T540 Polymer Commercial Off-the-Shelf (COTS)

Overview

The KEMET Organic Capacitor (KO-CAP) is a tantalum capacitor with a Ta anode and Ta_2O_5 dielectric. A conductive organic polymer replaces the more common MnO_2 as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency. The KO-CAP may also be operated at steady state voltages at 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.

The T540 Series KO-CAP offers the same advantages as the T525 Series but is also designed for the Commercial Off-the-Shelf (COTS) requirements of military and aerospace applications. This surface mount product offers a tin lead (SnPb) leadframe finish, surge current testing options and standard or low ESR levels.

Benefits

- Polymer cathode technology
- 125°C maximum operating temperature
- High frequency capacitance retention
- Benign failure mode
- Capacitance: 22µF to 680µF
- Voltage: 2.5V to 16V
- Use at up to 90% of rated voltage (10% derating) for part types ≤10V
- Use at up to 80% of rated voltage (20% derating) for part types >10V
- Surge current testing options
- Self-healing mechanism
- Volumetrically efficient
- EIA standard case sizes
- Low ESR

Applications

Typical applications include decoupling and filtering in military and aerospace applications that require low ESR or a benign failure mode.

Environmental Compliance

RoHS Compliant (6/6)* according to Directive 2002/95/EC

**When ordered with 100% Sn Solder*

SPICE

For a detailed analysis of specific part numbers, please visit 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	540	D	107	M	010	A	H	65	10
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/ Design	Lead Material	Surge Option	ESR
T = Tantalum	540 = Polymer COTS	B = 3528-21 D = 7343-31	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	2R5 = 2.5V 003 = 3V 004 = 4V 006 = 6.3V 010 = 10V 016 = 16V	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

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C*
Rated Capacitance Range	22µF–680µF @ 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2.5V–16V
DF(120Hz)	≤ 10%
ESR (100kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.1CV (µA) at Rated Voltage after 5 minutes

** KEMET's Polymer COTS (T540/T541 Series) capacitors are rated for operation between -55°C and +125°C. Parametric electrical performance remains within stated specification limits after 1,000 hours of continuous operation and/or storage at +125°C. Long-term duty cycles or storage at or above +125°C may result in an increase in ESR performance outside of the stated specification limits.*

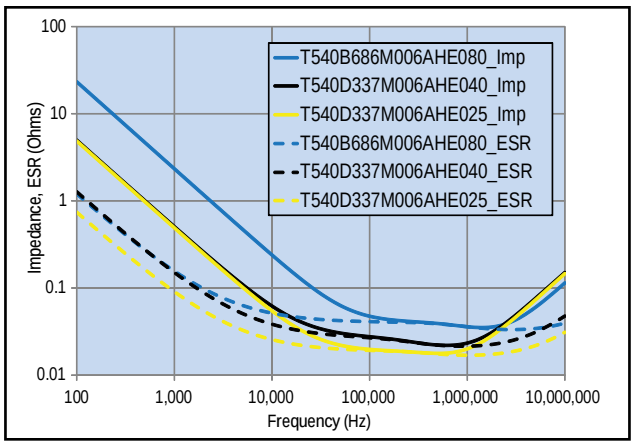
Qualification

Test	Condition		Characteristics			
Endurance	105°C @ Rated Voltage, 2,000 Hours 125°C @ 2/3 Rated Voltage, 2,000 Hours		ΔC/C	Within -20%/+10% of initial value		
			DF	≤ initial limit		
			DCL	1.25 x initial limit @ 125°C		
			ESR	2 x initial limit		
Storage Life	125°C @ 0 Volts, 2,000 Hours		ΔC/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, 500 Hours, Rated Voltage 60°C, 90% RH, 500 Hours, no load		ΔC/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
		ΔC/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, 33Ω Resistance, 1,000 cycles		ΔC/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, Meth. 213, Cond. I, 100G Peak MIL-STD-202, Meth. 204, Cond. D, 10Hz to 2000Hz, 20G Peak		ΔC/C	Within ±10% of initial value		
			DF	Within initial limits		
			DCL	Within initial limits		
Additional Qualification Testing per MIL-PRF-55365/8						

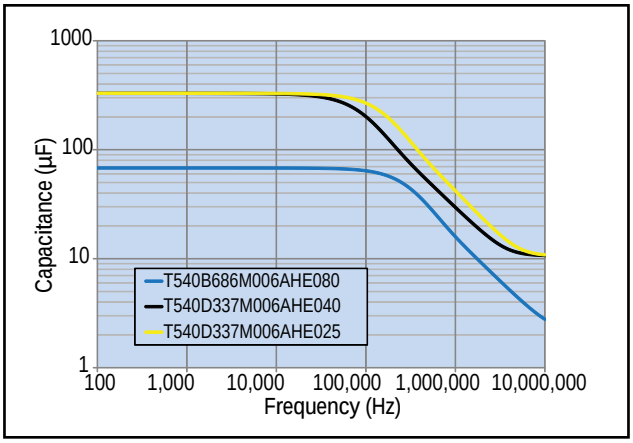
**IL = Initial limit*

Electrical Characteristics

ESR vs. Frequency

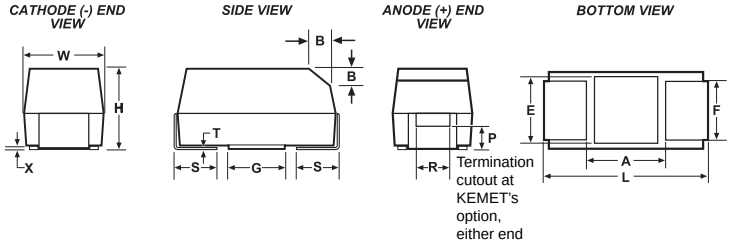


Capacitance vs. Frequency



Dimensions – Millimeters (Inches)

Metric will govern



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)
B	3528-21	3.5 ± 02 (138 ± .008)	2.8 ± 0.2 (.110 ± .008)	1.9 ± 0.2 (.075 ± .008)	2.2 (.087)	0.8 (.031)	0.4 (.016)	0.10 ± 0.10 (.004 ± .004)	0.5 (.020)	1.0 (.039)	0.13 (.005)	2.1 (.083)	1.8 (.071)	2.2 (.087)
D	7343-31	7.3 ± 0.3 (287 ± .012)	4.3 ± 0.3 (.169 ± .012)	2.8 ± 0.3 (098 ± .012)	2.4 (.094)	1.3 (.051)	0.5 (.020)	0.10 ± 0.10 (.004 ± .004)	0.9 (.035)	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-C-55365/8 specified dimensions*

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR
VDC	120Hz µF	KEMET/EIA	(See below for part options)	+25°C µAmps	+25°C 120Hz % Max	+25°C 100kHz mOhms	+25°C 100kHz mOhms
2.5	330	D/7343-31	T540D337M2R5AH(1)(2)	83	10.0	25.0	N/A
2.5	470	D/7343-31	T540D477M2R5AH(1)(2)	118	10.0	25.0	N/A
2.5	680	D/7343-31	T540D687M2R5AH(1)(2)	170	10.0	25.0	N/A
3	100	B/3528-20	T540B107M003AH(1)(2)	30	8.0	80.0	N/A
3	150	B/3528-20	T540B157M003AH(1)(2)	45	8.0	80.0	N/A
3	330	D/7343-31	T540D337M003AH(1)(2)	99	10.0	25.0	N/A
3	470	D/7343-31	T540D477M003AH(1)(2)	141	10.0	25.0	N/A
3	680	D/7343-31	T540D687M003AH(1)(2)	204	10.0	25.0	N/A
4	68	B/3528-20	T540B686M004AH(1)(2)	28	8.0	80.0	N/A
4	100	B/3528-20	T540B107M004AH(1)(2)	40	8.0	80.0	N/A
4	220	D/7343-31	T540D227M004AH(1)(2)	88	10.0	25.0	N/A
4	330	D/7343-31	T540D337M004AH(1)(2)	132	10.0	25.0	N/A
4	470	D/7343-31	T540D477M004AH(1)(2)	188	10.0	40.0	25.0
6.3	33	B/3528-20	T540B336M006AH(1)(2)	21	8.0	80.0	N/A
6.3	47	B/3528-20	T540B476M006AH(1)(2)	30	8.0	80.0	N/A
6.3	68	B/3528-20	T540B686M006AH(1)(2)	43	8.0	80.0	N/A
6.3	150	D/7343-31	T540D157M006AH(1)(2)	95	10.0	25.0	N/A
6.3	220	D/7343-31	T540D227M006AH(1)(2)	139	10.0	25.0	N/A
6.3	330	D/7343-31	T540D337M006AH(1)(2)	208	10.0	40.0	25.0
10	22	B/3528-20	T540B226M010AH(1)(2)	22	8.0	80.0	N/A
10	33	B/3528-20	T540B336M010AH(1)(2)	33	8.0	80.0	N/A
10	100	D/7343-31	T540D107M010AH(1)(2)	100	10.0	55.0	25.0
10	150	D/7343-31	T540D157M010AH(1)(2)	150	10.0	55.0	25.0
10	220	D/7343-31	T540D227M010AH(1)(2)	220	10.0	25.0	N/A
16	47	D/7343-31	T540D476M016AH(1)(2)	76	10.0	65.0	35.0
VDC	µF 120Hz	KEMET/EIA	(see below for part options)	µAmps +25°C	% Max +25°C 120Hz	mOhms +25°C 100kHz	mOhms +25°C 100kHz
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	Standard ESR	Low ESR

Notes:

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

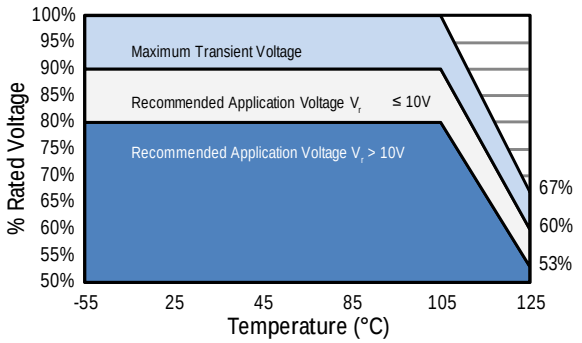
(2) To complete KEMET part number, insert 10 = Standard ESR, 20 = Low ESR. Designates ESR option.

Please refer to Ordering Information for additional details.

Derating Guidelines

Voltage Rating	Max Recommended Steady State Voltage	Max Recommended Transient Voltage (1ms–1µs)
-55°C to 105°C		
2.5V ≤ V_r ≤ 10V	90% of V_r	V_r
12.5V ≤ V_r ≤ 16V	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 below left table. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Please refer to the below right table for temperature compensation requirements.

Case Code		Maximum Power Dissipation (Pmax) mWatts @ 45°C w/ +30°C Rise
KEMET	EIA	
T520/525/ T540T	3528-12	105
T520M	3528-15	120
T520A	3216-18	112
T520/525/ T540B	3538-21	127
T520U	6032-15	135
T520L	3528-19	150
T520C	6032-28	165
T520W	7343-15	180
T520V	7343-20	187
T520/525/ T540D	7343-31	225
T520Y/525Y	7343-40	241
T520X	7343-43	247
T528I	3216-10	95
T528K	3528-10	150
T528W	7343-15	325
T528Z	7343-17	325
T530/T541D	7343-31	255
T530/T541Y	7343-40	263
T530/T541X	7443-43	270

Temperature Compensation Multipliers for Maximum Power Dissipation (Pmax)		
≤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.

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

I = rms ripple current (amperes)
E = rms ripple voltage (volts)
Pmax = maximum power dissipation (watts)
R = ESR 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

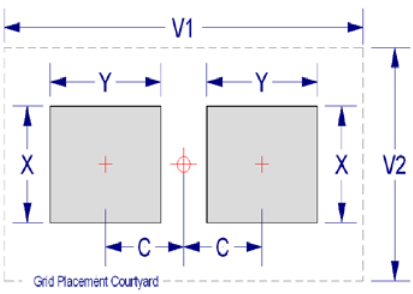
KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	**EIA**	X	Y	**C**	V1	V2	X	Y	**C**	V1	V2	X	Y	**C**	V1	V2
A	3216-18	1.35	2.15	1.45	6.10	2.80	1.25	1.75	1.35	5.00	2.30	1.15	1.35	1.25	4.10	2.00
B	3258-19	2.35	2.15	1.45	6.10	4.00	2.25	1.75	1.35	5.00	3.50	2.15	1.35	1.25	4.10	3.20
C	6032-25	2.35	2.65	2.60	8.90	4.40	2.25	2.25	2.50	7.80	3.90	2.15	1.85	2.40	6.90	3.60
D	7343-31	2.55	3.75	2.70	10.20	5.50	2.45	3.35	2.60	9.10	5.00	2.35	2.95	2.50	8.20	4.70
E[1]	7260-38	4.25	2.65	3.20	10.10	7.20	4.15	2.25	3.30	9.40	6.70	4.05	1.85	3.00	8.10	6.40
R	2012-12	1.05	1.80	1.00	4.80	2.40	0.95	1.45	0.90	3.80	1.90	0.85	1.05	0.80	2.90	1.60
S[2]	3216-12	1.35	2.15	1.45	6.10	2.80	1.25	1.75	1.35	5.00	2.30	1.15	1.35	1.25	4.10	2.00
T	3258-12	2.35	2.15	1.45	6.10	4.00	2.25	1.75	1.35	5.00	3.50	2.15	1.35	1.25	4.10	3.20
U	7343-20	2.55	3.75	2.70	10.20	5.50	2.45	3.35	2.60	9.10	5.00	2.35	2.95	2.50	8.20	4.70
V	7343-20	2.55	3.75	2.70	10.20	5.50	2.45	3.35	2.60	9.10	5.00	2.35	2.95	2.50	8.20	4.70
X[1]	7343-43	2.55	3.75	2.70	10.20	5.50	2.45	3.35	2.60	9.10	5.00	2.35	2.95	2.50	8.20	4.70
Y[1]	7343-35	2.55	3.75	2.70	10.20	5.50	2.45	3.35	2.60	9.10	5.00	2.35	2.95	2.50	8.20	4.70

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

Density Level B: For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.

Density Level C: For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC-7351).

[1] Height of these chips may create problems in wave soldering.



Soldering Process

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

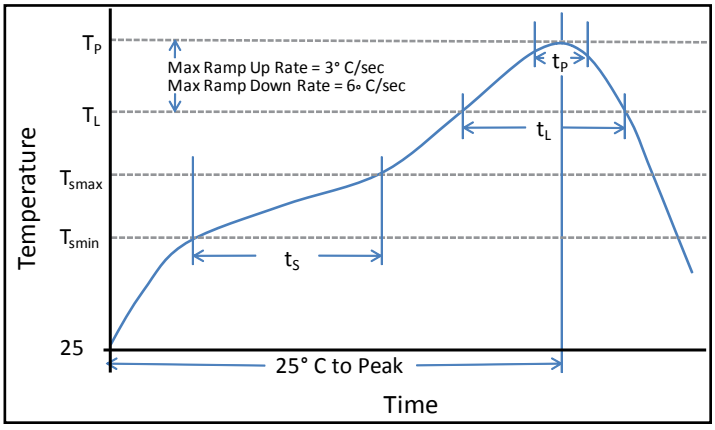
Note that although the X/7343-43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

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.

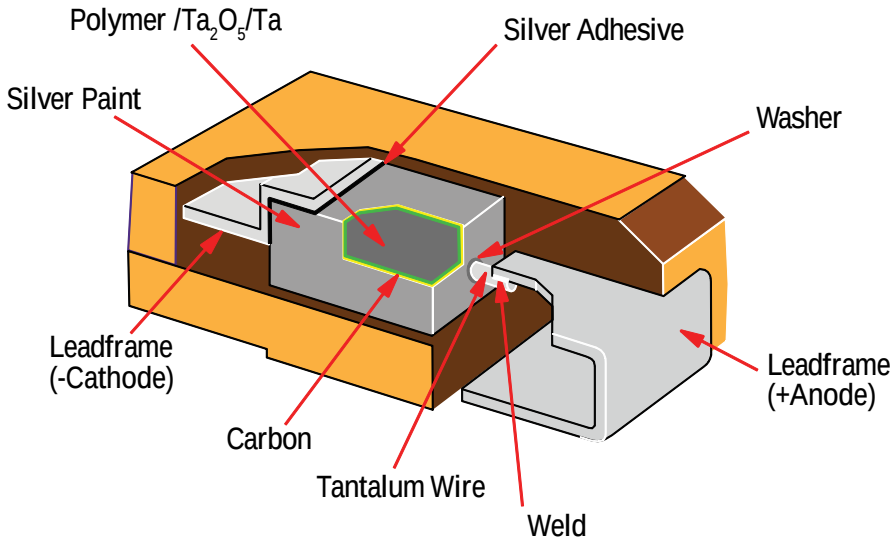
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and is not harmful to the product. Marking permanency is not affected by this change.

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

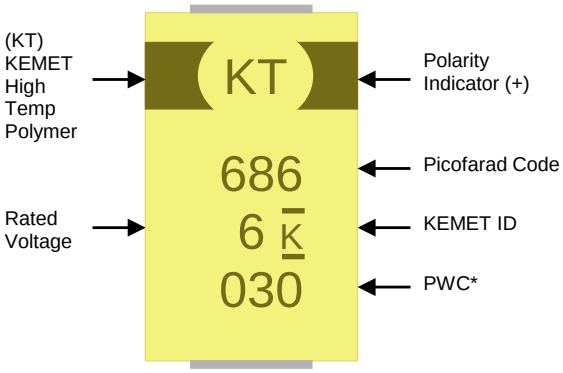
Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
**Case Size D, E, P, Y and X*
***Case Size A, B, C, H, I, K, M, R, S, T, U, V, W and Z*



Construction



Capacitor Marking



* 030 = 30th week of 2010

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 60% RH.

Tape & Reel Packaging Information

KEMET's Molded Tantalum and Aluminum Chip Capacitor families are packaged in 8 mm and 12 mm plastic tape on 7" and 13" reels, in accordance with EIA Standard 481-D: Taping of Surface Mount Components for Automatic Handling. This packaging system is compatible with all tape fed automatic pick and place systems.

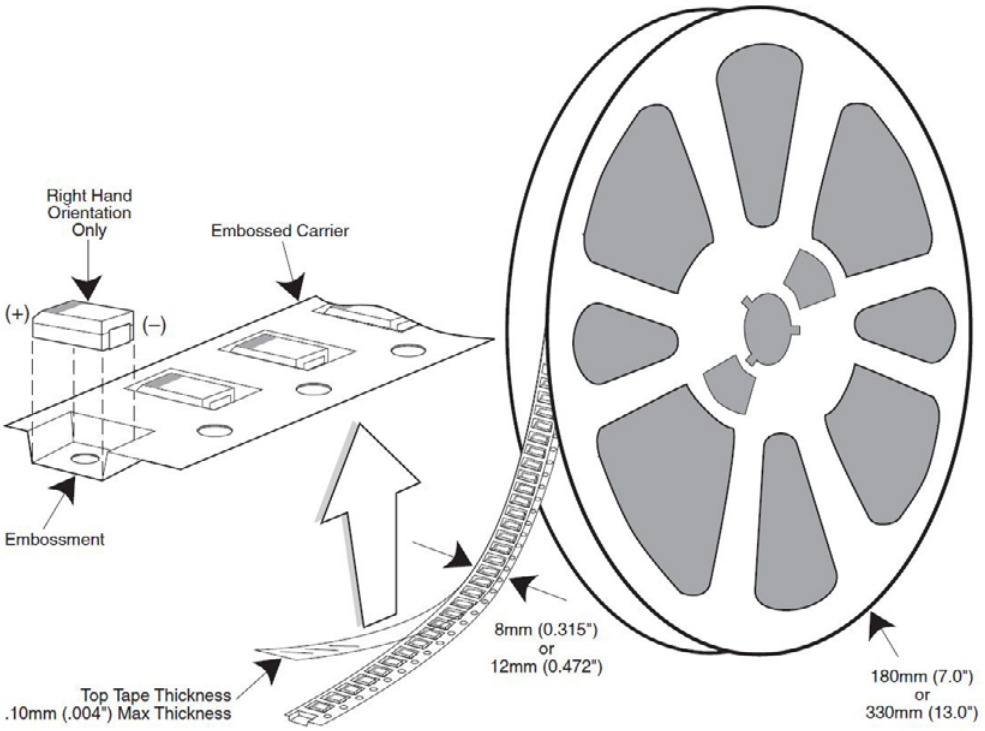


Table 3 – Packaging Quantity

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	7343-20	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
Y	7343-40	12	500	2,000
X	7343-43	12	500	2,000
E	7260-38	12	500	2,000

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

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

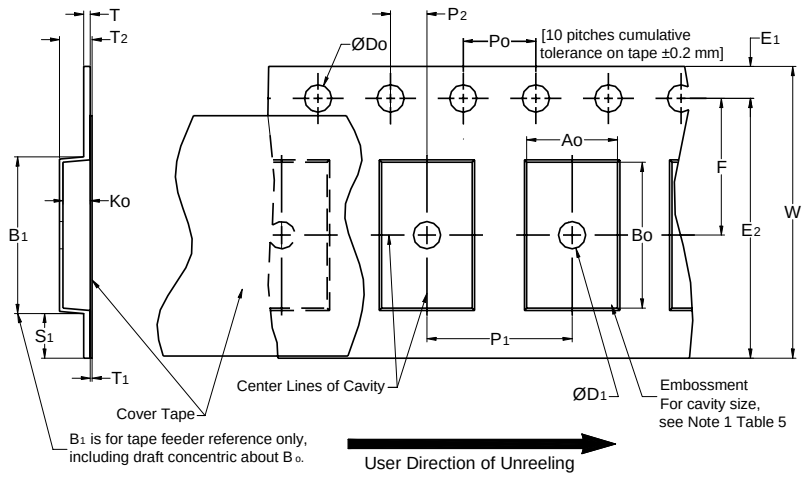


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D_0	D_1 Min. Note 1	E_1	P_0	P_2	R Ref. Note 2	S_1 Min. Note 3	T Max.	T_1 Max.
8mm	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)
12mm		1.5 (0.059)				30 (1.181)			
16mm									

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Max. Note 4	E_2 Min.	F	P_1	T_2 Max	W Max	A_0,B_0 & K_0
8mm	Single (4mm)	4.35 (0.171)	6.25 (0.246)	3.5 ± 0.05 (0.138 ± 0.002)	4.0 ± 0.10 (0.157 ± 0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12mm	Single (4mm) & Double (8mm)	8.2 (0.323)	10.25 (0.404)	5.5 ± 0.05 (0.217 ± 0.002)	8.0 ± 0.10 (0.315 ± 0.004)	4.6 (0.181)	12.3 (0.484)	
16mm	Triple (12mm)	12.1 (0.476)	14.25 (0.561)	5.5 ± 0.05 (0.217 ± 0.002)	8.0 ± 0.10 (0.315 ± 0.004)	4.6 (0.181)	16.3 (0.642)	

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

2. The tape with or without components shall pass around R without damage (see Figure 5).

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

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

5. The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:

(a) the component does not protrude above the top surface of the carrier tape.

(b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.

(c) rotation of the component is limited to 20° maximum for 8 and 12mm tapes and 10° maximum for 16mm tapes (see Figure 3).

(d) lateral movement of the component is restricted to 0.5 mm maximum for 8mm and 12mm wide tape and to 1.0mm maximum for 16mm tape (see Figure 4).

(e) see Addendum in EIA Document 481 for standards relating to more precise taping requirements.

Packaging Information Performance Notes

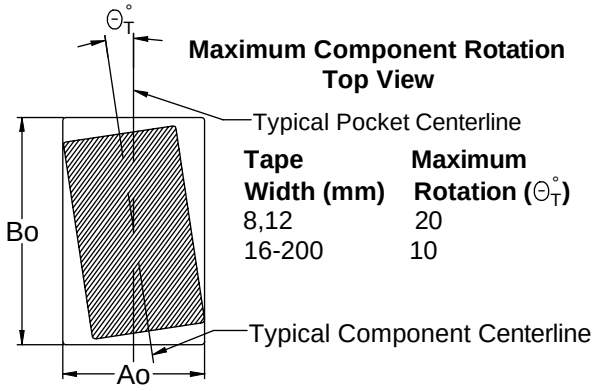
1. **Cover Tape Break Force:** *1.0 Kg minimum.*
2. **Cover Tape Peel Strength:** *The total peel strength of the cover tape from the carrier tape shall be:*

Tape Width	Peel Strength
8mm	0.1 Newton to 1.0 Newton (10gf to 100gf)
12mm & 16mm	0.1 Newton to 1.3 Newton (10gf to 130gf)

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-556 and EIA-624.*

Figure 2 – Maximum Component Rotation



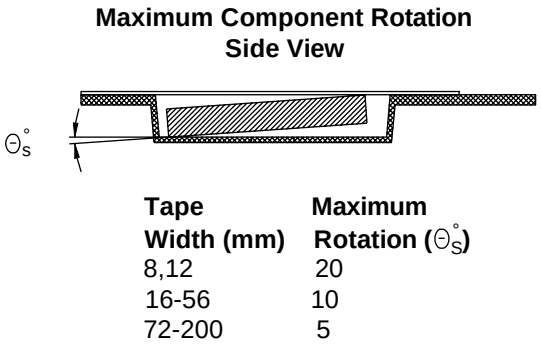


Figure 3 – Maximum Lateral Movement

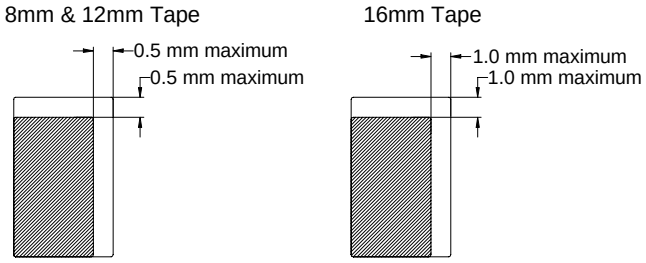


Figure 4 – Bending Radius

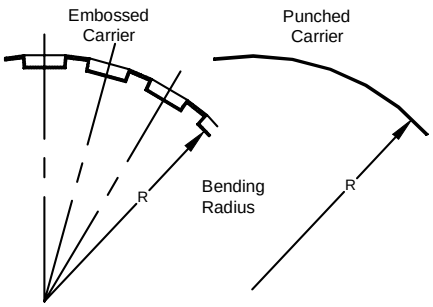
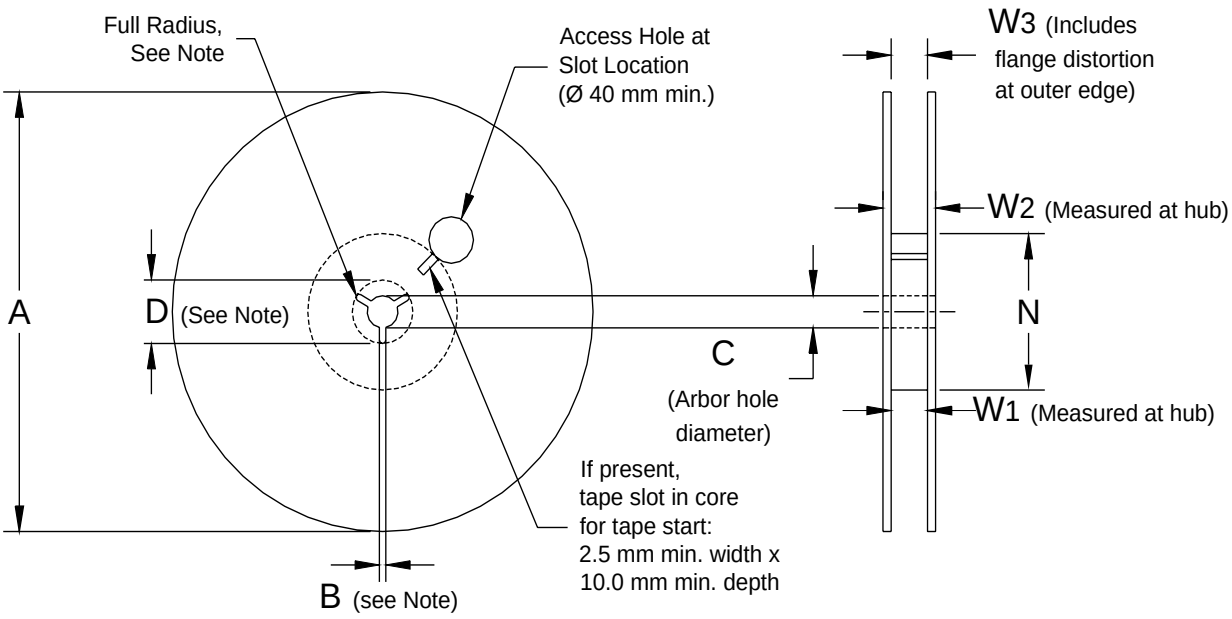


Figure 5 – Reel Dimensions



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 Min	C	D Min
8mm	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)
12mm				
16mm				

Variable Dimensions — Millimeters (Inches)				
Tape Size	N Min	W_1	W_2 Max	W_3
8mm	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
12mm		12.4 +2.0/-0.0 (0.488 +0.078/-0.0)	18.4 (0.724)	
16mm		16.4 +2.0/-0.0 (0.646 +0.078/-0.0)	22.4 (0.882)	

Figure 6 – Tape Leader & Trailer Dimensions

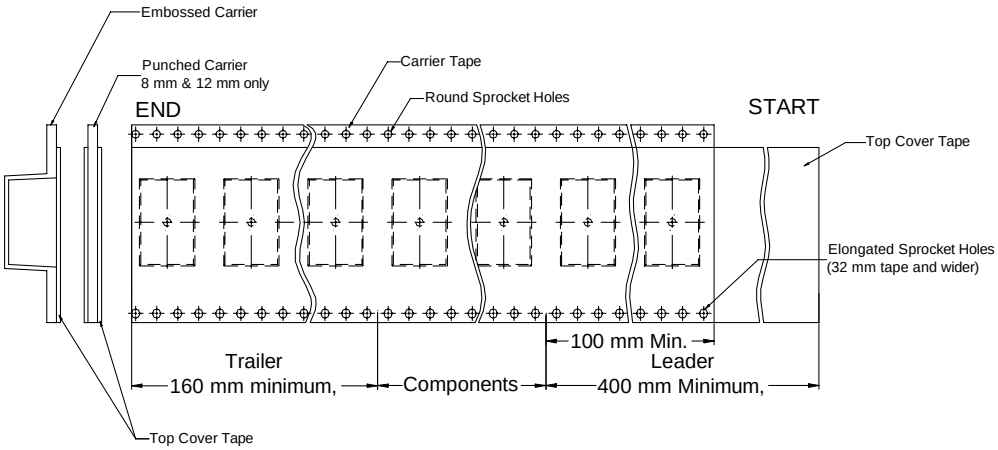
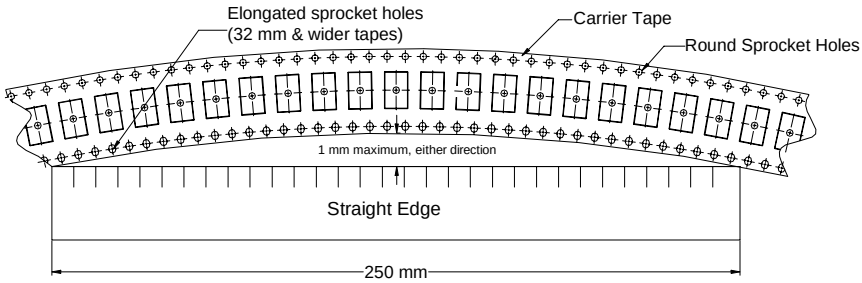


Figure 7 – Maximum Camber



KEMET Corporation World Headquarters

2835 KEMET Way
Simpsonville, SC 29681

Mailing Address:
P.O. Box 5928
Greenville, SC 29606

www.kemet.com
Tel: 864-963-6300
Fax: 864-963-6521

Corporate Offices
Fort Lauderdale, FL
Tel: 954-766-2800

North America

Southeast
Lake Mary, FL
Tel: 407-855-8886

Northeast
Wilmington, MA
Tel: 978-658-1663

West Chester, PA
Tel: 610-692-4642

Central
Schaumburg, IL
Tel: 847-882-3590

Carmel, IN
Tel: 317-706-6742

West
Milpitas, CA
Tel: 408-433-9950

Mexico
Zapopan, Jalisco
Tel: 52-33-3123-2141

Europe

Southern Europe
Geneva, Switzerland
Tel: 41-22-715-0100

Paris, France
Tel: 33-1-4646-1009

Sasso Marconi, Italy
Tel: 39-051-939111

Milan, Italy
Tel: 39-02-57518176

Rome, Italy
Tel: 39-06-23231718

Madrid, Spain
Tel: 34-91-804-4303

Central Europe
Landsberg, Germany
Tel: 49-8191-3350800

Dortmund, Germany
Tel: 49-2307-3619672

Kwidzyn, Poland
Tel: 48-55-279-7025

Northern Europe
Bishop's Stortford, United Kingdom
Tel: 44-1279-757201

Weymouth, United Kingdom
Tel: 44-1305-830747

Coatbridge, Scotland
Tel: 44-1236-434455

Färjestaden, Sweden
Tel: 46-485-563934

Espoo, Finland
Tel: 358-9-5406-5000

Asia

Northeast Asia
Hong Kong
Tel: 852-2305-1168

Shenzhen, China
Tel: 86-755-2518-1306

Beijing, China
Tel: 86-10-5829-1711

Shanghai, China
Tel: 86-21-6447-0707

Taipei, Taiwan
Tel: 886-2-27528585

Southeast Asia
Singapore
Tel: 65-6586-1900

Penang, Malaysia
Tel: 60-4-6430200

Bangalore, India
Tel: 91-806-53-76817

Note: KEMET reserves the right to modify minor details of internal and external construction at any time in the interest of product improvement. KEMET does not assume any responsibility for infringement that might result from the use of KEMET Capacitors in potential circuit designs. KEMET is a registered trademark of KEMET Electronics Corporation.

Other KEMET Resources

Tools	
Resource	Location
Configure A Part: CapEdge	http://capacitoredge.kemet.com
SPICE & FIT Software	http://www.kemet.com/spice
Search Our FAQs: KnowledgeEdge	http://www.kemet.com/keask

Product Information	
Resource	Location
Products	http://www.kemet.com/products
Technical Resources (Including Soldering Techniques)	http://www.kemet.com/technicalpapers
RoHS Statement	http://www.kemet.com/rohs
Quality Documents	http://www.kemet.com/qualitydocuments

Product Request	
Resource	Location
Sample Request	http://www.kemet.com/sample
Engineering Kit Request	http://www.kemet.com/kits

Contact	
Resource	Location
Website	www.kemet.com
Contact Us	http://www.kemet.com/contact
Investor Relations	http://www.kemet.com/ir
Call Us	1-877-MyKEMET
Twitter	http://twitter.com/kemetcapacitors

Disclaimer

All product specifications, statements, information and data (collectively, the "Information") are subject to change without notice.

All Information given herein is believed to be accurate and reliable, but is presented without guarantee, warranty, or responsibility of any kind, expressed or implied.

Statements of suitability for certain applications are based on our knowledge of typical operating conditions for such applications, but are not intended to constitute – and we specifically disclaim – any warranty concerning suitability for a specific customer application or use. This Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by us with reference to the use of our products is given gratis, and we assume no obligation or liability for the advice given or results obtained.

Although we design and manufacture our products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

Digitally signed by Marcy Brand
DN: c=US, st=FL, l=Fort Lauderdale, o=KEMET Corporation, ou=Marketing Communications, cn=Marcy Brand, email=marcybrand@kemet.com
Date: 2011.09.14 16:39:31 -04'00'