	68	W/7343-15	T543W686(1)010A(2)(3)040	68	10	40	2121	105	3
10	68	V/7343-20	T543V686(1)010A(2)(3)025	68	10	25	2735	105	3
10	68	V/7343-20	T543V686(1)010A(2)(3)040	68	10	40	2162	105	3
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 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.



**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp	MSL
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
10	68	V/7343-20	T543V686(1)010A(2)(3)045	68	10	45	2039	105	3
10	68	V/7343-20	T543V686(1)010A(2)(3)060	68	10	60	1765	105	3
10	68	V/7343-20	T543V686(1)010A(2)(3)100	68	10	100	1367	105	3
10	68	D-7343-31	T543D686(1)010A(2)(3)100	68	10	100	1500	105	3
10	100	L/6032-19	T543L107(1)010A(2)(3)025	100	8	25	2449	105	3
10	100	C/6032-25	T543C107(1)010A(2)(3)025	100	8	25	2569	105	3
10	100	C/6032-25	T543C107(1)010A(2)(3)045	100	8	45	1915	105	3
10	100	W/7343-15	T543W107(1)010A(2)(3)040	100	10	40	2121	105	3
10	100	V/7343-20	T543V107(1)010A(2)(3)018	100	10	18	3223	105	3
10	100	V/7343-20	T543V107(1)010A(2)(3)025	100	10	25	2735	105	3
10	100	V/7343-20	T543V107(1)010A(2)(3)045	100	10	45	2039	105	3
10	100	V/7343-20	T543V107(1)010A(2)(3)050	100	10	50	1934	105	3
10	100	D-7343-31	T543D107(1)010A(2)(3)018	100	10	18	3536	105	3
10	100	D-7343-31	T543D107(1)010A(2)(3)025	100	10	25	3000	105	3
10	100	D-7343-31	T543D107(1)010A(2)(3)055	100	10	55	2023	105	3
10	100	D-7343-31	T543D107(1)010A(2)(3)080	100	10	80	1677	105	3
10	150	C/6032-25	T543C157(1)010A(2)(3)055	150	8	55	1732	105	3
10	150	V/7343-20	T543V157(1)010A(2)(3)025	150	10	25	2735	105	3
10	150	V/7343-20	T543V157(1)010A(2)(3)040	150	10	40	2162	105	3
10	150	D-7343-31	T543D157(1)010A(2)(3)005	150	10	5	6708	105	3
10	150	D-7343-31	T543D157(1)010A(2)(3)006	150	10	6	6124	105	3
10	150	D-7343-31	T543D157(1)010A(2)(3)010	150	10	10	4743	105	3
10	150	D-7343-31	T543D157(1)010A(2)(3)015	150	10	15	3873	105	3
10	150	D-7343-31	T543D157(1)010A(2)(3)018	150	10	18	3536	105	3
10	150	D-7343-31	T543D157(1)010A(2)(3)025	150	10	25	3000	105	3
10	150	D-7343-31	T543D157(1)010A(2)(3)040	150	10	40	2372	105	3
10	150	D-7343-31	T543D157(1)010A(2)(3)055	150	10	55	2023	105	3
10	150	Y/7343-40	T543Y157(1)010A(2)(3)018	150	10	18	3659	105	3
10	150	Y/7343-40	T543Y157(1)010A(2)(3)025	150	10	25	3105	105	3
10	220	V/7343-20	T543V227(1)010A(2)(3)025	220	10	25	2735	105	3
10	220	V/7343-20	T543V227(1)010A(2)(3)045	220	10	45	2039	105	3
10	220	D-7343-31	T543D227(1)010A(2)(3)006	220	10	6	6124	105	3
10	220	D-7343-31	T543D227(1)010A(2)(3)010	220	10	10	4743	105	3
10	220	D-7343-31	T543D227(1)010A(2)(3)018	220	10	18	3536	105	3
10	220	D-7343-31	T543D227(1)010A(2)(3)025	220	10	25	3000	105	3
10	220	D-7343-31	T543D227(1)010A(2)(3)040	220	10	40	2372	105	3
10	220	Y/7343-40	T543Y227(1)010A(2)(3)006	220	10	6	6338	105	3
10	220	Y/7343-40	T543Y227(1)010A(2)(3)010	220	10	10	4909	105	3
10	220	Y/7343-40	T543Y227(1)010A(2)(3)040	220	10	40	2455	105	3
10	330	Y/7343-40	T543Y337(1)010A(2)(3)015	330	10	15	4008	105	3
10	330	Y/7343-40	T543Y337(1)010A(2)(3)035	330	10	35	2624	105	3
10	330	X/7343-43	T543X337(1)010A(2)(3)005	330	10	5	7029	105	3
10	330	X/7343-43	T543X337(1)010A(2)(3)006	330	10	6	6416	105	3
10	330	X/7343-43	T543X337(1)010A(2)(3)010	330	10	10	4970	105	3
10	330	X/7343-43	T543X337(1)010A(2)(3)025	330	10	25	3143	105	3
10	330	X/7343-43	T543X337(1)010A(2)(3)040	330	10	40	2485	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	1146	105	3
12.5	330	X/7343-43	T543X337(1)12RA(2)(3)015	413	10	15	4058	105	3
16	10	B/3528-21	T543B106(1)016A(2)(3)100	16	8	100	1127	105	3
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 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.

**Table 1 – Ratings & Part Number Reference cont'd**

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp	MSL
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
16	22	C/6032-25	T543C226(1)016A(2)(3)080	35	8	80	1436	105	3
16	33	W/7343-15	T543W336(1)016A(2)(3)045	53	10	45	2000	105	3
16	33	V/7343-20	T543V336(1)016A(2)(3)045	53	10	45	2039	105	3
16	33	V/7343-20	T543V336(1)016A(2)(3)060	53	10	60	1765	105	3
16	33	V/7343-20	T543V336(1)016A(2)(3)070	53	10	70	1634	105	3
16	47	W/7343-15	T543W476(1)016A(2)(3)045	75	10	45	2000	105	3
16	47	V/7343-20	T543V476(1)016A(2)(3)045	75	10	45	2039	105	3
16	47	V/7343-20	T543V476(1)016A(2)(3)070	75	10	70	1634	105	3
16	47	V/7343-20	T543V476(1)016A(2)(3)080	75	10	80	1529	105	3
16	47	D-7343-31	T543D476(1)016A(2)(3)035	75	10	35	2535	105	3
16	47	D-7343-31	T543D476(1)016A(2)(3)065	75	10	65	1861	105	3
16	47	D-7343-31	T543D476(1)016A(2)(3)070	75	10	70	1793	105	3
16	68	V/7343-20	T543V686(1)016A(2)(3)050	109	10	50	1934	105	3
16	68	V/7343-20	T543V686(1)016A(2)(3)090	109	10	90	1441	105	3
16	100	V/7343-20	T543V107(1)016A(2)(3)050	160	10	50	1934	105	3
16	100	D-7343-31	T543D107(1)016A(2)(3)035	160	10	35	2535	105	3
16	100	D-7343-31	T543D107(1)016A(2)(3)050	160	10	50	2121	105	3
16	150	X/7343-43	T543X157(1)016A(2)(3)015	240	10	15	4058	105	3
16	150	X/7343-43	T543X157(1)016A(2)(3)025	240	10	25	3143	105	3
16	150	X/7343-43	T543X157(1)016A(2)(3)040	240	10	40	2485	105	3
16	150	X/7343-43	T543X157(1)016A(2)(3)080	240	10	80	1757	105	3
16	220	X/7343-43	T543X227(1)016A(2)(3)035	352	10	35	2657	105	3
16	220	X/7343-43	T543X227(1)016A(2)(3)080	352	10	80	1757	105	3
16	330	X/7343-43	T543X337(1)016A(2)(3)025	528	10	25	3143	105	3
16	330	X/7343-43	T543X337(1)016A(2)(3)050	528	10	50	2223	105	3
20	22	V/7343-20	T543V226(1)020A(2)(3)040	44	10	40	2162	105	3
20	22	V/7343-20	T543V226(1)020A(2)(3)045	44	10	45	2039	105	3
20	22	V/7343-20	T543V226(1)020A(2)(3)090	44	10	90	1441	105	3
20	22	D-7343-31	T543D226(1)020A(2)(3)040	44	10	40	2372	105	3
20	22	D-7343-31	T543D226(1)020A(2)(3)045	44	10	45	2236	105	3
20	22	D-7343-31	T543D226(1)020A(2)(3)090	44	10	90	1581	105	3
20	33	D-7343-31	T543D336(1)020A(2)(3)060	66	10	60	1936	105	3
20	47	V/7343-20	T543V476(1)020A(2)(3)055	94	10	55	1844	105	3
20	47	V/7343-20	T543V476(1)020A(2)(3)090	94	10	90	1441	105	3
20	47	D-7343-31	T543D476(1)020A(2)(3)055	94	10	55	2023	105	3
20	100	X/7343-43	T543X107(1)020A(2)(3)035	200	10	35	2657	105	3
20	100	X/7343-43	T543X107(1)020A(2)(3)050	200	10	50	2223	105	3
25	15	V/7343-20	T543V156(1)025A(2)(3)090	38	10	90	1441	105	3
25	15	D-7343-31	T543D156(1)025A(2)(3)060	38	10	60	1936	105	3
25	15	D-7343-31	T543D156(1)025A(2)(3)080	38	10	80	1677	105	3
25	22	V/7343-20	T543V226(1)025A(2)(3)060	55	10	60	1765	105	3
25	22	V/7343-20	T543V226(1)025A(2)(3)090	55	10	90	1441	105	3
25	33	V/7343-20	T543V336(1)025A(2)(3)060	83	10	60	1765	105	3
25	33	D-7343-31	T543D336(1)025A(2)(3)060	83	10	60	1936	105	3
25	68	X/7343-43	T543X686(1)025A(2)(3)035	170	10	35	2657	105	3
25	68	X/7343-43	T543X686(1)025A(2)(3)050	170	10	50	2223	105	3
25	100	X/7343-43	T543X107(1)025A(2)(3)060	250	10	60	2029	105	3
35	15	V/7343-20	T543V156(1)035A(2)(3)100	53	10	100	1367	105	3
35	15	V/7343-20	T543V156(1)035A(2)(3)125	53	10	125	1223	105	3
35	15	D-7343-31	T543D156(1)035A(2)(3)100	53	10	100	1500	105	3
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 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.

**Table 1 – Ratings & Part Number Reference cont'd**

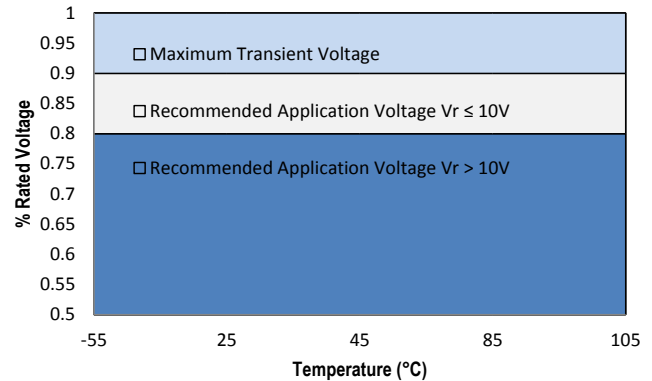
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp	MSL
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	°C	Reflow Temp ≤ 260°C
35	15	D-7343-31	T543D156(1)035A(2)(3)125	53	10	125	1342	105	3
35	33	X/7343-43	T543X336(1)035A(2)(3)065	116	10	65	1949	105	3
35	47	X/7343-43	T543X476(1)035A(2)(3)030	165	10	30	2869	105	3
35	47	X/7343-43	T543X476(1)035A(2)(3)060	165	10	60	2029	105	3
50	5.6	D-7343-31	T543D565(1)050A(2)(3)070	28	10	70	1793	105	3
50	5.6	D-7343-31	T543D565(1)050A(2)(3)090	28	10	90	1581	105	3
50	10	D-7343-31	T543D106(1)050A(2)(3)090	50	10	90	1581	105	3
50	12	X/7343-43	T543X126(1)050A(2)(3)045	60	10	45	2343	105	3
50	12	X/7343-43	T543X126(1)050A(2)(3)070	60	10	70	1878	105	3
50	18	X/7343-43	T543X186(1)050A(2)(3)035	90	10	35	2657	105	3
50	18	X/7343-43	T543X186(1)050A(2)(3)070	90	10	70	1878	105	3
50	22	X/7343-43	T543X226(1)050A(2)(3)040	110	10	40	2485	105	3
50	22	X/7343-43	T543X226(1)050A(2)(3)075	110	10	75	1815	105	3
50	33	X/7343-43	T543X336(1)050A(2)(3)040	165	10	40	2485	105	3
50	33	X/7343-43	T543X336(1)050A(2)(3)075	165	10	75	1815	105	3
50	10	D-7343-31	T543D106(1)050A(2)(3)100	50	10	100	1500	105	3
50	10	D-7343-31	T543D106(1)050A(2)(3)120	50	10	120	1369	105	3
63	4.7	D-7343-31	T543D475(1)063A(2)(3)100	30	10	100	1500	105	3
63	4.7	D-7343-31	T543D475(1)063A(2)(3)120	30	10	120	1369	105	3
63	10	X/7343-43	T543X106(1)063A(2)(3)050	63	10	50	2223	105	3
63	10	X/7343-43	T543X106(1)063A(2)(3)075	63	10	75	1815	105	3
63	10	X/7343-43	T543X106(1)063A(2)(3)100	63	10	100	1572	105	3
63	10	X/7343-43	T543X106(1)063A(2)(3)150	63	10	150	1283	105	3
63	15	X/7343-43	T543X156(1)063A(2)(3)050	95	10	50	2223	105	3
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 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.

## Derating Guidelines

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 μs)
-55°C to 105°C		
$2.5\text{ V} \leq V_R \leq 10\text{ V}$	90% of $V_R$	$V_R$
$12.5\text{ V} \leq V_R \leq 63\text{ V}$	80% of $V_R$	$V_R$

$V_R$  = 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.

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		
$T \leq 45^\circ\text{C}$	$45^\circ\text{C} < T \leq 85^\circ\text{C}$	$85^\circ\text{C} < T \leq 105^\circ\text{C}$
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)

Case Code	EIA Case Code	Maximum Power Dissipation ( $P_{max}$ ) mWatts @ 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
T	3528-12	105
U	6032-15	135
V	7343-20	187
W	7343-15	180
X	7343-43	247
Y	7343-40	241

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

## Reverse Voltage

Polymer tantalum 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
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
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
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
E <sup>1</sup>	7360-38		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
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
R <sup>2</sup>	2012-12		1.05	1.83	0.15	4.82	2.50	0.93	1.50	0.22	3.72	2.00	0.83	1.12	0.38	2.86	1.74
S <sup>2</sup>	3216-12		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
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	7343-20		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 <sup>1</sup>	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 <sup>1</sup>	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

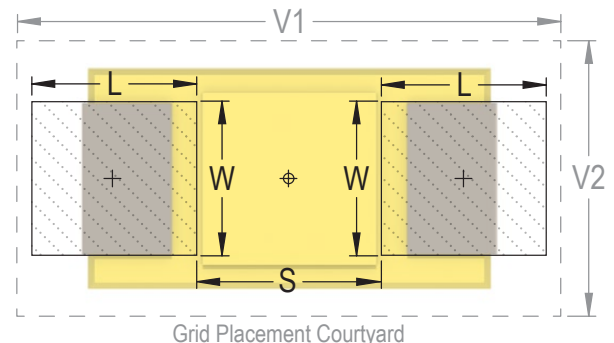
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## 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.

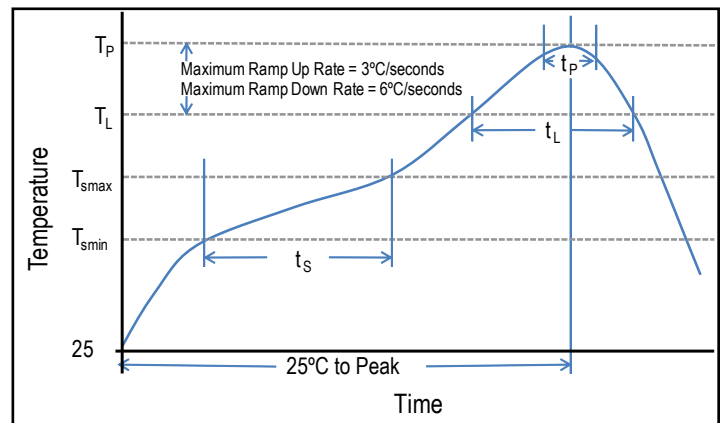
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

Profile Feature	SnPb Assembly	Pb-Free Assembly
<b>Preheat/Soak</b>		
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.

\*Case Size D, E, P, Y, and X

\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z

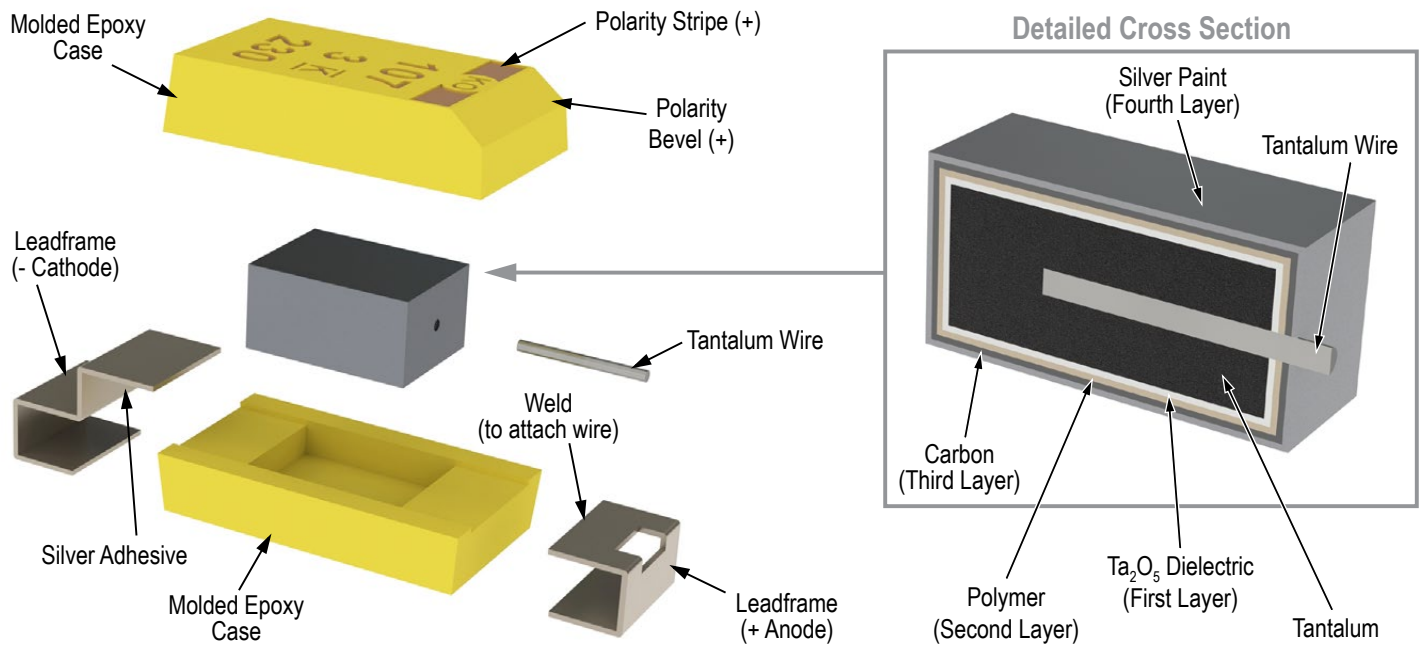


## Storage

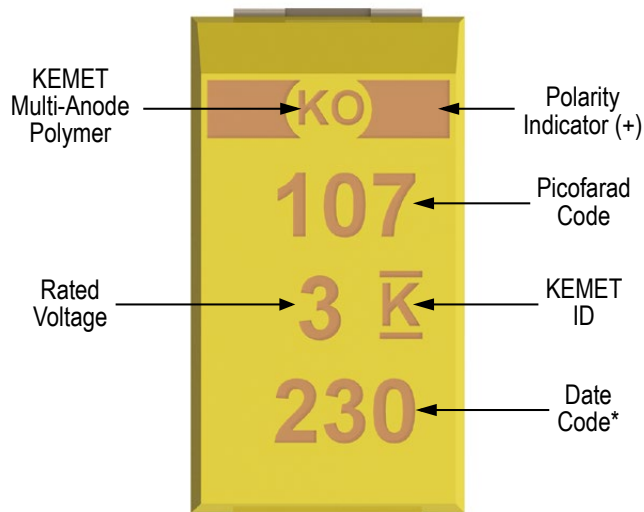
All KO-CAP Series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 40°C and humidity not in excess of 90% RH.



## Construction



## Capacitor Marking



\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year



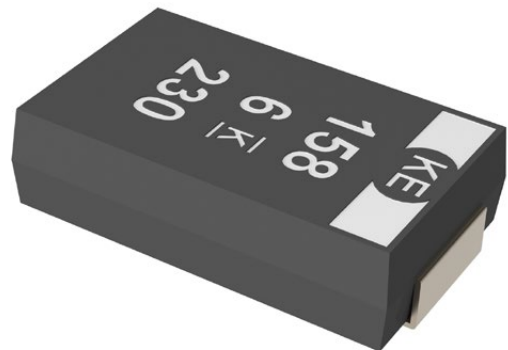
## Overview

The KEMET Organic Capacitor is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The polymer technology also exhibits a benign failure mode which eliminates the ignition failures that can occur in standard MnO<sub>2</sub> tantalum types. Polymer tantalum capacitors may be operated at voltages up to 90% of rated voltage for part types with rated voltages of ≤ 10 volts and up to 80% of rated voltage for part types > 10 volts with equivalent or better reliability than traditional MnO<sub>2</sub> tantalum capacitors operated at 50% of rated voltage.

The T545 Series was developed to deliver the highest energy per CC of any tantalum surface mount device. As a result, this capacitor is an excellent solution for designs requiring high energy at relatively low voltages, such as data hardening or data vaulting for solid state drives (SSD's). The T545 Series captures the best features of multilayer ceramic capacitors (low ESR and high frequency capacitance retention), aluminum electrolytic capacitors (higher capacitance and benign failure mode) and proven solid tantalum technology (volumetric efficiency, surface mount capability and extremely long life). In addition, this series is subjected to 100% thermal shock and voltage aging to ensure long term reliability.

## Benefits

- Extremely low ESR
- High energy delivery capability
- Operating temperature range of -55°C to 125°C
- Polymer cathode technology
- High frequency capacitance retention
- Non-ignition failure mode
- Capacitance up to 1,500 µF
- Voltage range of 6.3 – 16 V
- 100% accelerated steady state aging
- 100% surge current tested
- 100% thermal shock
- Volumetric efficiency, very high capacitance
- Self-healing mechanism
- Taped and reeled per EIA 481, EIA standard case sizes



## Applications

Typical applications include hold-up, data hardening or vaulting for enterprise and military SSDs, and high-end desktop modems.

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

T	545	H	108	M	006	A	T	E055	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	ESR	Packaging (C-Spec)
T = Tantalum	High Energy Polymer Tantalum	D, H, T, V, W, X, Y	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20% K = ±10 %	006 = 6.3 V 008 = 8 V 010 = 10 V 016 = 16 V	A = N/A	T = 100% Tin (Sn)	ESR in mΩ	Blank = 7" Reel 7280 = 13" Reel

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C
Rated Capacitance Range	33 μF – 1,500 μF @ 120 Hz/25°C
Capacitance Tolerance	K Tolerance (10%), M Tolerance (20%)
Rated Voltage Range	6.3 – 16 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	85°C @ rated voltage, 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			
Storage Life	85°C @ 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, 500 hours, No Load	Δ C/C	Within -5%/+35% of initial value			
		DF	Within initial limits			
		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 +25°C, -55°C, +25°C, +85°C, +105°/125°C***+25° C	+25°C	-55°C	+85°C	+105/125°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	85°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			

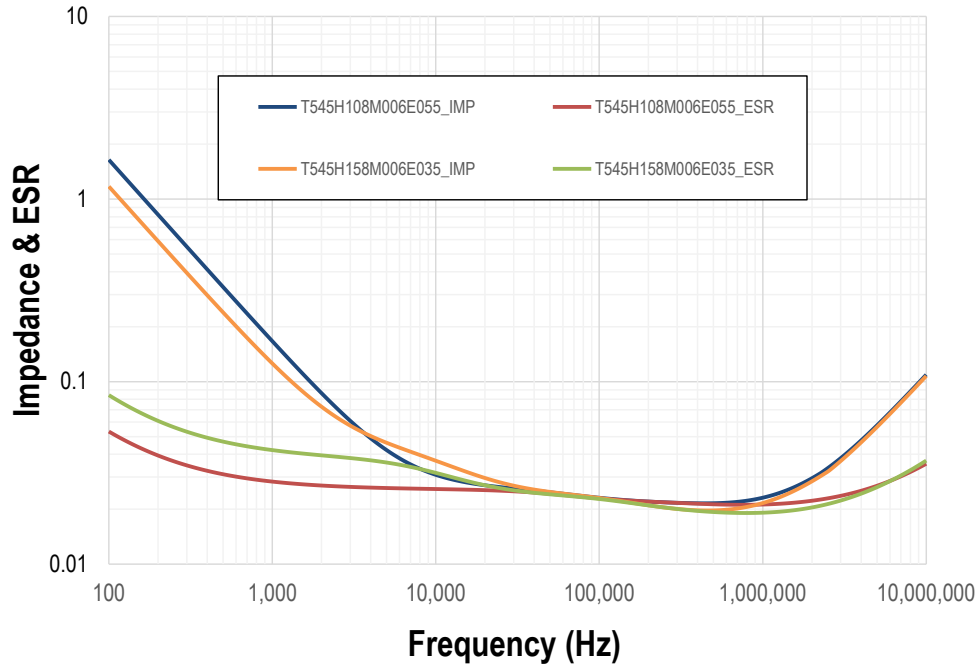
\*IL = Initial limit

\*\*Minimum temperature test condition 85°C

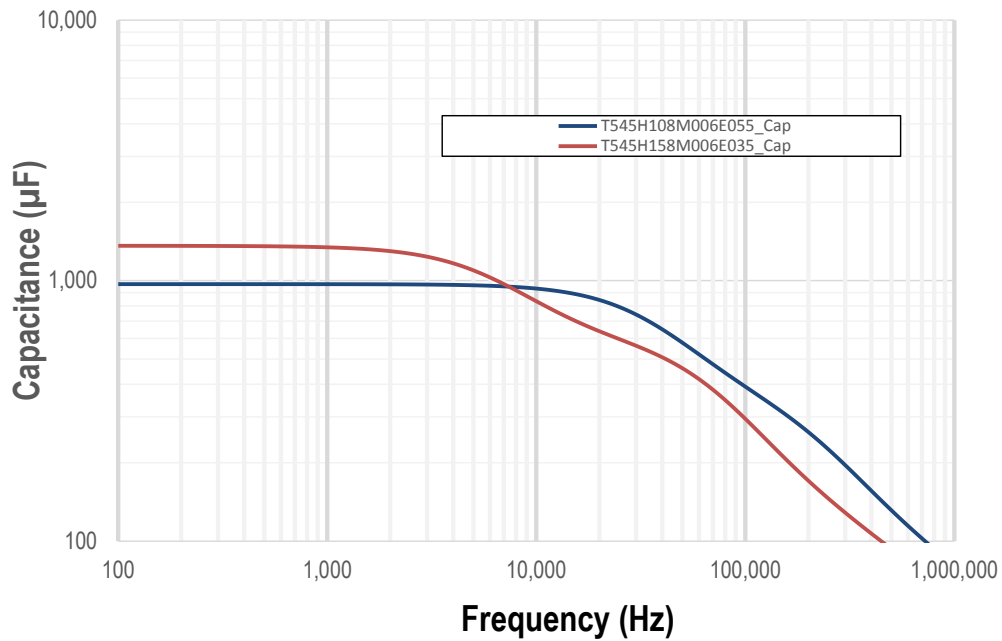
\*\*\* Refer to part number specifications for individual temperature classification.

## Electrical Characteristics

### ESR vs. Frequency

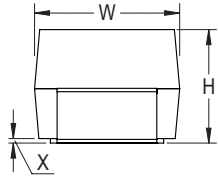


### Capacitance vs. Frequency

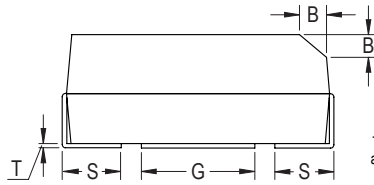


## Dimensions – Millimeters

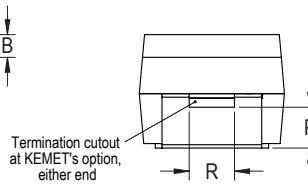
CATHODE (-) END VIEW



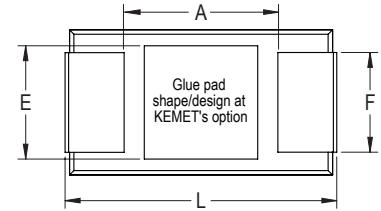
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component												
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)
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)
H	7360-20	7.3 ±0.3 (0.287 ±0.012)	6.0 ±0.3 (0.236 ±0.012)	2.0 (0.078) Maximum	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)	3.5 (0.138)	3.5 (0.138)
T	3528-12	3.5 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.2 (0.047)	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)	1.8 (0.071)	2.2 (0.087)
V	7343-20	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.0 (0.079)	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)
W	7343-15	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.5 (0.059)	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)
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)
Y	7343-40	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	4.0 (0.157)	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)

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions

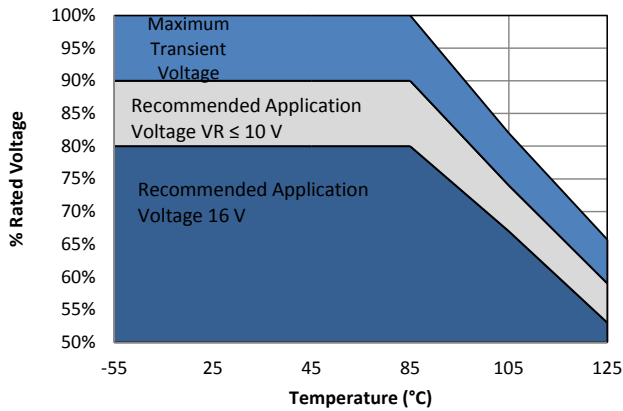
**Table 1 – Ratings & Part Number Reference**

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature	Energy (mJ)
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temperature ≤ 260°C	°C	(½CVa²) - (½CVd²) Va = Voltage Applied Vd = Voltage Drop
6.3	1000	H/7360-20	T545H108M006ATE055	630.0	20	55	1850.0	3	85	11.57
6.3	1500	H/7360-20	T545H158M006ATE035	945.0	20	35	2300.0	3	85	17.36
6.3	1500	H/7360-20	T545H158M006ATE055	945.0	20	55	1850.0	3	85	17.36
<b>6.3</b>	<b>100</b>	<b>T/3528-12</b>	<b>T545T107M006ATE070</b>	<b>63.0</b>	<b>8</b>	<b>70</b>	<b>1200.0</b>	<b>3</b>	<b>105</b>	<b>1.16</b>
6.3	330	V/7343-20	T545V337M006ATE045	207.9	10	45	2000.0	3	105	3.82
6.3	470	W/7343-15	T545W477M006ATE035	296.0	10	35	2268.0	3	105	5.44
6.3	470	W/7343-15	T545W477M006ATE055	296.0	10	55	1800.0	3	105	5.44
6.3	470	V/7343-20	T545V477M006ATE055	296.0	10	55	1800.0	3	105	5.44
10	220	V/7343-20	T545V227M010ATE045	220.0	10	45	2000.0	3	105	7.92
10	330	Y/7343-40	T545Y337M010ATE035	330.0	10	35	2600.0	3	105	11.88
16	47	W/7343-15	T545W476M016ATE045	75.0	10	45	2000.0	3	105	3.64
16	47	V/7343-20	T545V476M016ATE070	75.0	10	70	1400.0	3	105	3.64
16	150	X/7343-43	T545X157M016ATE040	240.0	10	40	2485.0	3	105	11.61
16	180	H/7360-20	T545H187M016ATE055	288.0	20	55	1843.0	3	85	13.94
16	220	X/7343-43	T545X227M016ATE035	352.0	10	35	2700.0	3	105	17.03
16	330	X/7343-43	T545X337M016ATE025	528.0	10	25	3300.0	3	105	25.55
16	100	V/7343-20	T545V107M016ATE050	160.0	10	50	1934.0	3	105	7.74
20	47	V/7343-20	T545V476M020ATE090	94.0	10	90	1400.0	3	125	5.80
VDC @ 85°C	µF	KEMET/EIA	(See below for part options)	µA @ V <sub>R</sub> , 25°C Maximum/ 5 Minutes	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 45°C 100 kHz	Reflow Temperature ≤ 260°C	°C	(½CVa²) - (½CVd²) Va = Voltage Applied Vd = Voltage Drop
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	MSL	Maximum Operating Temperature	Energy (mJ)

Blue color text denotes "Under Development"

Bold text denotes black epoxy product

## Derating Guidelines



Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 μs)	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 μs)
	-55°C to 105°C		105°C to 125°C	
$6.3 \text{ V} \leq V_R \leq 10 \text{ V}$	90% of $V_R$	$V_R$	60% of $V_R$	$V_R$
$V_R \geq 16 \text{ V}$	80% of $V_R$	$V_R$	54% of $V_R$	$V_R$

$V_R$  = 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.

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

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)

Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts @ 45°C with +30°C Rise
T	3528-12	105
M	3528-15	120
A	3216-18	112
B	3528-21	127
U	6032-15	135
L	6032-19	150
C	6032-28	165
W	7343-15	180
V	7343-20	187
D	7343-31	225
Y	7343-40	241
X	7343-43	247
H	7360-20	187
I	3216-10	95

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

## Reverse Voltage

Polymer tantalum 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

**Table 2 – Land Dimensions/Courtyard**

KEMET Case	Metric Size Code EIA	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
		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
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
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
E <sup>1</sup>	7360-38	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
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
R <sup>2</sup>	2012-12	1.05	1.83	0.15	4.82	2.50	0.93	1.50	0.22	3.72	2.00	0.83	1.12	0.38	2.86	1.74
S <sup>2</sup>	3216-12	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
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	7343-20	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 <sup>1</sup>	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 <sup>1</sup>	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

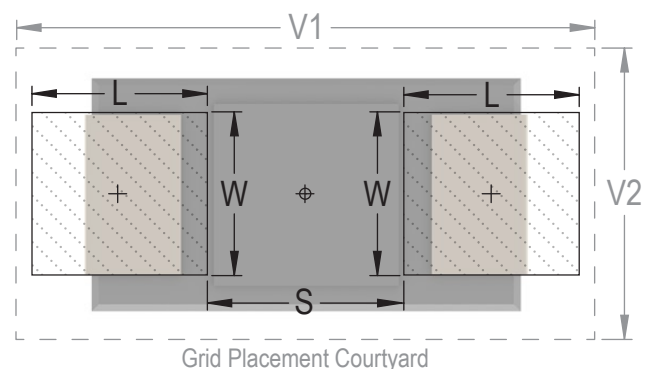
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## 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.

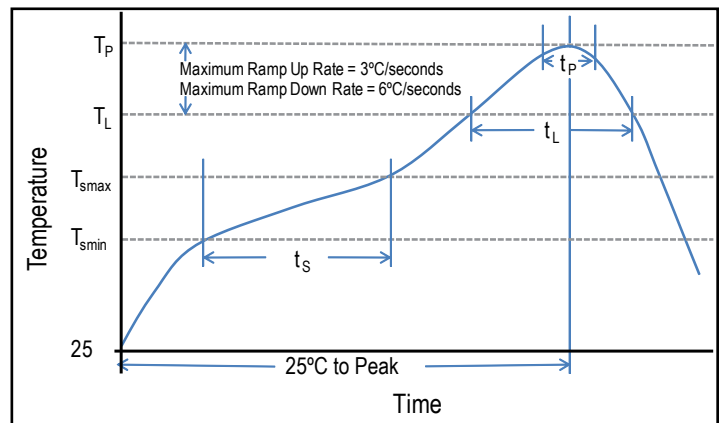
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

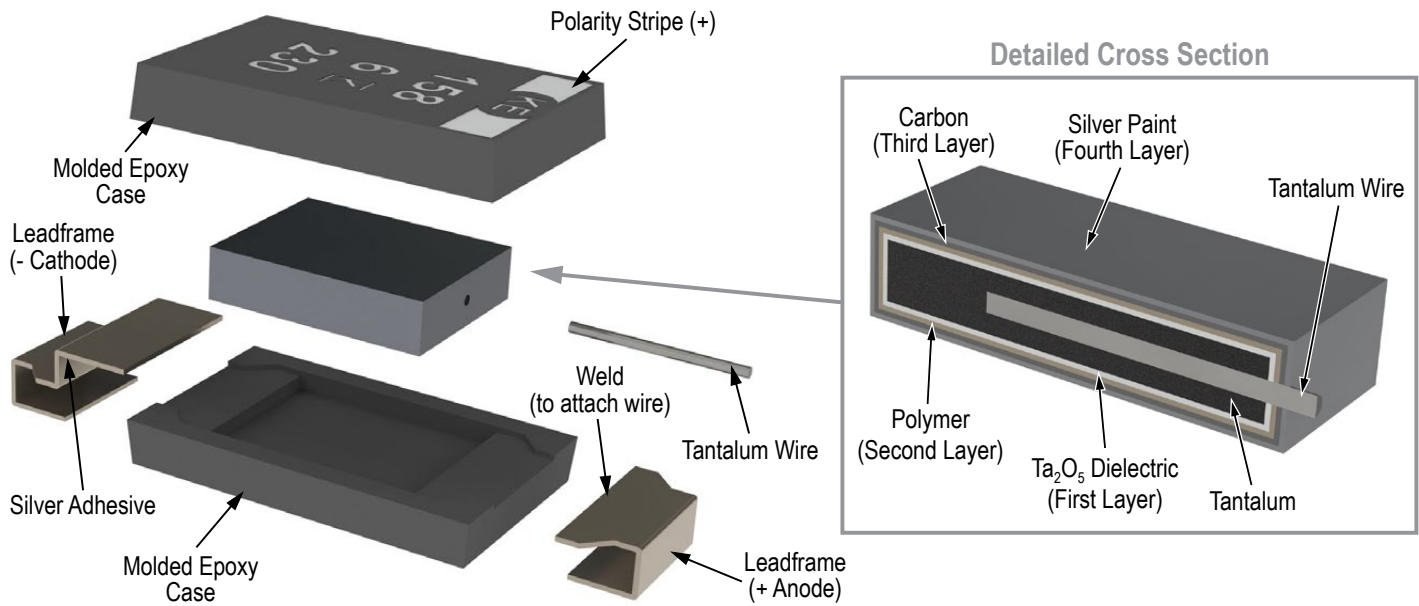
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



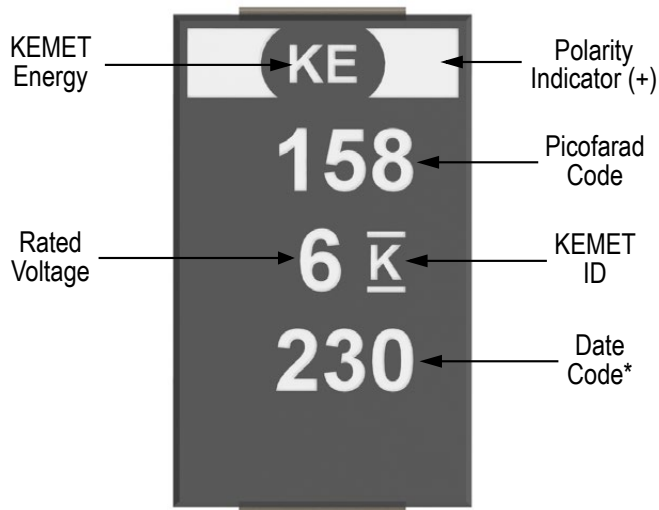
## Storage

All KO-CAP Series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 40°C and humidity not in excess of 90% RH.

## Construction



## Capacitor Marking



\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

# T591 Series High Performance Automotive Grade Polymer Tantalum 105°C/125°C

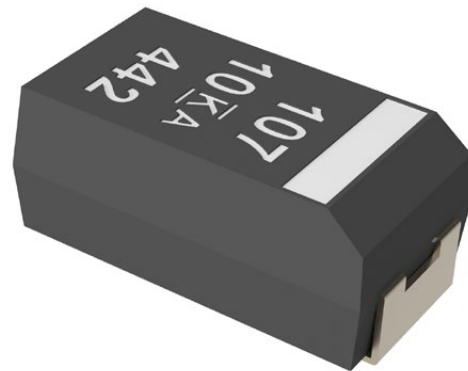
## Overview

The KEMET Organic Capacitor is a tantalum capacitor with a Ta anode and Ta<sub>2</sub>O<sub>5</sub> dielectric. A conductive organic polymer replaces the traditionally used MnO<sub>2</sub> as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The polymer technology also exhibits a benign failure mode which eliminates the ignition failures that can occur in standard MnO<sub>2</sub> tantalum types. Polymer tantalum capacitors may be operated at voltages up to 90% of rated voltage for part types with rated voltages of ≤ 10 volts with equivalent or better reliability than traditional MnO<sub>2</sub> tantalum capacitors operated at 50% of rated voltage.

The T591 Series High Performance Automotive Grade Polymer was developed to deliver higher stability under harsh conditions of humidity and temperature. Special enhancements in design and material setting were introduced in the build of the material to deliver 500 hours under 85°C / 85% RH/Ur. This T591 Series is manufactured in a ISO TS 16949 certified plant and is subject to PPAP/PSW and change control.

## Benefits

- Ultra-low ESR
- Polymer cathode technology
- Non-ignition failure mode
- Operating temperature range of -55°C to 105°C / 125°C
- Qualification based on AEC-Q200 guidelines
- High reliability up to 500 hours with 85°C / 85% RH load
- Capacitance up to 220 µF
- Voltage range of 2.5 – 10 V
- Capacitance tolerance of ±20%
- Laser marked case
- RoHS Compliant and lead-free terminations
- Halogen-free epoxy
- TS 16949 certified plant
- Meets or exceeds EIA standard 535BAAC
- Taped and reeled per EIA 481



## Applications

Typical applications include decoupling and filtering in a variety of market segments, with special emphasis in automotive applications such as infotainment and output in DC/DC converters where harsh conditions such as high humidity and temperature are a concern.

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

T	591	D	107	M	010	A	T	E025
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	ESR
T = Tantalum	591 = Automotive Grade Polymer	B, D, V	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	2R5 = 2.5 V 006 = 6.3 V 010 = 10 V	A = N/A	T = 100% Tin (Sn)	Maximum ESR in mΩ, 025 = 25 mΩ

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 105°C / 125°C
Rated Capacitance Range	33 – 220 μF @ 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2.5 – 10 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 @ rated voltage, 2,000 hours** 125°C @ 2/3 rated voltage, 1,000 hours**	Δ C/C	Within -20%/+10% of initial value			
		DF	Within 2 x Initial Limits			
		DCL	Within 2 x Initial Limit			
		ESR	Within 2 x Initial Limit			
Storage Life	105°C @ 0 volts, 2,000 hours** 125°C @ 0 volts, 1,000 hours	Δ C/C	Within -20%/+10% of initial value			
		DF	Within 2 x Initial Limits			
		DCL	Within 2 x Initial Limit			
		ESR	Within 2 x Initial Limit			
Humidity	85°C, 85% RH, Load, 500 hours	Δ C/C	Within -5%/+35% of initial value			
		DF	Within 1.5 x Initial Limits			
		DCL	Within Initial Limit			
		ESR	Within 2 x Initial Limit			
Thermal Shock	MIL-STD-202, Method 107, Condition B, mounted, -55°C to 105°C / 125°C, 1,000 cycles	Δ C/C	Within -20%/+10% of initial value			
		DF	Within Initial Limits			
		DCL	Within Initial Limit			
		ESR	Within 2 x Initial Limits			
Surge Voltage	105°C, 1.32 x rated voltage, 1,000 cycles, 33 Ω in series 125°C, 1.32 x rated voltage, 1,000 cycles, 33 Ω in series	Δ C/C	Within -20%/+10% of initial value			
		DF	Within initial limits			
		DCL	Within initial limits			
		ESR	Within initial limits			
Temperature Stability	Extreme temperature exposure at a succession of continuous steps at +25°C, -55°C, +25°C, +85°C, +105°C/+125°C***, +25°C	+25°C	-55°C	+85°C	+105°C/+125°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
Mechanical Shock/Vibration	AEC-Q200 (MIL-STD-202, Method 213, Figure 1, Condition F)	Δ C/C	Within ±10% of initial value			
		DF	Within initial limits			
	AEC-Q200 (MIL-STD-202, Method 204, 5 gs for 20 min/12 cycles each of 3 orientations. Test from 10 – 2, 000 Hz).	ESR	Within initial limits			
		DCL	Within initial limits			

\* IL = Initial Limit

\*\* Minimum temperature test condition at 85°C

\*\*\* Refer to part number specifications for individual temperature classification

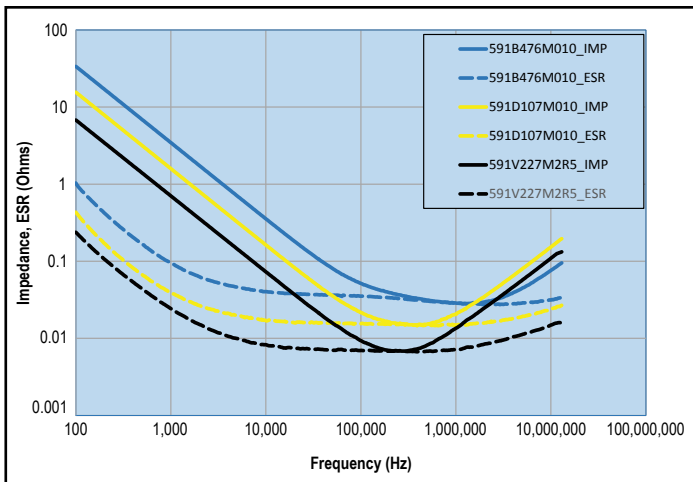
## Certification

KEMET's Internal Qualification Plan for this tantalum series of capacitors follows AEC-Q200 guidelines. The humidity bias is limited to a maximum of 500 hours.

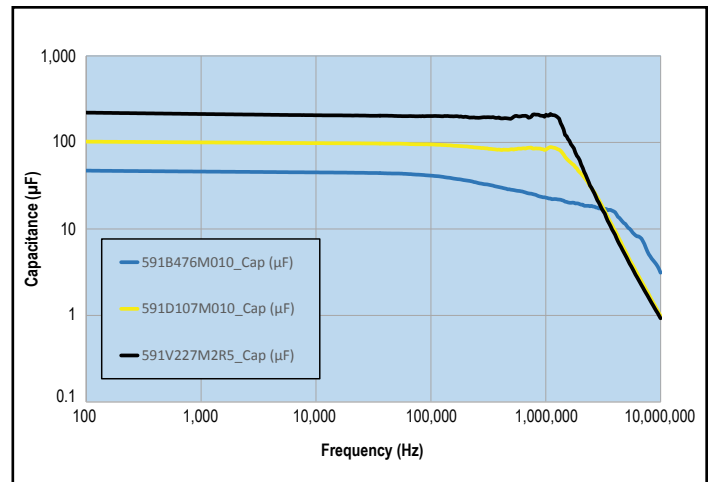


## Electrical Characteristics

ESR vs. Frequency



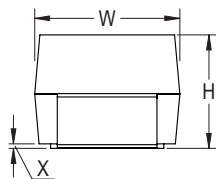
Capacitance vs. Frequency



## Dimensions – Millimeters (Inches)

Metric will govern

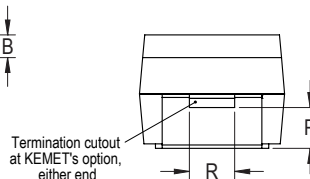
CATHODE (-) END VIEW



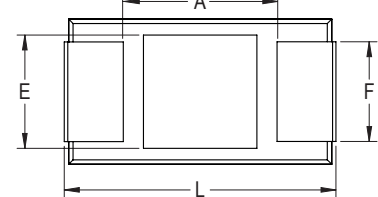
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component												
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)
B	3528-21	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)	1.8 (0.071)	2.2 (0.087)
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)
V	7343-20	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.0 max (0.079)	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)

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-PRF-55365/8 specified dimensions

**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
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @+25°C Max/5 Min	% @ +25°C 120 Hz Max	mΩ @ +25°C 100 kHz Max	mA @ +45°C 100 kHz	Reflow Temp ≤ 260°C	°C
2.5	220	V/7343-20	T591V227M2R5ATE009	55	10	9	4558	3	105
2.5	220	V/7343-20	T591V227M2R5ATE012	55	10	12	3947	3	105
2.5	220	V/7343-20	T591V227M2R5ATE015	55	10	15	3531	3	105
6.3	33	B/3528-21	T591B336M006ATE080	20.8	8	80	1260	3	125
6.3	47	B/3528-21	T591B476M006ATE070	29.6	8	70	1347	3	125
10	33	B/3528-21	T591B336M010ATE080	33	8	80	1260	3	125
10	47	B/3528-21	T591B476M010ATE070	47	8	70	1347	3	125
10	100	D/7343-31	T591D107M010ATE025	100	10	25	3000	3	125
10	100	D/7343-31	T591D107M010ATE040	100	10	40	2372	3	125
10	100	D/7343-31	T591D107M010ATE080	100	10	80	1677	3	125

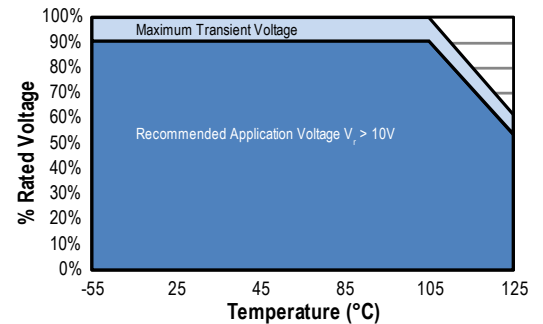
Refer to Ordering Information for additional detail.

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. Substitutions can include those better than the series.

**Derating Guidelines**

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1ms – 1µs)
-55°C to 105°C		
2.5 V ≤ V <sub>R</sub> ≤ 10 V	90% of V <sub>R</sub>	V <sub>R</sub>
105°C to 125°C		
2.5 V ≤ V <sub>R</sub> ≤ 10 V	60% of V <sub>R</sub>	67% of V <sub>R</sub>

V<sub>R</sub> = 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 (P max) mWatts @ 45°C with +30°C Rise
B	3528-21	127
D	7343-31	225
V	7343-20	187

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

Temperature Compensation Multipliers for Maximum Ripple Current			
T ≤ 45°C	45°C < T ≤ 85°C	85°C < T ≤ 105°C	T ≤ 125°C
1.00	0.90	0.40	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)

R = ESR at specified frequency (ohms)

E = rms ripple voltage (volts)

Z = Impedance at specified frequency (ohms)

P max = maximum power dissipation (watts)

## Reverse Voltage

Polymer tantalum 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
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	7343-20	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

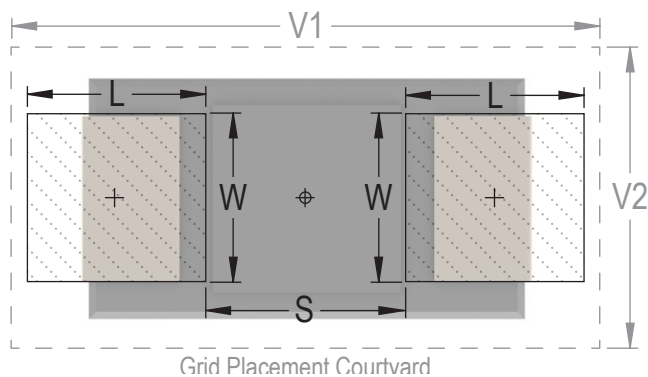
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## 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.

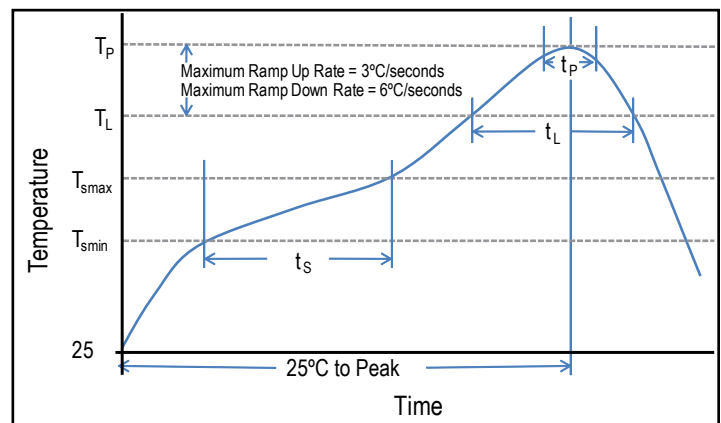
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

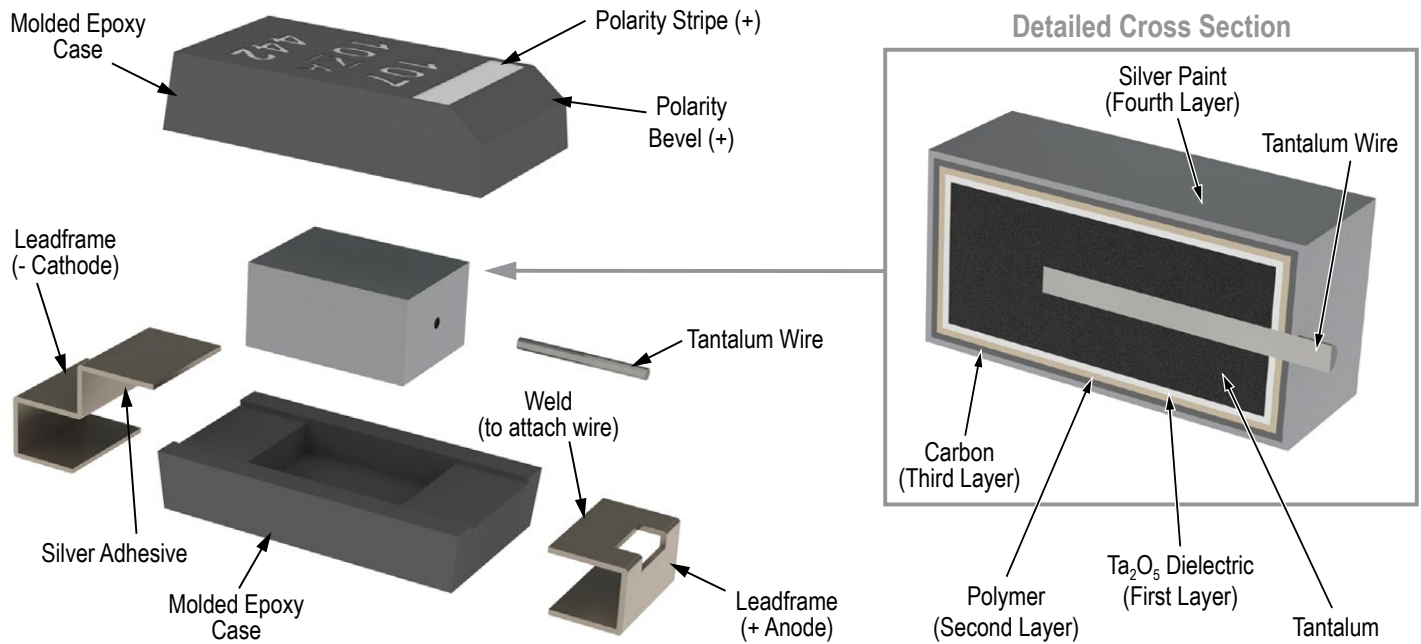
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



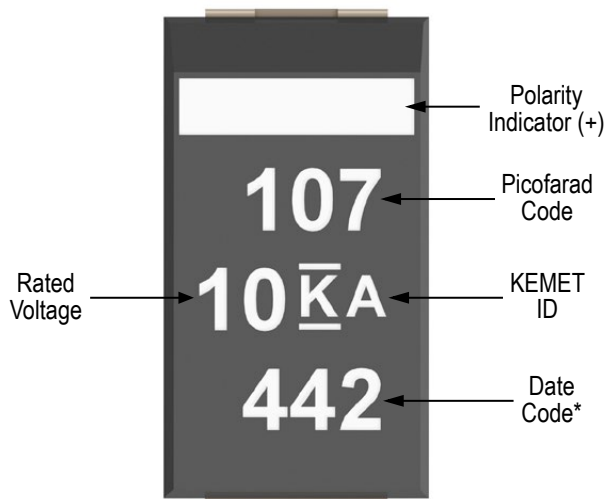
## Storage

All KO-CAP series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 40°C and humidity not in excess of 90% RH.

## Construction



## Capacitor Marking



\* 442 = 42<sup>nd</sup> week of 2014

Date Code *	
1 <sup>st</sup> digit = Last number of Year	4 = 2014 5 = 2015 6 = 2016
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

## Overview

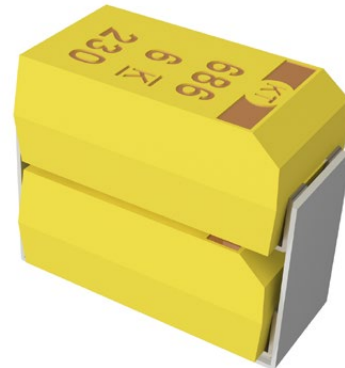
The KEMET Tantalum Stack Polymer (TSP) Series is designed to provide the highest capacitance/voltage ratings in surface mount configuration. KEMET's T540 Polymer COTS capacitors are utilized in stacks of 2,3,4 and 6 components to achieve a broad range of capacitance and voltage ratings. The T540 COTS series offers component level surge current testing options and standard and low ESR options. As with other KEMET Polymer product, this series may be operated at steady state voltages

up to 90% of rated voltage for part types with rated voltages of  $\leq$  10 volts and up to 80% of rated voltage for part types  $>$  10 volts. Stacking configurations offer this Polymer COTS product with custom capacitance/voltage solutions and very low ESR options.

*Note: Custom stacking solutions are available with other KEMET Tantalum Surface Mount Series. Please contact KEMET Product Management for availability.*

## Benefits

- Polymer cathode technology
- High capacitance
- Surface mountable
- Capacitance values of 66  $\mu$ F to 4080  $\mu$ F
- Capacitance can be custom specified
- Voltage ratings of 3 VDC to 16 VDC
- High volumetric efficiency
- Ultra low ESR
- Surge capability
- Operating temperature range of -55°C to +125°C
- Laser-marked case
- Use up to 90% of rated voltage for part types  $\leq$  10 volts
- Use up to 80% of rated voltage for part types  $>$  10 volts



## Applications

Typical applications include decoupling and filtering in a variety of market segments. The T540 Polymer COTS stack devices can be utilized in military and aerospace applications. Other KEMET series can be utilized in filtering and decoupling applications to service various market segments.

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant



## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

T	SP	2D	207	M	010	A	H	65	20	D540
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	Surge	ESR	C-Spec 2
T = Tantalum	Stacks Polymer Cathode	2B, 3B, 4B, 6B, 2D, 3D, 4D, 6D	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	003 = 3 V 004 = 4 V 006 = 6.3 V 010 = 10 V 016 = 16 V	A = N/A	H = Standard Solder Coated (SnPb 5% Pb minimum)	65 = No Surge 66 = 10 cycles @ 25°C 67 = 10 cycles -55°C and 85°C	10 = ESR - Standard 20 = ESR-Low	Designates discrete component series. D540 = T540

Note: These TSP Stacks are specific to T540 COTS.

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C
Rated Capacitance Range	66 – 4080 µF @ 120 Hz/25° C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	3 – 16 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

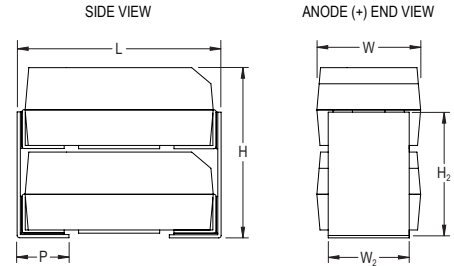
Test	Condition	Characteristics	
Endurance	105°C @ rated voltage, 2,000 hours 125°C @ 2/3 rated voltage, 2,000 hours	Δ C/C	Within -20/+10% of initial value
		DF	≤ initial limit
		DCL	1.25 x IL @125° C
		ESR	2 x initial limit
Thermal Shock	KEMET specified test, mounted, -55°C to 125° C, 5 cycles	Δ C/C	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	125°C, 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

## Dimensions – Millimeters (Inches)

Metric will govern

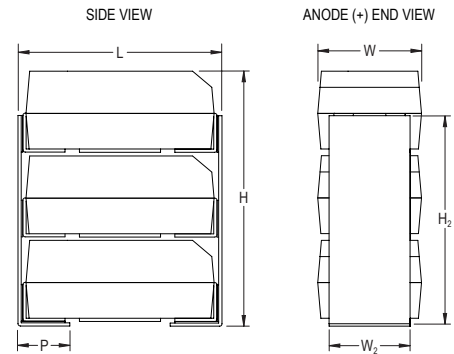
### TSP2

KEMET 2 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
2B	4.1 ± 0.38 (.162 ± 0.015)	3.1 ± 0.2 (.122 ± 0.008)	4.3 ± 0.38 (.170 ± 0.015)	2.3 ± 0.2 (.090 ± 0.008)	3.1 ± 0.38 (.124 ± 0.015)	0.76 ± 0.38 (.030 ± 0.015)
2D	8.0 ± 0.38 (.315 ± 0.015)	4.4 ± 0.2 (.174 ± 0.008)	6.2 ± 0.38 (.245 ± 0.015)	3.0 ± 0.2 (.120 ± 0.008)	4.8 ± 0.38 (.192 ± 0.015)	1.9 ± 0.38 (.075 ± 0.015)



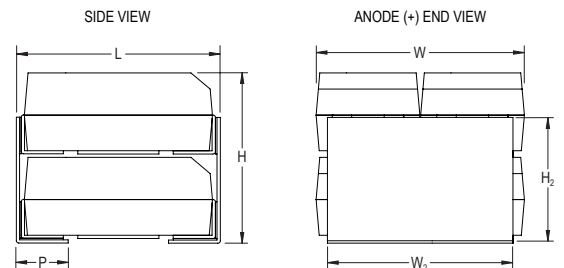
### TSP3

KEMET 3 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
3B	4.1 ± 0.38 (.162 ± .015)	3.1 ± 0.2 (.122 ± .008)	6.3 ± 0.38 (.248 ± .015)	2.3 ± 0.2 (.090 ± .008)	5.3 ± 0.38 (.210 ± .015)	0.76 ± 0.38 (.030 ± .015)
3D	8.0 ± 0.38 (.315 ± .015)	4.4 ± 0.2 (.174 ± .008)	9.2 ± 0.38 (.365 ± .015)	3.0 ± 0.2 (.120 ± .008)	7.7 ± 0.38 (.304 ± .015)	1.9 ± 0.38 (.075 ± .015)



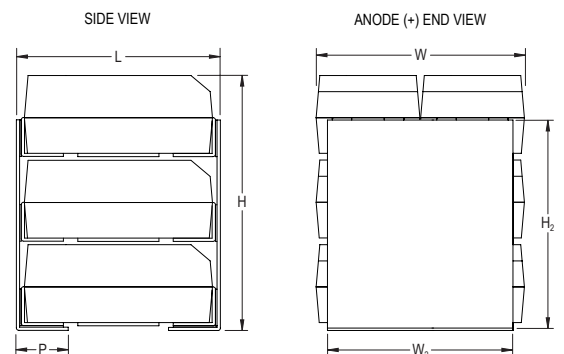
### TSP4

KEMET 4 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
4B	4.1 ± 0.38 (.162 ± .015)	6.1 ± 0.2 (.242 ± .008)	4.3 ± 0.38 (.170 ± .015)	5.3 ± 0.2 (.210 ± .008)	3.1 ± 0.38 (.124 ± .015)	0.76 ± 0.38 (.030 ± .015)
4D	8.0 ± 0.38 (.315 ± .015)	8.9 ± 0.2 (.350 ± .008)	6.2 ± 0.38 (.245 ± .015)	7.4 ± 0.2 (.292 ± .008)	4.8 ± 0.38 (.192 ± .015)	1.9 ± 0.38 (.075 ± .015)



### TSP6

KEMET 6 Component Stack Dimensions						
Case Code	L	W	H	W2	H2	P
6B	4.1 ± 0.38 (.162 ± .015)	6.1 ± 0.2 (.242 ± .008)	6.3 ± 0.38 (.248 ± .015)	5.3 ± 0.2 (.210 ± .008)	5.3 ± 0.38 (.210 ± .015)	0.76 ± 0.38 (.030 ± .015)
6D	8.0 ± 0.38 (.315 ± .015)	8.9 ± 0.2 (.350 ± .008)	9.2 ± 0.38 (.365 ± .015)	7.4 ± 0.2 (.292 ± .008)	7.7 ± 0.38 (.304 ± .015)	1.9 ± 0.38 (.075 ± .015)



## Capacitance and Rated Voltage Chart

Capacitance		Rated Voltage				
μF	Code	3	4	6.3	10	16
66	666				2B	
94	946					2D
99	996				3B	
132	137				4B	
136	137			2B		
141	147					3D
188	197					4D
198	207				6B	
200	207		2B		2D	
204	207			3B		
272	277			4B		
282	287					6D
300	307		3B		2D	
400	407		4B		4D	
408	407			6B		
440	447		2D		2D	
450	457	3B				
600	607	4B	6B			
660	667	2D		2D	3D	
880	887		4D		4D	
900	907	6B			6D	
940	947		2D			
990	997			3D		
1320	138			4D	6D	
1360	148	2D				
1410	148		3D			
1880	198		4D			
1980	208			6D		
2040	208	3D				
2720	278	4D				
2820	288		6D			
4080	418	6D				

**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	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Max/5 Min	% @ +25°C 120 Hz Max	mΩ @ +25°C 100 kHz Max	mΩ @ +25°C 100 kHz Max	°C
4	200	2B	TSP2B207M004AH(1)(2)D540	80	8	40	N/A	125
6.3	130	2B	TSP2B137M006AH(1)(2)D540	86	8	40	N/A	125
10	66	2B	TSP2B666M010AH(1)(2)D540	66	8	40	N/A	125
3	660	2D	TSP2D667M003AH(1)(2)D540	198	10	13	N/A	125
3	1400	2D	TSP2D148M003AH(1)(2)D540	408	10	13	N/A	125
4	440	2D	TSP2D447M004AH(1)(2)D540	176	10	13	N/A	125
4	940	2D	TSP2D947M004AH(1)(2)D540	376	10	20	13	125
6.3	660	2D	TSP2D667M006AH(1)(2)D540	416	10	20	13	125
10	200	2D	TSP2D207M010AH(1)(2)D540	200	10	28	13	125
10	300	2D	TSP2D307M010AH(1)(2)D540	300	10	28	13	125
10	440	2D	TSP2D447M010AH(1)(2)D540	440	10	13	N/A	125
16	94	2D	TSP2D946M016AH(1)(2)D540	152	10	33	18	125

**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 @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Max/5 Min	% @ +25°C 120 Hz Max	mΩ @ +25°C 100 kHz Max	mΩ @ +25°C 100 kHz Max	°C
3	450	3B	TSP3B457M003AH(1)(2)D540	135	8	27	N/A	125
4	300	3B	TSP3B307M004AH(1)(2)D540	120	8	27	N/A	125
6.3	200	3B	TSP3B207M006AH(1)(2)D540	129	8	27	N/A	125
10	99	3B	TSP3B996M010AH(1)(2)D540	99	8	27	N/A	125
3	2000	3D	TSP3D208M003AH(1)(2)D540	612	10	9	N/A	125
4	1400	3D	TSP3D148M004AH(1)(2)D540	564	10	14	9	125
6.3	990	3D	TSP3D997M006AH(1)(2)D540	624	10	14	9	125
10	660	3D	TSP3D667M010AH(1)(2)D540	660	10	9	N/A	125
16	140	3D	TSP3D147M016AH(1)(2)D540	226	10	22	12	125

(1) To complete KEMET part number, insert 65 = None, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C. Designates surge current option.

(2) To complete KEMET part number, insert 10 = Standard ESR, 20 = Low ESR. Designates ESR option.

Refer to Ordering Information for additional detail.

**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	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Max/5 Min	% @ +25°C 120 Hz Max	mΩ @ +25°C 100 kHz Max	mΩ @ +25°C 100 kHz Max	°C
3	600	4B	TSP4B607M003AH(1)(2)D540	180	8	20	N/A	125
4	400	4B	TSP4B407M004AH(1)(2)D540	160	8	20	N/A	125
6.3	270	4B	TSP4B277M006AH(1)(2)D540	172	8	20	N/A	125
10	130	4B	TSP4B137M010AH(1)(2)D540	132	8	20	N/A	125
3	2700	4D	TSP4D278M003AH(1)(2)D540	816	10	7	N/A	125
4	880	4D	TSP4D887M004AH(1)(2)D540	352	10	7	N/A	125
4	1900	4D	TSP4D198M004AH(1)(2)D540	752	10	10	7	125
6.3	1300	4D	TSP4D138M006AH(1)(2)D540	832	10	10	7	125
10	400	4D	TSP4D407M010AH(1)(2)D540	400	10	14	7	125
10	880	4D	TSP4D887M010AH(1)(2)D540	880	10	7	N/A	125
16	190	4D	TSP4D197M016AH(1)(2)D540	301	10	17	9	125

**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 @ 105°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Max/5 Min	% @ +25°C 120 Hz Max	mΩ @ +25°C 100 kHz Max	mΩ @ +25°C 100 kHz Max	°C
3	900	6B	TSP6B907M003AH(1)(2)D540	270	8	14	N/A	125
4	600	6B	TSP6B607M004AH(1)(2)D540	240	8	14	N/A	125
6.3	400	6B	TSP6B407M006AH(1)(2)D540	258	8	14	N/A	125
10	200	6B	TSP6B207M010AH(1)(2)D540	198	8	14	N/A	125
3	4100	6D	TSP6D418M003AH(1)(2)D540	1224	10	5	N/A	125
4	2800	6D	TSP6D288M004AH(1)(2)D540	1128	10	7	5	125
6.3	2000	6D	TSP6D208M006AH(1)(2)D540	1248	10	7	5	125
10	900	6D	TSP6D907M010AH(1)(2)D540	900	10	10	5	125
10	1300	6D	TSP6D138M010AH(1)(2)D540	1320	10	5	N/A	125
16	280	6D	TSP6D287M016AH(1)(2)D540	452	10	11	6	125

(1) To complete KEMET part number, insert 65 = None, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C +85°C. Designates surge current option.

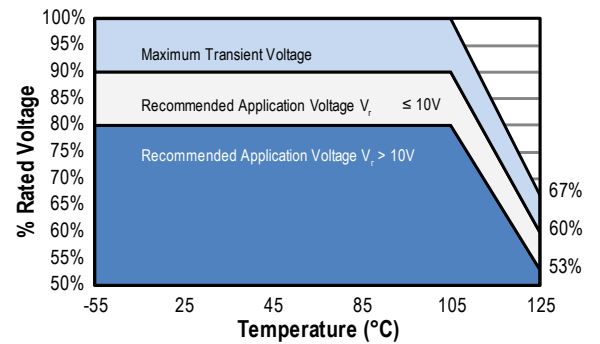
(2) To complete KEMET part number, insert 10 = Standard ESR, 20 = Low ESR. Designates ESR option.

Refer to Ordering Information for additional detail.

## Derating Guidelines

Voltage Rating	Maximum Recommended Steady State Voltage	Maximum Recommended Transient Voltage (1 ms – 1 μs)
-55°C to 105°C		
$10 V \leq V_R$	90% of $V_R$	$V_R$
$V_R > 10$	80% of $V_R$	$V_R$

$V_R$  = Rated Voltage



## Reverse Voltage

Solid tantalum 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**

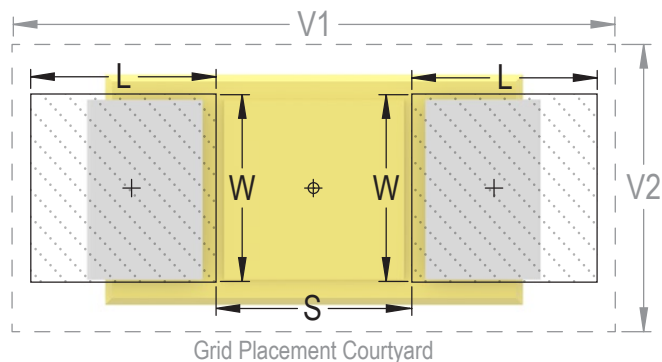
KEMET	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
	L	W	S	V1	V2	L	W	S	V1	V2	L	W	S	V1	V2
TSP2B	2.34	2.54	1.41	7.10	4.30	1.94	2.42	1.61	6.00	3.80	1.56	2.32	1.77	5.14	3.54
TSP2D	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
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
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
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

**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).

<sup>1</sup> 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.

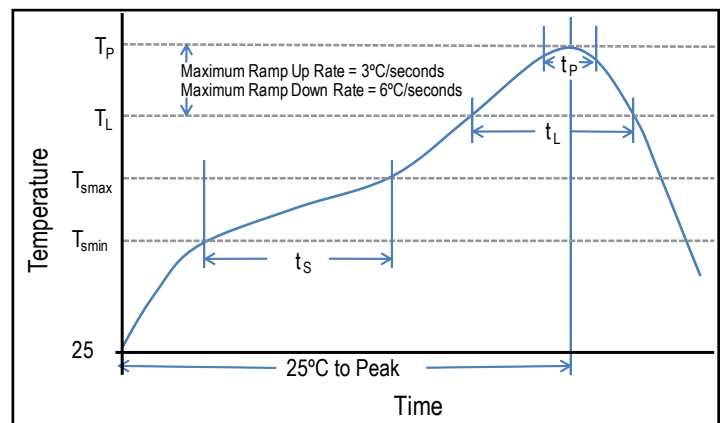
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

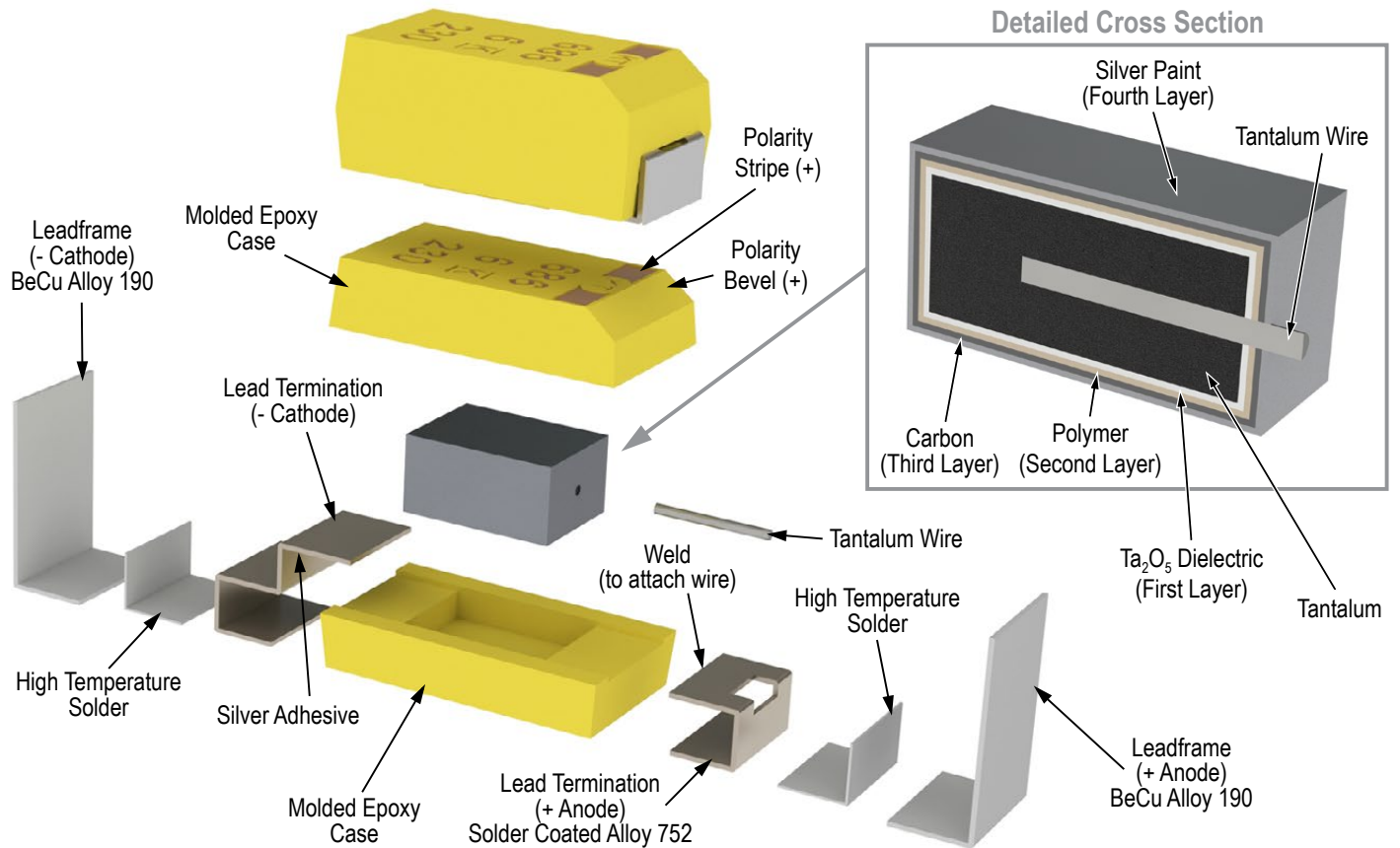
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



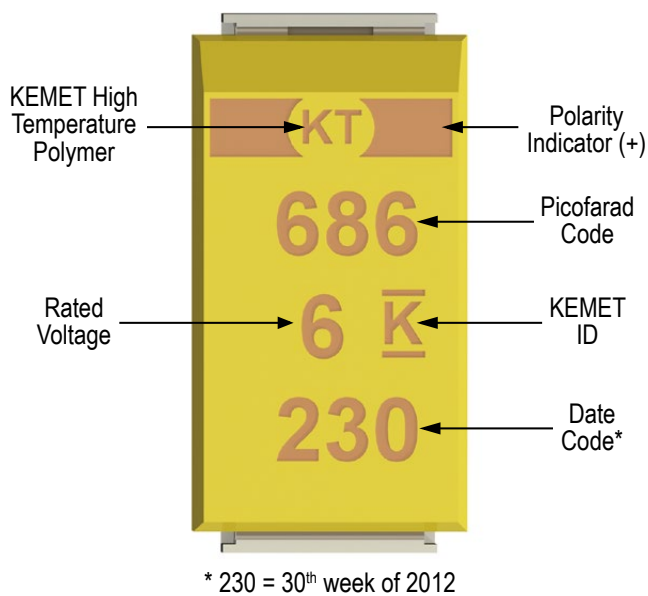
## Storage

Tantalum chip capacitors should be stored in normal working environments. While the chips 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 chip stock should be used promptly, preferably within three years of receipt.

## Construction



## Capacitor Marking



Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

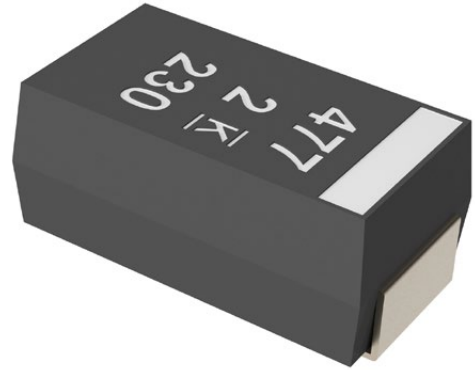
## Overview

The KEMET Aluminum Organic Capacitor (AO-CAP) is a solid state aluminum capacitor with an aluminum oxide dielectric and conductive polymer cathode. The use of the conductive polymer cathode results in very low ESR and improved capacitance retention at high frequency. AO-CAP's may be operated at steady state voltages up to 100% of rated voltage (no derating) with equivalent or better reliability than tantalum capacitors operating at the recommended derated voltage.

The A700 Series AO-CAP offers the same advantages as the polymer tantalum capacitors but also has the added advantages of 125°C performance capability, higher ripple current handling capability and a lower ESR range. Packaged with multiple anodes/elements to reduce the depth that the signal must penetrate, this parallel arrangement reduces the ESR further still to achieve lower ESR than other types of surface mount capacitors with similar capacitance ranges. With reduced ESR, the enhanced capacitance retention at higher frequencies provides the lowest total capacitance and an economical solution for power applications.

## Benefits

- ESR: 5 mΩ to 70 mΩ
- Voltage: 2 V to 16 V
- Capacitance: 6.8 μF to 560 μF
- Operating Temperature: -55°C to 125°C
- 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.

## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

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

## Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C
Rated Capacitance Range	6.8 – 560 $\mu\text{F}$ @ 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2 – 16 V
DF (120 Hz)	6%
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	$\leq 4$ V Rating: $\leq 0.06$ CV ( $\mu\text{A}$ ) at rated voltage after 5 minutes > 4 V Rating: $\leq 0.04$ CV ( $\mu\text{A}$ ) at rated voltage after 5 minutes

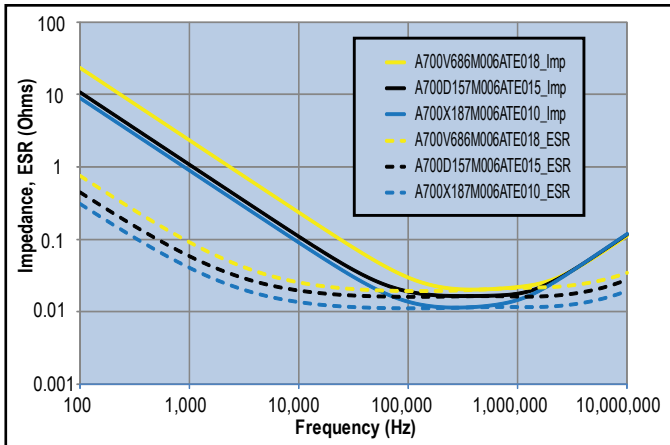
## Qualification

Test	Condition	Characteristics				
Endurance	125°C @ rated voltage, 2,000 hours	Δ C/C	Within ±10% of initial value			
		DF	≤ initial limit			
		DCL	Within 1.25 x initial limit			
		ESR	Within 2.0 x initial limit			
Storage Life	125°C @ 0 volts, 2,000 hours	Δ C/C	Within ±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, 1,000 hours, rated voltage 60°C, 90% RH, 500 hours, No Load	Δ C/C	Within -5%/+30% of initial value			
		DF	≤ initial limit			
		DCL	Within 5.0 x initial limit			
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	+125°C
		Δ C/C	IL*	±15%	±15%	±20%
		DF	IL	IL	1.2 x IL	1.5 x IL
DCL		IL	n/a	10 x IL	10 x IL	
		Δ C/C	Within ±10% of initial value			
		DF	Within initial limits			
Surge Voltage	125°C, 1.32 x rated voltage, 33 Ω Resistance, 1,000 cycles	DCL	Within initial limits			
		ESR	Within initial limits			
		Δ C/C	Within ±10% of initial value			
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	DF	Within initial limits			
		DCL	Within initial limits			
		Δ C/C	Within ±10% of initial value			

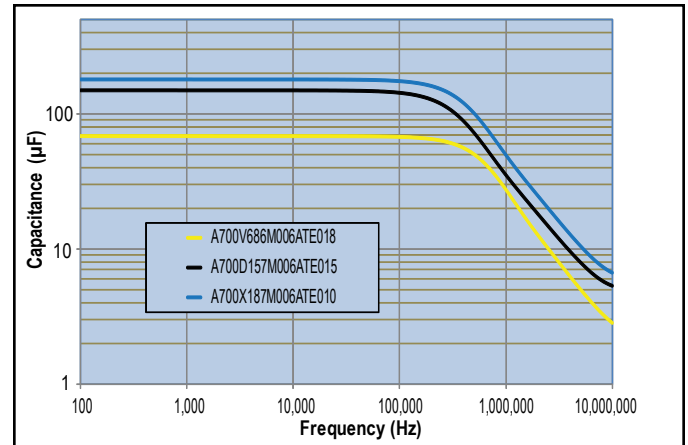
\*IL = Initial Limit

## Electrical Characteristics

ESR vs. Frequency



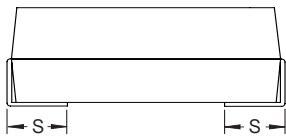
Capacitance vs. Frequency



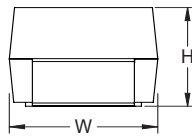
## Dimensions – Millimeters (Inches)

Metric will govern

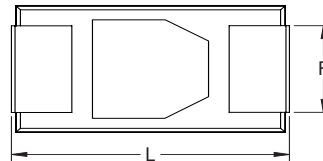
SIDE VIEW



END VIEW



BOTTOM VIEW



Case Size		Component				
KEMET	EIA	L*	W*	H*	F* ±0.1 ±(0.004)	S* ±0.3 ±(0.012)
D	7343-31	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.8 ±0.3 (0.098 ±0.012)	2.4 (0.094)	1.3 (0.051)
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)
W	7343-15	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	1.5 (0.059) Maximum	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)



Table 1 – Ratings &amp; Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp
VDC @ 125°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 100 kHz with/T = +20°C @ -55°C to 125°C	Reflow Temp ≤ 260°C	°C
2	100	V/7343-20	A700V107M002ATE016	12	6	16	4100	3	125
2	100	V/7343-20	A700V107M002ATE018	12	6	18	3900	3	125
2	100	V/7343-20	A700V107M002ATE025	12	6	25	3300	3	125
2	100	V/7343-20	A700V107M002ATE028	12	6	28	3100	3	125
2	150	V/7343-20	A700V157M002ATE015	18	6	15	4200	3	125
2	150	V/7343-20	A700V157M002ATE018	18	6	18	3900	3	125
2	150	V/7343-20	A700V157M002ATE025	18	6	25	3300	3	125
2	150	V/7343-20	A700V157M002ATE028	18	6	28	3100	3	125
2	180	D/7343-31	A700D187M002ATE015	22	6	15	4100	3	125
2	180	D/7343-31	A700D187M002ATE018	22	6	18	3700	3	125
2	220	V/7343-20	A700V227M002ATE009	26	6	9	5500	3	125
2	220	V/7343-20	A700V227M002ATE015	26	6	15	4200	3	125
2	220	V/7343-20	A700V227M002ATE018	26	6	18	3900	3	125
2	220	D/7343-31	A700D227M002ATE009	26	6	9	5300	3	125
2	220	D/7343-31	A700D227M002ATE015	26	6	15	4100	3	125
2	220	D/7343-31	A700D227M002ATE018	26	6	18	3700	3	125
2	270	D/7343-31	A700D277M002ATE012	32	6	12	4600	3	125
2	270	X/7343-43	A700X277M002ATE010	32	6	10	4700	3	125
2	270	X/7343-43	A700X277M002ATE012	32	6	12	4300	3	125
2	270	X/7343-43	A700X277M002ATE015	32	6	15	3900	3	125
2	330	D/7343-31	A700D337M002ATE007	40	6	7	6000	3	125
2	330	D/7343-31	A700D337M002ATE009	40	6	9	5300	3	125
2	330	D/7343-31	A700D337M002ATE012	40	6	12	4600	3	125
2	330	X/7343-43	A700X337M002ATE010	40	6	10	4700	3	125
2	330	X/7343-43	A700X337M002ATE015	40	6	15	3900	3	125
2	390	X/7343-43	A700X397M002ATE010	47	6	10	4700	3	125
2	390	X/7343-43	A700X397M002ATE015	47	6	15	3900	3	125
2	470	D/7343-31	A700D477M002ATE005	56	6	5	7100	3	125
2	470	D/7343-31	A700D477M002ATE006	56	6	6	6500	3	125
2	470	X/7343-43	A700X477M002ATE005	56	6	5	6700	3	125
2	470	X/7343-43	A700X477M002ATE007	56	6	7	5700	3	125
2	470	X/7343-43	A700X477M002ATE010	56	6	10	4700	3	125
2	470	X/7343-43	A700X477M002ATE015	56	6	15	3900	3	125
2	560	X/7343-43	A700X567M002ATE005	67	6	5	6700	3	125
2.5	68	V/7343-20	A700V686M2R5ATE020	10	6	20	3700	3	125
2.5	68	V/7343-20	A700V686M2R5ATE028	10	6	28	3100	3	125
2.5	82	V/7343-20	A700V826M2R5ATE018	12	6	18	3900	3	125
2.5	82	V/7343-20	A700V826M2R5ATE025	12	6	25	3300	3	125
2.5	82	V/7343-20	A700V826M2R5ATE028	12	6	28	3100	3	125
2.5	100	D/7343-31	A700D107M2R5ATE018	15	6	18	3700	3	125
2.5	100	D/7343-31	A700D107M2R5ATE025	15	6	25	3200	3	125
2.5	100	D/7343-31	A700D107M2R5ATE028	15	6	28	3000	3	125
2.5	120	D/7343-31	A700D127M2R5ATE015	18	6	15	4100	3	125
2.5	120	D/7343-31	A700D127M2R5ATE018	18	6	18	3700	3	125
2.5	150	D/7343-31	A700D157M2R5ATE015	23	6	15	4100	3	125
2.5	150	D/7343-31	A700D157M2R5ATE018	23	6	18	3700	3	125
2.5	180	D/7343-31	A700D187M2R5ATE015	27	6	15	4100	3	125
2.5	180	D/7343-31	A700D187M2R5ATE018	27	6	18	3700	3	125
2.5	180	X/7343-43	A700X187M2R5ATE010	27	6	10	4700	3	125
2.5	180	X/7343-43	A700X187M2R5ATE015	27	6	15	3900	3	125
2.5	180	X/7343-43	A700X187M2R5ATE018	27	6	18	3500	3	125
VDC @ 125°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 100 kHz with/T = +20°C @ -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

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.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp
VDC @ 125°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 100 kHz with/T = +20°C @ -55°C to 125°C	Reflow Temp ≤ 260°C	°C
2.5	220	X/7343-43	A700X227M2R5ATE009	33	6	9	5000	3	125
2.5	220	X/7343-43	A700X227M2R5ATE010	33	6	10	4700	3	125
2.5	220	X/7343-43	A700X227M2R5ATE015	33	6	15	3900	3	125
2.5	330	X/7343-43	A700X337M2R5ATE010	50	6	10	4700	3	125
2.5	330	X/7343-43	A700X337M2R5ATE015	50	6	15	3900	3	125
4	68	V/7343-20	A700V686M004ATE020	16	6	20	3700	3	125
4	68	V/7343-20	A700V686M004ATE028	16	6	28	3100	3	125
4	82	V/7343-20	A700V826M004ATE016	20	6	16	4100	3	125
4	82	V/7343-20	A700V826M004ATE018	20	6	18	3900	3	125
4	82	V/7343-20	A700V826M004ATE025	20	6	25	3300	3	125
4	82	V/7343-20	A700V826M004ATE028	20	6	28	3100	3	125
4	100	D/7343-31	A700D107M004ATE018	24	6	18	3700	3	125
4	100	D/7343-31	A700D107M004ATE025	24	6	25	3200	3	125
4	100	D/7343-31	A700D107M004ATE028	24	6	28	3000	3	125
4	100	V/7343-20	A700V107M004ATE025	24	6	25	3300	3	125
4	100	V/7343-20	A700V107M004ATE028	24	6	28	3100	3	125
4	120	D/7343-31	A700D127M004ATE015	29	6	15	4100	3	125
4	120	D/7343-31	A700D127M004ATE018	29	6	18	3700	3	125
4	150	D/7343-31	A700D157M004ATE015	36	6	15	4100	3	125
4	150	D/7343-31	A700D157M004ATE018	36	6	18	3700	3	125
4	150	V/7343-20	A700V157M004ATE016	36	6	16	4100	3	125
4	180	D/7343-31	A700D187M004ATE012	43	6	12	4600	3	125
4	180	D/7343-31	A700D187M004ATE015	43	6	15	4100	3	125
4	180	D/7343-31	A700D187M004ATE018	43	6	18	3700	3	125
4	180	X/7343-43	A700X187M004ATE010	43	6	10	4700	3	125
4	180	X/7343-43	A700X187M004ATE015	43	6	15	3900	3	125
4	180	X/7343-43	A700X187M004ATE018	43	6	18	3500	3	125
4	220	D/7343-31	A700D227M004ATE009	53	6	9	5300	3	125
4	220	D/7343-31	A700D227M004ATE010	53	6	10	5000	3	125
4	220	D/7343-31	A700D227M004ATE015	53	6	15	4100	3	125
4	220	X/7343-43	A700X227M004ATE009	53	6	9	5000	3	125
4	220	X/7343-43	A700X227M004ATE010	53	6	10	4700	3	125
4	220	X/7343-43	A700X227M004ATE015	53	6	15	3900	3	125
4	270	X/7343-43	A700X277M004ATE010	65	6	10	4700	3	125
4	270	X/7343-43	A700X277M004ATE015	65	6	15	3900	3	125
4	330	X/7343-43	A700X337M004ATE008	79	6	8	5300	3	125
4	330	X/7343-43	A700X337M004ATE010	79	6	10	4700	3	125
4	330	X/7343-43	A700X337M004ATE015	79	6	15	3900	3	125
6.3	10	V/7343-20	A700V106M006ATE055	3	6	55	2200	3	125
6.3	22	V/7343-20	A700V226M006ATE028	6	6	28	3100	3	125
6.3	22	V/7343-20	A700V226M006ATE045	6	6	45	2400	3	125
6.3	33	V/7343-20	A700V336M006ATE018	8	6	18	3900	3	125
6.3	33	V/7343-20	A700V336M006ATE025	8	6	25	3300	3	125
6.3	33	V/7343-20	A700V336M006ATE028	8	6	28	3100	3	125
6.3	47	V/7343-20	A700V476M006ATE018	12	6	18	3900	3	125
6.3	47	V/7343-20	A700V476M006ATE025	12	6	25	3300	3	125
6.3	47	V/7343-20	A700V476M006ATE028	12	6	28	3100	3	125
6.3	56	V/7343-20	A700V566M006ATE018	14	6	18	3900	3	125
6.3	56	V/7343-20	A700V566M006ATE025	14	6	25	3300	3	125
6.3	56	V/7343-20	A700V566M006ATE028	14	6	28	3100	3	125
6.3	68	V/7343-20	A700V686M006ATE015	17	6	15	4200	3	125
VDC @ 125°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 100 kHz with/T = +20°C @ -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

Also available on large (13 inch) reels. Add 7280 to the end of the part number.

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Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp
VDC @ 125°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 100 kHz with/T = +20°C @ -55°C to 125°C	Reflow Temp ≤ 260°C	°C
6.3	68	V/7343-20	A700V686M006ATE018	17	6	18	3900	3	125
6.3	68	V/7343-20	A700V686M006ATE025	17	6	25	3300	3	125
6.3	68	V/7343-20	A700V686M006ATE028	17	6	28	3100	3	125
6.3	82	V/7343-20	A700V826M006ATE018	21	6	18	3900	3	125
6.3	82	V/7343-20	A700V826M006ATE025	21	6	25	3300	3	125
6.3	82	V/7343-20	A700V826M006ATE028	21	6	28	3100	3	125
6.3	100	V/7343-20	A700V107M006ATE015	25	6	15	4200	3	125
6.3	100	V/7343-20	A700V107M006ATE018	25	6	18	3900	3	125
6.3	100	V/7343-20	A700V107M006ATE025	25	6	25	3300	3	125
6.3	100	D/7343-31	A700D107M006ATE015	25	6	15	4100	3	125
6.3	100	D/7343-31	A700D107M006ATE018	25	6	18	3700	3	125
6.3	120	D/7343-31	A700D127M006ATE012	30	6	12	4600	3	125
6.3	120	D/7343-31	A700D127M006ATE015	30	6	15	4100	3	125
6.3	120	D/7343-31	A700D127M006ATE018	30	6	18	3700	3	125
6.3	150	D/7343-31	A700D157M006ATE010	38	6	10	5000	3	125
6.3	150	D/7343-31	A700D157M006ATE012	38	6	12	4600	3	125
6.3	150	D/7343-31	A700D157M006ATE015	38	6	15	4100	3	125
6.3	150	X/7343-43	A700X157M006ATE010	38	6	10	4700	3	125
6.3	150	X/7343-43	A700X157M006ATE012	38	6	12	4300	3	125
6.3	150	X/7343-43	A700X157M006ATE015	38	6	15	3900	3	125
6.3	180	D/7343-20	A700D187M006ATE010	45	6	10	5000	3	125
6.3	180	X/7343-43	A700X187M006ATE010	45	6	10	4700	3	125
6.3	180	X/7343-43	A700X187M006ATE015	45	6	15	3900	3	125
6.3	220	X/7343-20	A700X227M006ATE010	55	6	10	4700	3	125
6.3	220	X/7343-43	A700X227M006ATE015	55	6	15	3900	3	125
8	10	V/7343-20	A700V106M008ATE055	3	6	55	2200	3	125
8	22	V/7343-20	A700V226M008ATE028	7	6	28	3100	3	125
8	22	V/7343-20	A700V226M008ATE045	7	6	45	2400	3	125
8	33	V/7343-20	A700V336M008ATE018	11	6	18	3900	3	125
8	33	V/7343-20	A700V336M008ATE025	11	6	25	3300	3	125
8	33	V/7343-20	A700V336M008ATE028	11	6	28	3100	3	125
8	56	D/7343-31	A700D566M008ATE015	18	6	15	4100	3	125
8	56	D/7343-31	A700D566M008ATE018	18	6	18	3700	3	125
8	68	D/7343-31	A700D686M008ATE015	22	6	15	4100	3	125
8	68	D/7343-31	A700D686M008ATE018	22	6	18	3700	3	125
8	100	X/7343-43	A700X107M008ATE010	32	6	10	4700	3	125
8	100	X/7343-43	A700X107M008ATE012	32	6	12	4300	3	125
8	100	X/7343-43	A700X107M008ATE015	32	6	15	3900	3	125
10	10	V/7343-20	A700V106M010ATE055	4	6	55	2200	3	125
10	22	V/7343-20	A700V226M010ATE028	9	6	28	3100	3	125
10	22	V/7343-20	A700V226M010ATE045	9	6	45	2400	3	125
10	33	V/7343-20	A700V336M010ATE018	13	6	18	3900	3	125
10	33	V/7343-20	A700V336M010ATE025	13	6	25	3300	3	125
10	33	V/7343-20	A700V336M010ATE028	13	6	28	3100	3	125
10	47	V/7343-20	A700V476M010ATE025	19	6	25	3300	3	125
10	47	V/7343-20	A700V476M010ATE028	19	6	28	3100	3	125
10	56	D/7343-31	A700D566M010ATE015	22	6	15	4100	3	125
10	56	D/7343-31	A700D566M010ATE018	22	6	18	3700	3	125
10	68	D/7343-31	A700D686M010ATE015	27	6	15	4100	3	125
10	68	D/7343-31	A700D686M010ATE018	27	6	18	3700	3	125
10	100	X/7343-43	A700X107M010ATE010	40	6	10	4700	3	125
VDC @ 125°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 100 kHz with/T = +20°C @ -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

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.

Table 1 – Ratings &amp; Part Number Reference cont'd

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Ripple Current	MSL	Maximum Operating Temp
VDC @ 125°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 100 kHz with/T = +20°C @ -55°C to 125°C	Reflow Temp ≤ 260°C	°C
10	100	X/7343-43	A700X107M010ATE015	40	6	15	3900	3	125
10	120	X/7343-43	A700X127M010ATE010	48	6	10	4700	3	125
10	120	X/7343-43	A700X127M010ATE015	48	6	15	3900	3	125
10	150	X/7343-43	A700X157M010ATE010	60	6	10	4700	3	125
10	150	X/7343-43	A700X157M010ATE015	60	6	15	3900	3	125
12.5	10	V/7343-20	A700V106M12RATE040	5	6	40	2600	3	125
12.5	10	V/7343-20	A700V106M12RATE055	5	6	55	2200	3	125
12.5	10	V/7343-20	A700V106M12RATE060	5	6	60	2100	3	125
12.5	15	V/7343-20	A700V156M12RATE040	8	6	40	2600	3	125
12.5	15	V/7343-20	A700V156M12RATE045	8	6	45	2400	3	125
12.5	22	V/7343-20	A700V226M12RATE030	11	6	30	3000	3	125
12.5	33	V/7343-20	A700V336M12RATE025	17	6	25	3300	3	125
12.5	56	D/7343-31	A700D566M12RATE020	28	6	20	3500	3	125
12.5	47	D/7343-31	A700D476M12RATE020	24	6	20	3500	3	125
12.5	47	D/7343-31	A700D476M12RATE025	24	6	25	3200	3	125
12.5	100	X/7343-43	A700X107M12RATE012	50	6	12	4300	3	125
12.5	100	X/7343-43	A700X107M12RATE015	50	6	15	3900	3	125
16	6.8	V/7343-20	A700V685M016ATE070	4	6	70	2000	3	125
16	8.2	V/7343-20	A700V825M016ATE045	5	6	45	2400	3	125
16	10	V/7343-20	A700V106M016ATE045	6	6	45	2400	3	125
16	10	V/7343-20	A700V106M016ATE060	6	6	60	2100	3	125
16	15	V/7343-20	A700V156M016ATE040	10	6	40	2600	3	125
16	22	D/7343-31	A700D226M016ATE018	14	6	18	3700	3	125
16	22	D/7343-31	A700D226M016ATE025	14	6	25	3200	3	125
16	22	D/7343-31	A700D226M016ATE030	14	6	30	2900	3	125
VDC @ 125°C	µF	KEMET/EIA	(See below for part options)	µA @ +25°C Maximum/5 Minutes	% @ +25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA @ 100 kHz with/T = +20°C @ -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

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	Maximum Recommended Transient Voltage (1 ms – 1 μs)
	-55°C to 125°C	
$2 V \leq V_R \leq 16 V$	$V_R$	$V_R$

$V_R$  = 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 (P max) mWatts @ 25°C with +20°C Rise
A700W	7343-15	290
A700V	7343-20	270
A700D	7343-31	250
A700X	7343-43	225

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 permissible 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 Case	Metric Size Code EIA	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
		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	7343-20	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 <sup>1</sup>	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

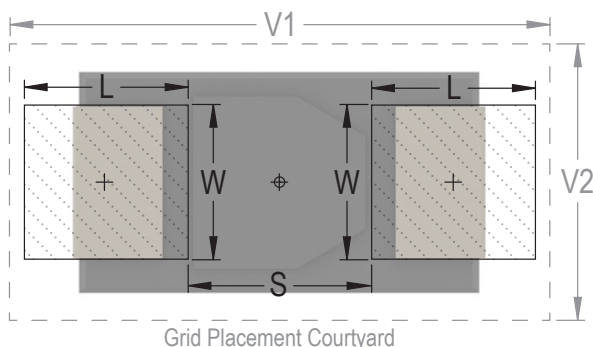
**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**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).

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## 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.

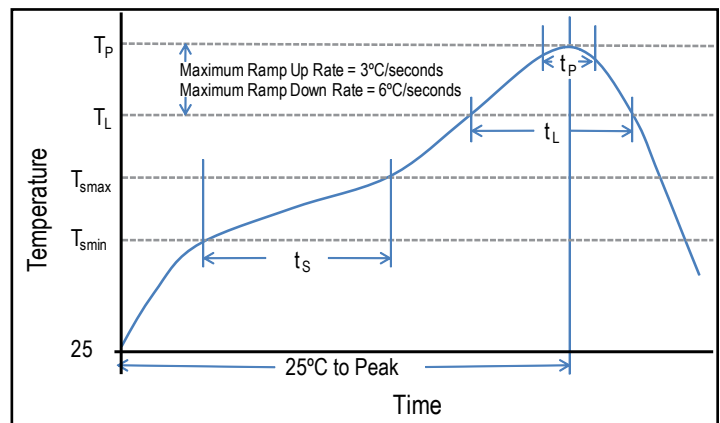
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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.

\*Case Size D, E, P, Y, and X

\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z

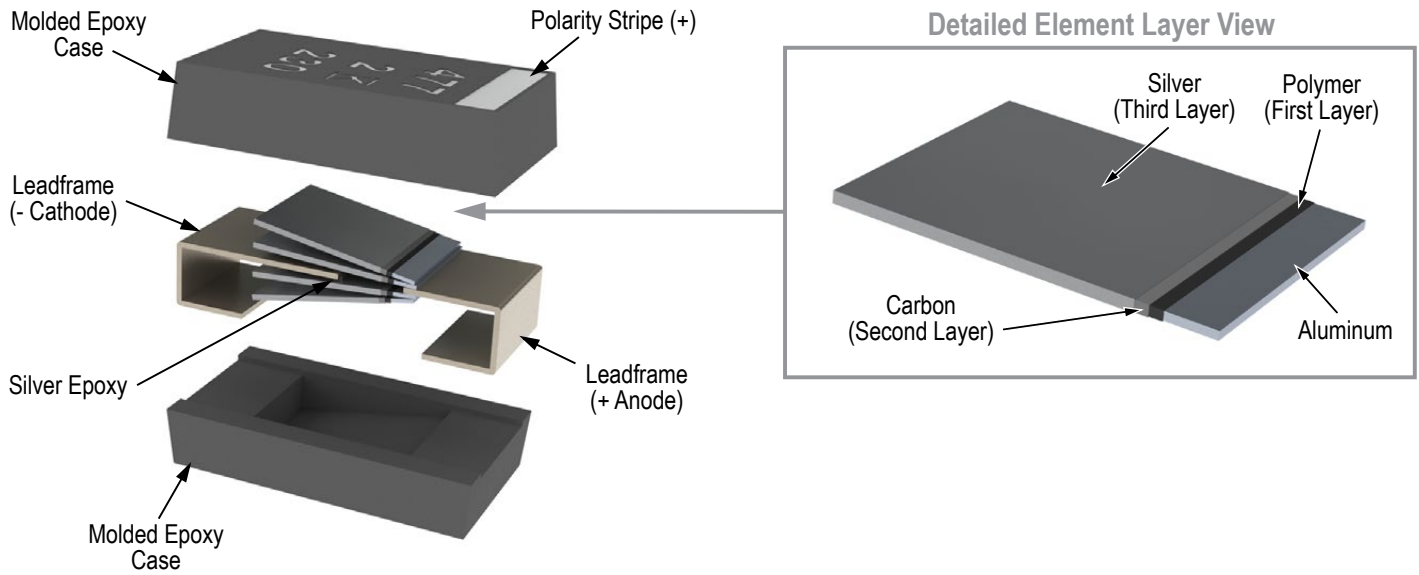


## Storage

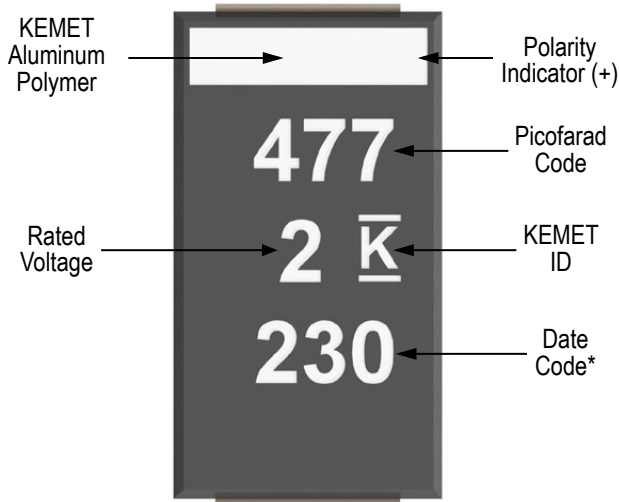
All AO-CAP series are shipped in moisture barrier bags with a desiccant and moisture indicator card. These series are classified as MSL3 (Moisture Sensitivity Level 3). Product contained within the moisture barrier bags should be stored in normal working environments with temperatures not to exceed 40°C and humidity not in excess of 60% RH.



## Construction



## Capacitor Marking

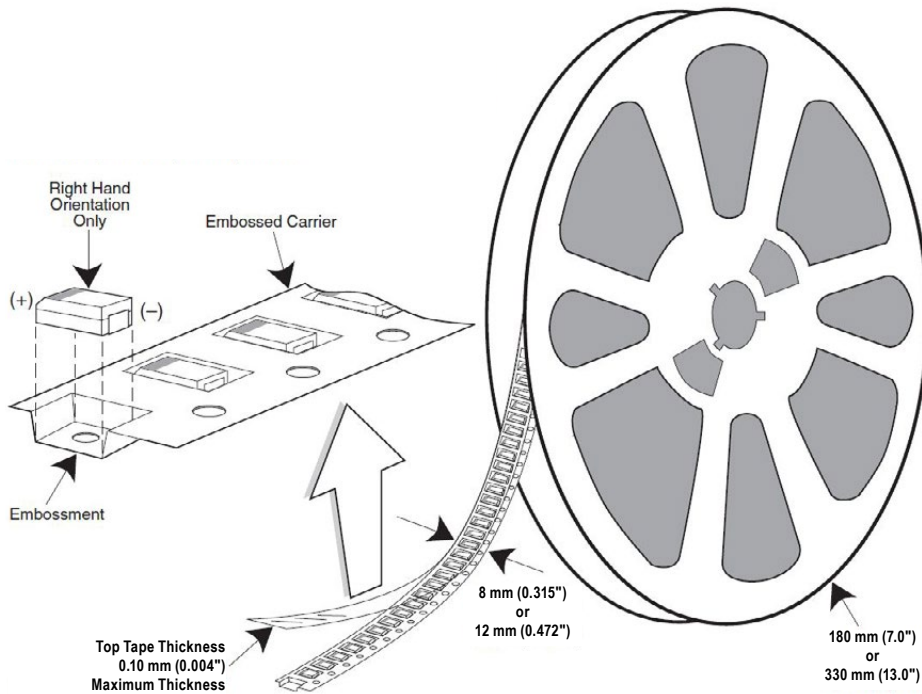


\* 230 = 30<sup>th</sup> week of 2012

Date Code *	
1 <sup>st</sup> digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
2 <sup>nd</sup> and 3 <sup>rd</sup> digit = Week of the Year	01 = 1 <sup>st</sup> week of the Year to 52 = 52 <sup>nd</sup> week of the Year

## Tape & Reel Packaging Information

KEMET's molded tantalum and aluminum 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.

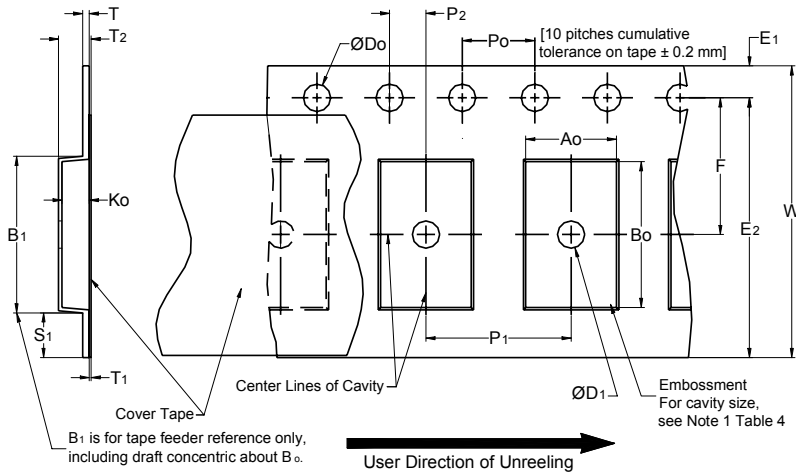


**Table 3 – Packaging Quantity**

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
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	5,000
W	7343-15	12	1,000	3,000
Z	7343-17	12	1,000	3,000
V	7343-20	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
Q	7343-12	12	1,000	3,000
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 <sub>0</sub>	D <sub>1</sub> Minimum Note 1	E <sub>1</sub>	P <sub>0</sub>	P <sub>2</sub>	R Reference Note 2	S <sub>1</sub> Minimum Note 3	T Maximum	T <sub>1</sub> 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)								2.0 ±0.1 (0.079 ±0.059)	30 (1.181)
16 mm											
Variable Dimensions — Millimeters (Inches)											
Tape Size	Pitch	B <sub>1</sub> Maximum Note 4	E <sub>2</sub> Minimum	F	P <sub>1</sub>	T <sub>2</sub> Maximum	W Maximum	A <sub>0</sub> , B <sub>0</sub> & K <sub>0</sub>			
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) & 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)				
16 mm	Triple (12 mm)	12.1 (0.476)	14.25 (0.561)	7.5 ±0.10 (0.295 ±0.004)	4.0 ±0.10 (0.157 ±0.004) to 12.0 ±0.10 (0.472 ±0.004)	8.0 (0.315)	16.3 (0.642)				

- 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.
- The tape, with or without components, shall pass around R without damage (see Figure 4).
- If S<sub>1</sub> < 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).
- B<sub>1</sub> dimension is a reference dimension for tape feeder clearance only.
- The cavity defined by A<sub>0</sub>, B<sub>0</sub> and K<sub>0</sub> shall surround the component with sufficient clearance that:
  - the component does not protrude above the top surface of the carrier tape.
  - the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
  - rotation of the component is limited to 20° maximum for 8 and 12 mm tapes and 10° maximum for 16 mm tapes (see Figure 2).
  - lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape and to 1.0 mm maximum for 16 mm tape (see Figure 3).
  - see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

## Packaging Information Performance Notes

- Cover Tape Break Force:** 1.0 Kg minimum.
- 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.

- 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.

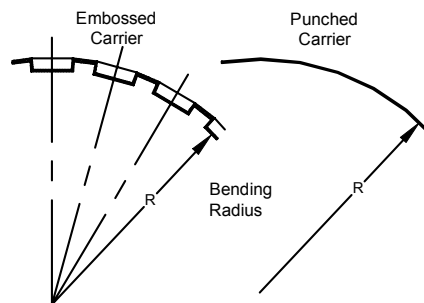
### Figure 2 – Maximum Component Rotation



### Figure 3 – Maximum Lateral Movement



### Figure 4 – Bending Radius



**Figure 5 – Reel Dimensions**



**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				
16 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W <sub>1</sub>	W <sub>2</sub> Maximum	W <sub>3</sub>
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)	
16 mm		16.4 +2.0/-0.0 (0.646 +0.078/-0.0)	22.4 (0.882)	

**Figure 6 – Tape Leader & Trailer Dimensions**

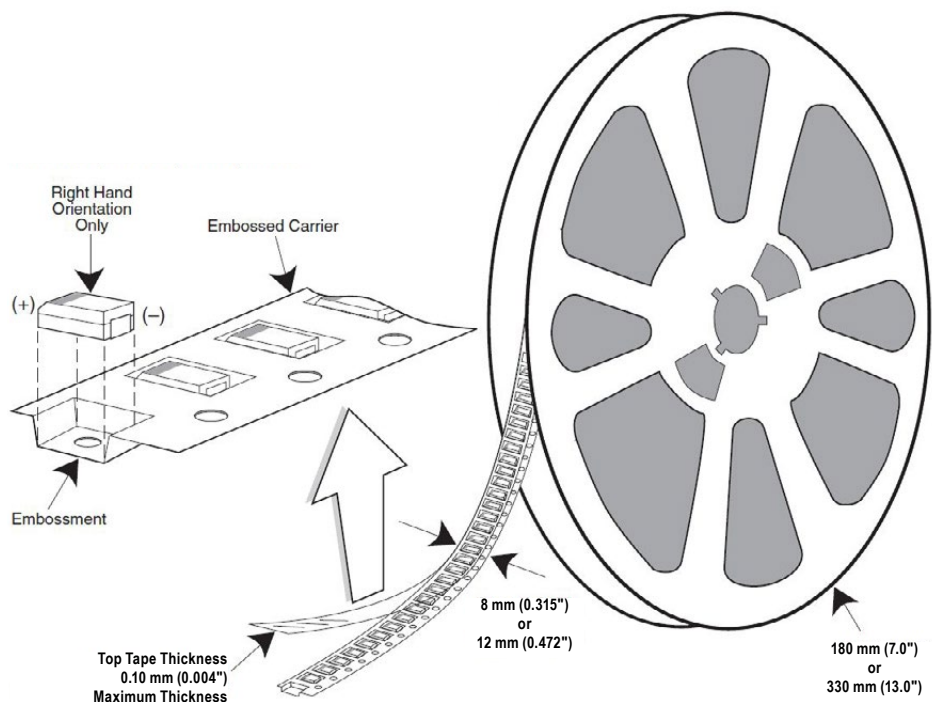


**Figure 7 – Maximum Camber**



## Tape & Reel Packaging Information

KEMET's molded tantalum and aluminum 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.



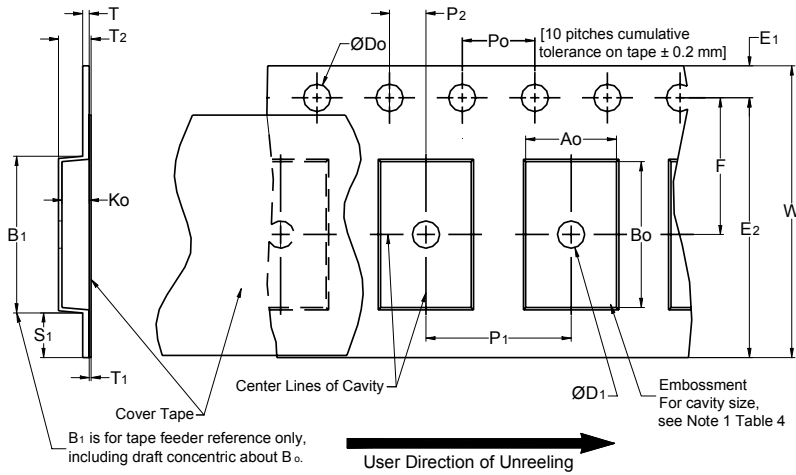
**Table 3 – Packaging Quantity**

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	5,000
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 <sub>0</sub>	D <sub>1</sub> Minimum Note 1	E <sub>1</sub>	P <sub>0</sub>	P <sub>2</sub>	R Reference Note 2	S <sub>1</sub> Minimum Note 3	T Maximum	T <sub>1</sub> 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)							
16 mm						2.0 ±0.1 (0.079 ±0.059)			
Variable Dimensions — Millimeters (Inches)									
Tape Size	Pitch	B <sub>1</sub> Maximum Note 4	E <sub>2</sub> Minimum	F	P <sub>1</sub>	T <sub>2</sub> Maximum	W Maximum	A <sub>0</sub> , B <sub>0</sub> & K <sub>0</sub>	
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) & 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)		
16 mm	Triple (12 mm)	12.1 (0.476)	14.25 (0.561)	7.5 ±0.10 (0.295 ±0.004)	4.0 ±0.10 (0.157 ±0.004) to 12.0 ±0.10 (0.472 ±0.004)	8.0 (0.315)	16.3 (0.642)		

- 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.
- The tape, with or without components, shall pass around R without damage (see Figure 4).
- If S<sub>1</sub> < 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).
- B<sub>1</sub> dimension is a reference dimension for tape feeder clearance only.
- The cavity defined by A<sub>0</sub>, B<sub>0</sub> and K<sub>0</sub> shall surround the component with sufficient clearance that:
  - the component does not protrude above the top surface of the carrier tape.
  - the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
  - rotation of the component is limited to 20° maximum for 8 and 12 mm tapes and 10° maximum for 16 mm tapes (see Figure 2).
  - lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape and to 1.0 mm maximum for 16 mm tape (see Figure 3).
  - see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

## Packaging Information Performance Notes

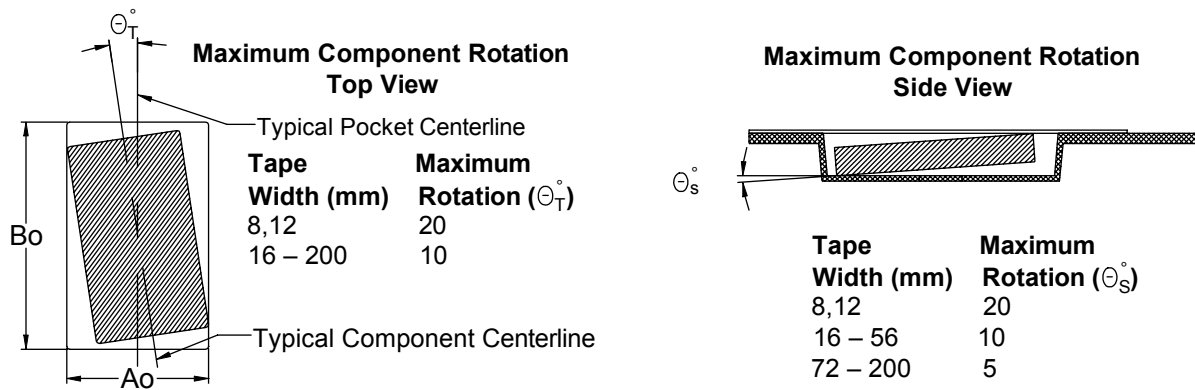
- 1. Cover Tape Break Force:** 1.0 Kg minimum.
- 2. Cover Tape Peel Strength:** The total peel strength of the cover tape from the carrier tape shall be:

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)

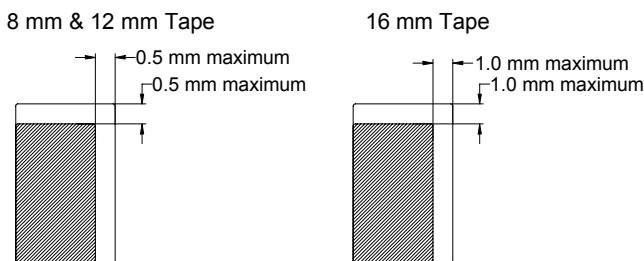
The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.

- 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.

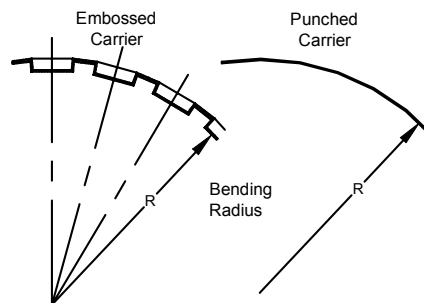
### Figure 2 – Maximum Component Rotation



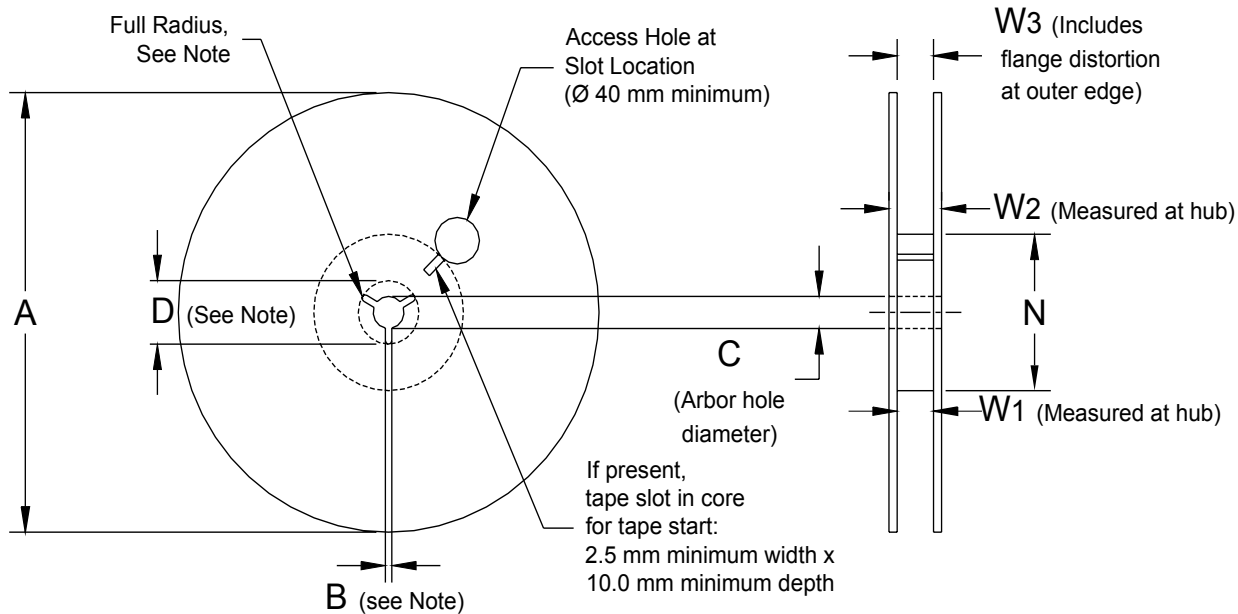
### Figure 3 – Maximum Lateral Movement



### Figure 4 – Bending Radius



**Figure 5 – Reel Dimensions**



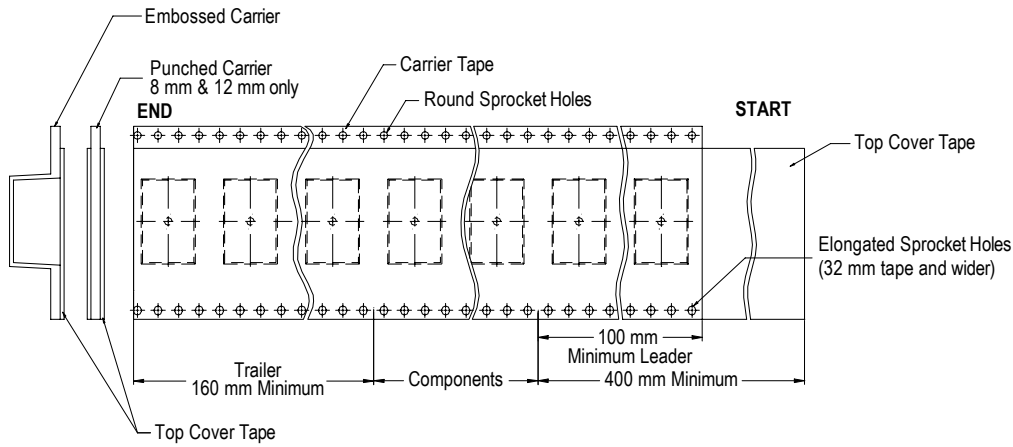
Note: Drive spokes optional; if used, dimensions B and D shall apply.

**Table 5 – Reel Dimensions**

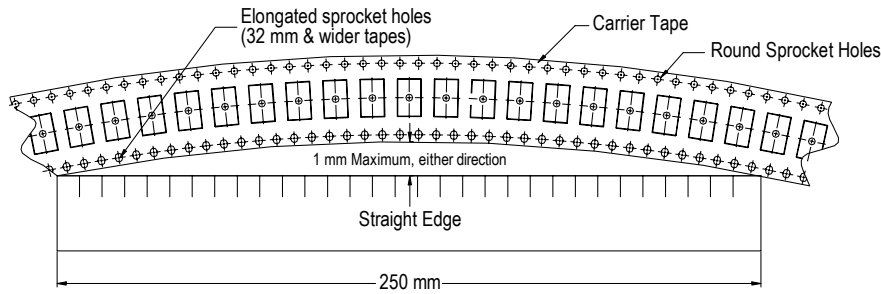
Metric will govern

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				
16 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W <sub>1</sub>	W <sub>2</sub> Maximum	W <sub>3</sub>
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)	
16 mm		16.4 +2.0/-0.0 (0.646 +0.078/-0.0)	22.4 (0.882)	

**Figure 6 – Tape Leader & Trailer Dimensions**



**Figure 7 – Maximum Camber**



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