

K-SIM

For a detailed analysis of specific part numbers, please visit ksim.kemet.com to access KEMET's K-SIM software. KEMET K-SIM is designed to simulate behavior of components with respect to frequency, ambient temperature, and DC bias levels.

Ordering Information

T	540	D	107	M	10	A	H	65	10	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/Design	Termination Finish	Surge Option	ESR	Packaging (C-Spec)
T = Tantalum	540 = Polymer COTS	B, C, D	First two digits represent significant figures. Third digit specifies number of zeros.	M = ±20%	2R5 = 2.5 003 = 3 004 = 4 006 = 6.3 010 = 10 016 = 16 020 = 20 025 = 25 035 = 35 050 = 50 063 = 63	A = N/A B* = 0.1%/1,000 hours C* = 0.01%/1,000 hours D* = 0.001%/1,000 hours	H = Standard Solder Coated (SnPb 5% Pb minimum)	65 = 4 cycles at 25°C ±5°C** 66 = 10 cycles at 25°C ±5°C*** 67 = 10 cycles at -55°C +0°C/-5°C and +85°C ±5°C***	10 = ESR - Standard 20 = ESR - Low	Blank = 7" Reel 7280 = 13" Reel

* Select part numbers,

** Before voltage aging,

*** After voltage aging

Ordering Information – DLA Drawing 04051

04051-	001	A
Drawing Number	Dash Number	Surge Current Option
04051	See Part Number List	Blank = 4 cycles +25°C ±5°C Before Voltage Aging A = 10 cycles +25°C ±5°C After Voltage Aging B = 10 cycles -55°C +0°C/-5°C and +85°C ±5°C After Voltage Aging

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C *
Rated Capacitance Range	4.7 – 680 µF at 120 Hz/25°C
Capacitance Tolerance	M Tolerance (20%)
Rated Voltage Range	2.5 – 63 V
DF (120 Hz)	≤ 10%
ESR (100 kHz)	Refer to Part Number Electrical Specification Table
Leakage Current	≤ 0.1C V (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 at rated voltage, 2,000 hours 125°C at 2/3 rated voltage, 2,000 hours	Δ C/C	Within -20%/+10% of initial value			
		DF	≤ initial limit			
		DCL**	1.25 x initial limit at 125°C			
		ESR	2 x initial limit			
Storage Life	125°C at 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, 500 hours, rated voltage 60°C, 90% RH, 500 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	Δ C/C	+25°C	-55°C	+85°C (1)	+125°C (2)
		DF	±5%	±10%	±20%	±30%
		DCL	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	Δ C/C	Within -20/+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			
Additional Qualification Tests per MIL-PRF-55365/8	Please contact KEMET for more information.					

*IL = Initial limit

** The test voltage shall be maintained during the cool down from elevated test temperature to +25°C. After cool down, the capacitors shall be discharged for a minimum of 5 minutes. DC leakage measurements are allowed at this time.

(1) ≥16V - D C/C = ±30%

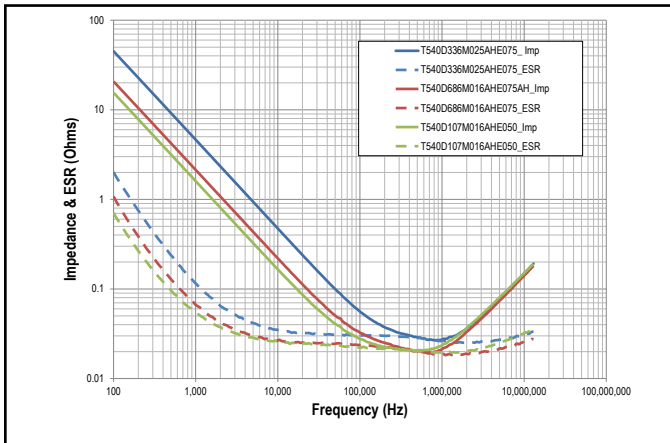
(2) ≥16V - D C/C = ±40%

Certification

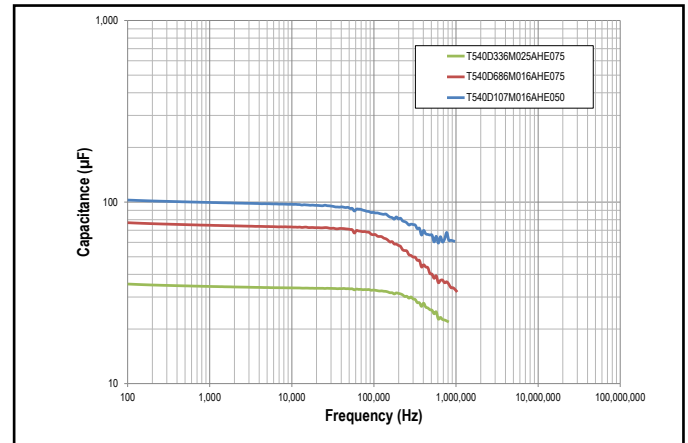
DLA Drawing 04051

Electrical Characteristics

ESR vs. Frequency



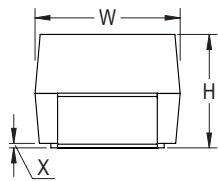
Capacitance vs. Frequency



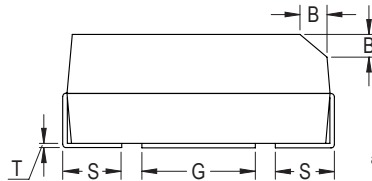
Dimensions – Millimeters (Inches)

Metric will govern

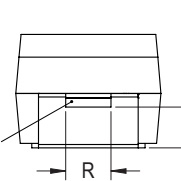
CATHODE (-) END VIEW



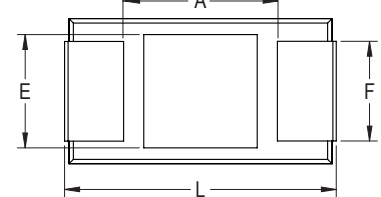
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Termination cutout at KEMET's option, either end

Case Size		Component Dimensions													Total Weight
KEMET	EIA	L	W	H	F ±0.1 ±(0.004)	S ±0.3 ±(0.012)	B ±0.15 (Ref) ±0.006	X (Ref)	P (Ref)	R (Ref)	T (Ref)	A (Min)	G (Ref)	E (Ref)	(mg)
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)	1.9 (0.075)	1.8 (0.071)	2.2 (0.087)	98.30
C	6032-28	6.0 ±0.3 (0.236 ±0.012)	3.2 ±0.3 (0.126 ±0.012)	2.5 ±0.3 (0.098 ±0.012)	2.2 (0.087)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	0.9 (0.035)	1.0 (0.039)	0.13 (0.005)	3.1 (0.122)	2.8 (0.110)	2.4 (0.095)	193.46
D	7343-31	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.8 ±0.3 (0.110 ±0.012)	2.4 (0.095)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	0.9 (0.035)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	352.36

Notes: (Ref) – Dimensions provided for reference only.

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

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DSCC Drawing Number 04051	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	Part Number	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 45°C 100 kHz	°C
2.5	330	D/7343-31	T540D337M2R5AH(1)10	04051-002(2)	83	10	25	3000	125
2.5	330	D/7343-31	T540D337M2R5(3)H(1)10	N/A	83	10	25	3000	125
2.5	470	D/7343-31	T540D477M2R5AH(1)10	04051-003(2)	118	10	25	3000	125
2.5	470	D/7343-31	T540D477M2R5(3)H(1)10	N/A	118	10	25	3000	125
2.5	680	D/7343-31	T540D687M2R5AH(1)10	04051-004(2)	170	10	25	3000	125
2.5	680	D/7343-31	T540D687M2R5(3)H(1)10	N/A	170	10	25	3000	125
3	100	B/3528-21	T540B107M003AH(1)10	04051-005(2)	30	8	80	1260	125
3	100	B/3528-21	T540B107M003(3)H(1)10	N/A	30	8	80	1260	125
3	150	B/3528-21	T540B157M003AH(1)10	04051-006(2)	45	8	80	1260	125
3	150	B/3528-21	T540B157M003(3)H(1)10	N/A	45	8	80	1260	125
3	330	D/7343-31	T540D337M003AH(1)10	04051-007(2)	99	10	25	3000	125
3	330	D/7343-31	T540D337M003(3)H(1)10	N/A	99	10	25	3000	125
3	470	D/7343-31	T540D477M003AH(1)10	04051-008(2)	141	10	25	3000	125
3	470	D/7343-31	T540D477M003(3)H(1)10	N/A	141	10	25	3000	125
3	680	D/7343-31	T540D687M003AH(1)10	04051-009(2)	204	10	25	3000	125
3	680	D/7343-31	T540D687M003(3)H(1)10	N/A	204	10	25	3000	125
4	68	B/3528-21	T540B686M004AH(1)10	04051-011(2)	28	8	80	1260	125
4	68	B/3528-21	T540B686M004(3)H(1)10	N/A	28	8	80	1260	125
4	100	B/3528-21	T540B107M004AH(1)10	04051-012(2)	40	8	80	1260	125
4	100	B/3528-21	T540B107M004(3)H(1)10	N/A	40	8	80	1260	125
4	220	D/7343-31	T540D227M004AH(1)10	04051-013(2)	88	10	25	3000	125
4	220	D/7343-31	T540D227M004(3)H(1)10	N/A	88	10	25	3000	125
4	330	D/7343-31	T540D337M004AH(1)10	04051-014(2)	132	10	25	3000	125
4	330	D/7343-31	T540D337M004(3)H(1)10	N/A	132	10	25	3000	125
4	470	D/7343-31	T540D477M004AH(1)20	04051-015(2)	188	10	25	3000	125
4	470	D/7343-31	T540D477M004(3)H(1)20	N/A	188	10	25	3000	125
4	470	D/7343-31	T540D477M004AH(1)10	04051-016(2)	188	10	40	2372	125
4	470	D/7343-31	T540D477M004(3)H(1)10	N/A	188	10	40	2372	125
6.3	33	B/3528-21	T540B336M006AH(1)10	04051-017(2)	21	8	80	1260	125
6.3	33	B/3528-21	T540B336M006(3)H(1)10	N/A	21	8	80	1260	125
6.3	47	B/3528-21	T540B476M006AH(1)10	04051-019(2)	30	8	80	1260	125
6.3	47	B/3528-21	T540B476M006(3)H(1)10	N/A	30	8	80	1260	125
6.3	68	B/3528-21	T540B686M006AH(1)10	04051-020(2)	43	8	80	1260	125
6.3	68	B/3528-21	T540B686M006(3)H(1)10	N/A	43	8	80	1260	125
6.3	150	D/7343-31	T540D157M006AH(1)10	04051-021(2)	95	10	25	3000	125
6.3	150	D/7343-31	T540D157M006(3)H(1)10	N/A	95	10	25	3000	125
6.3	220	D/7343-31	T540D227M006AH(1)10	04051-022(2)	139	10	25	3000	125
6.3	220	D/7343-31	T540D227M006(3)H(1)10	N/A	139	10	25	3000	125
6.3	330	D/7343-31	T540D337M006AH(1)20	04051-023(2)	208	10	25	3000	125
6.3	330	D/7343-31	T540D337M006(3)H(1)20	N/A	208	10	25	3000	125
6.3	330	D/7343-31	T540D337M006AH(1)10	04051-024(2)	208	10	40	2372	125
6.3	330	D/7343-31	T540D337M006(3)H(1)10	N/A	208	10	40	2372	125
10	22	B/3528-21	T540B226M010AH(1)10	04051-025(2)	22	8	80	1260	125
10	22	B/3528-21	T540B226M010(3)H(1)10	N/A	22	8	80	1260	125
10	33	B/3528-21	T540B336M010AH(1)10	04051-027(2)	33	8	80	1260	125
10	33	B/3528-21	T540B336M010(3)H(1)10	N/A	33	8	80	1260	125
10	100	D/7343-31	T540D107M010AH(1)20	04051-028(2)	100	10	25	3000	125
10	100	D/7343-31	T540D107M010(3)H(1)20	N/A	100	10	25	3000	125
10	100	D/7343-31	T540D107M010AH(1)10	04051-029(2)	100	10	55	2023	125
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	Part Number	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	w/ΔT = 20°C at -55°C to 105°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DSCC Drawing Number 04051	DC Leakage	DF	ESR	Maximum Allowable Ripple Current (A) 100 kHz	Maximum Operating Temp

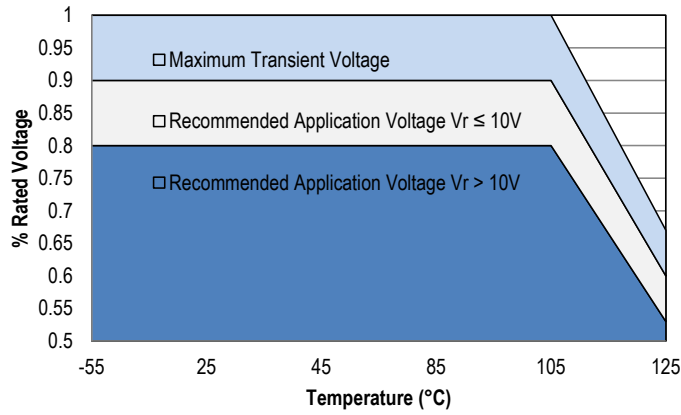
(1) To complete KEMET part number, insert 65 = None, 66 = 10 cycles +25°C, 67 = 10 cycles -55°C and +85°C. Designates surge current option.
(2) To complete DLA part number, insert Blank = 4 cycles 25°C, A = 10 cycles 25°C, B = 10 cycles -55°C and 85°C. Designates surge current option.
(3) To complete KEMET part number for non-DLA, insert B=0.1%/1,000 hours, C=0.01%/1,000 hours, D=0.001%/1,000 hours. Designates Reliability Level.
(4) To complete KEMET part number for non-DLA, insert B = 0.1%/1,000 hours or C = 0.01%/1,000 hours. Designates Reliability Level.
Please refer to Ordering Information for additional details.

Table 1 – Ratings & Part Number Reference cont'd

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DSCC Drawing Number 04051	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	Part Number	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	mA at 45°C 100 kHz	°C
10	100	D/7343-31	T540D107M010(3)H(1)10	N/A	100	10	55	2023	125
10	150	D/7343-31	T540D157M010AH(1)20	04051-030(2)	150	10	25	3000	125
10	150	D/7343-31	T540D157M010(3)H(1)20	N/A	150	10	25	3000	125
10	150	D/7343-31	T540D157M010AH(1)10	04051-031(2)	150	10	55	2023	125
10	150	D/7343-31	T540D157M010(3)H(1)10	N/A	150	10	55	2023	125
10	220	D/7343-31	T540D227M010AH(1)10	04051-032(2)	220	10	25	3000	125
10	220	D/7343-31	T540D227M010(3)H(1)10	N/A	220	10	25	3000	125
16	47	D/7343-31	T540D476M016AH(1)20	04051-033(2)	76	10	35	2535	125
16	47	D/7343-31	T540D476M016(3)H(1)20	N/A	76	10	35	2535	125
16	47	D/7343-31	T540D476M016AH(1)10	04051-034(2)	76	10	65	1861	125
16	47	D/7343-31	T540D476M016(3)H(1)10	N/A	76	10	65	1861	125
16	68	D/7343-31	T540D686M016AH(1)10	04051-035(2)	109	10	75	1732	125
16	68	D/7343-31	T540D686M016(3)H(1)10	N/A	109	10	75	1732	125
16	100	D/7343-31	T540D107M016AH(1)10	04051-036(2)	160	10	50	2121	125
16	100	D/7343-31	T540D107M016(3)H(1)10	N/A	160	10	50	2121	125
20	22	D/7343-31	T540D226M020AH(1)10	04051-037(2)	44	10	75	1732	125
20	22	D/7343-31	T540D226M020(3)H(1)10	N/A	44	10	75	1732	125
20	33	D/7343-31	T540D336M020AH(1)10	04051-038(2)	66	10	75	1732	125
20	33	D/7343-31	T540D336M020(3)H(1)10	N/A	66	10	75	1732	125
20	47	D/7343-31	T540D476M020AH(1)10	04051-039(2)	94	10	75	1732	125
20	47	D/7343-31	T540D476M020(3)H(1)10	N/A	94	10	75	1732	125
25	6.8	C/6032-28	T540C685M025(3)H(1)10	NA	17	10	150	1049	125
25	10	C/6032-28	T540C106M025(3)H(1)10	NA	25	10	150	1049	125
25	15	D/7343-31	T540D156M025AH(1)20	04051-040(2)	38	10	75	1732	125
25	15	D/7343-31	T540D156M025(3)H(1)20	N/A	38	10	75	1732	125
25	15	D/7343-31	T540D156M025AH(1)10	04051-041(2)	38	10	100	1500	125
25	15	D/7343-31	T540D156M025(3)H(1)10	N/A	38	10	100	1500	125
25	22	D/7343-31	T540D226M025AH(1)10	04051-042(2)	55	10	75	1732	125
25	22	D/7343-31	T540D226M025(3)H(1)10	N/A	55	10	75	1732	125
25	33	D/7343-31	T540D336M025AH(1)10	04051-043(2)	83	10	75	1732	125
25	33	D/7343-31	T540D336M025(3)H(1)10	N/A	83	10	75	1732	125
30	22	D/7343-31	T540D226M030(3)H(1)10	N/A	66	10	75	1732	125
35	15	D/7343-31	T540D156M035AH(1)20	04051-044(2)	53	10	75	1732	125
35	15	D/7343-31	T540D156M035(4)H(1)20	N/A	53	10	75	1732	125
35	15	D/7343-31	T540D156M035AH(1)10	04051-045(2)	53	10	100	1500	125
35	15	D/7343-31	T540D156M035(4)H(1)10	N/A	53	10	100	1500	125
50	10	D/7343-31	T540D106M050AH(1)20	04051-046(2)	50	10	100	1500	125
50	10	D/7343-31	T540D106M050(4)H(1)20	N/A	50	10	100	1500	125
50	10	D/7343-31	T540D106M050AH(1)10	04051-047(2)	50	10	125	1342	125
50	10	D/7343-31	T540D106M050(4)H(1)10	N/A	50	10	125	1342	125
63	4.7	D/7343-31	T540D475M063AH(1)20	04051-048(2)	30	10	100	1500	125
63	4.7	D/7343-31	T540D475M063(4)H(1)20	N/A	30	10	100	1500	125
63	4.7	D/7343-31	T540D475M063AH(1)10	04051-049(2)	30	10	120	1369	125
63	4.7	D/7343-31	T540D475M063(4)H(1)10	N/A	30	10	120	1369	125
VDC at 105°C	µF	KEMET/EIA	(See below for part options)	Part Number	µA at 25°C Maximum	% at 25°C 120 Hz Maximum	mΩ at 25°C 100 kHz Maximum	w/ΔT = 20°C at -55°C to 105°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DSCC Drawing Number 04051	DC Leakage	DF	ESR	Maximum Allowable Ripple Current (A) 100 kHz	Maximum Operating Temp

(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 DLA part number, insert Blank = 4 cycles 25°C, A = 10 cycles 25°C, B = 10 cycles -55°C and 85°C. Designates surge current option.
(3) To complete KEMET part number for non-DLA, insert B=0.1%/1,000 hours, C=0.01%/1,000 hours, D=0.001%/1,000 hours. Designates Reliability Level.
(4) To complete KEMET part number for non-DLA, insert B = 0.1%/1,000 hours or C = 0.01%/1,000 hours. Designates Reliability Level.
Please refer to Ordering Information for additional details.

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	
$2\text{ V} \leq V_R \leq 10\text{ V}$	90% of V_R	V_R	See Chart	67% of V_R
$12.5\text{ V} \leq V_R \leq 63\text{ V}$	80% of V_R	V_R	See Chart	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 at 45°C with +30°C Rise
B	3528-21	127
C	6032-28	165
D	7343-31	225

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 ≤ 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)

Reverse Voltage

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

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

*For series rated to 125°C

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
		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
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

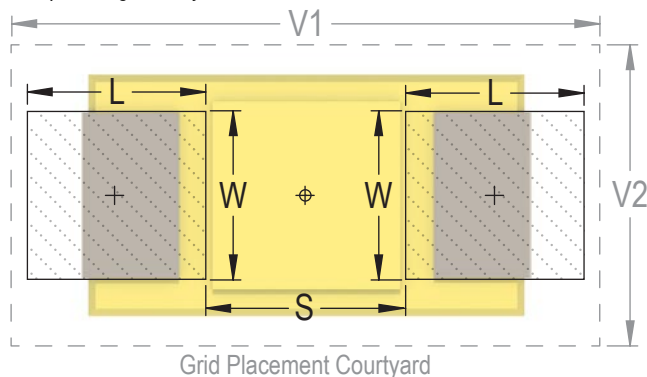
Density Level A: For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

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

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

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

² Land pattern geometry is too small for silkscreen outline.



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.

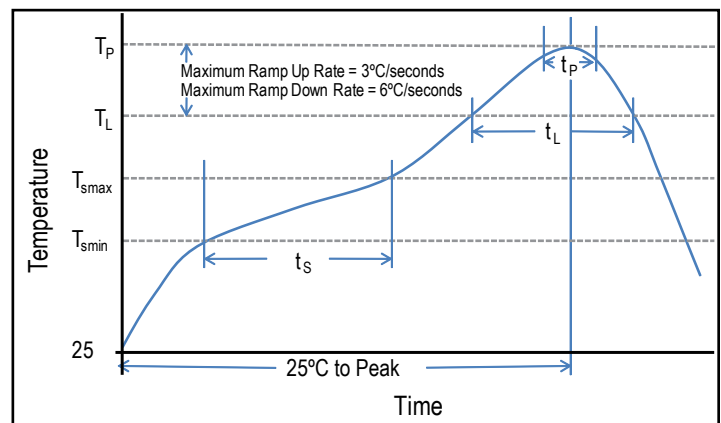
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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

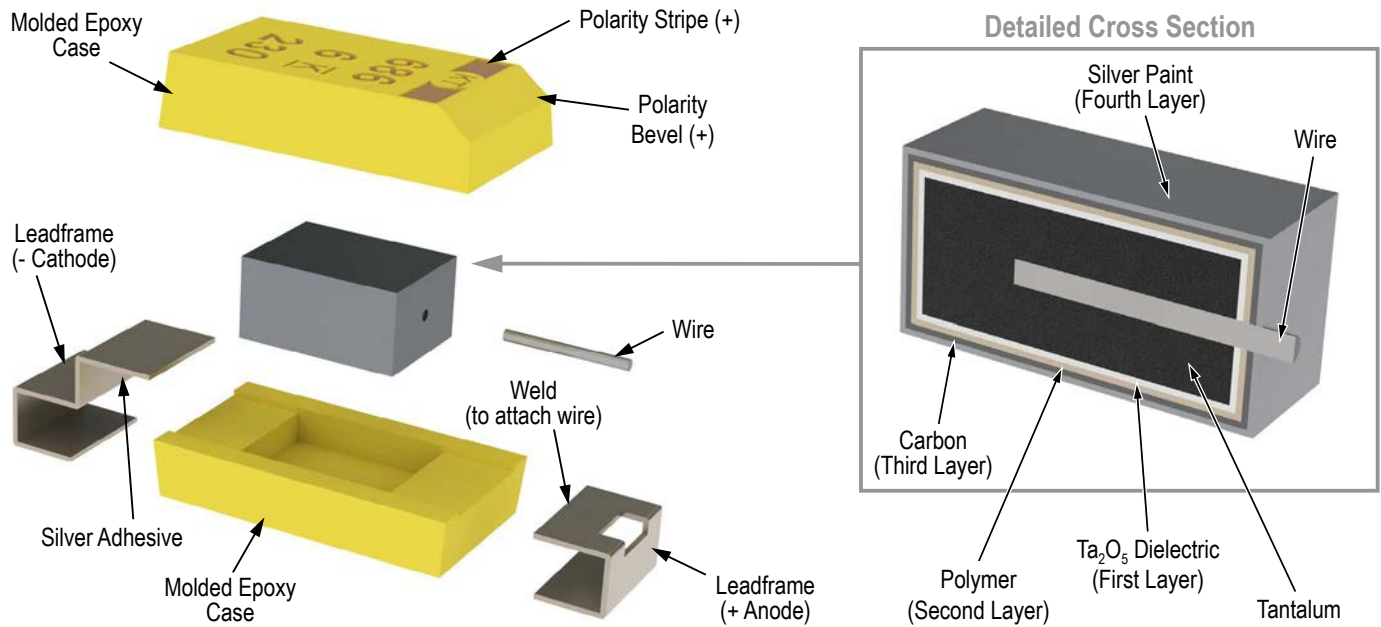
**Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



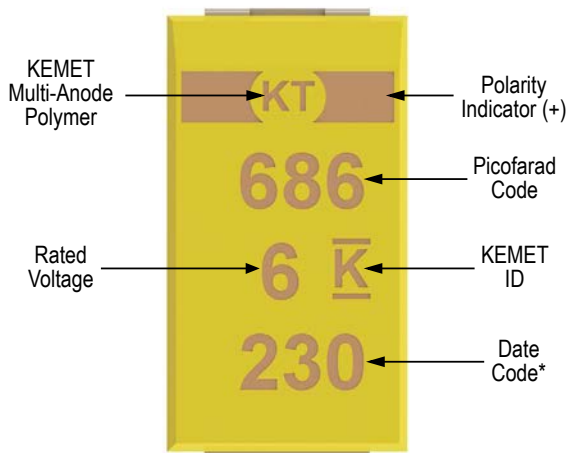
Storage

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 = 30th week of 2012

Date Code *	
1 st digit = Last number of Year	2 = 2012 3 = 2013 4 = 2014 5 = 2015 6 = 2016 7 = 2017
2 nd and 3 rd digit = Week of the Year	01 = 1 st week of the Year to 52 = 52 nd week of the Year

Tape & Reel Packaging Information

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

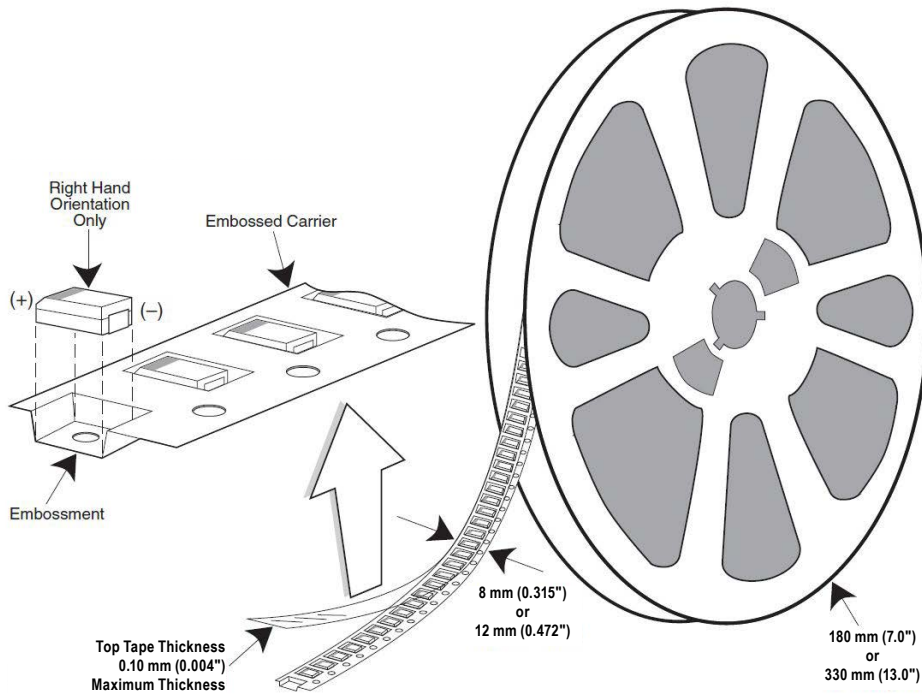


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
S	3216-12	8	2,500	10,000
T	3528-12	8	2,500	10,000
M	3528-15	8	2,000	8,000
U	6032-15	12	1,000	5,000
L	6032-19	12	1,000	3,000
W	7343-15	12	1,000	3,000
Z	7343-17	12	1,000	3,000
V	7343-20	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

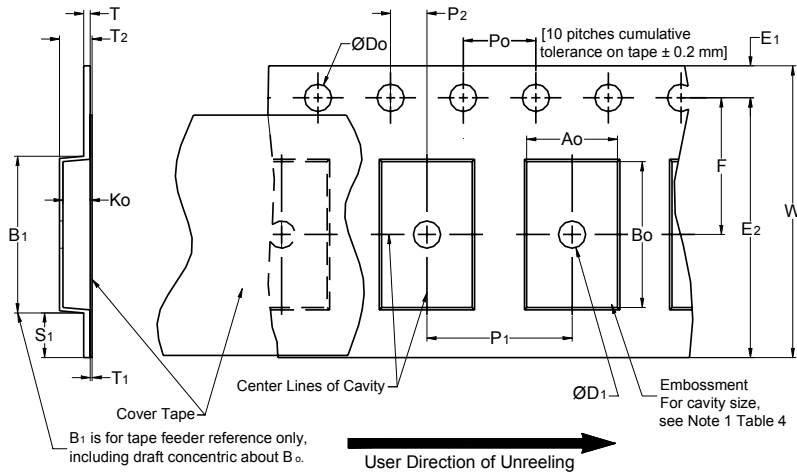


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)											
Tape Size	D ₀	D ₁ Minimum Note 1	E ₁	P ₀	P ₂	R Reference Note 2	S ₁ Minimum Note 3	T Maximum	T ₁ Maximum		
8 mm	1.5 +0.10/-0.0 (0.059 +0.004/-0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)		
12 mm		1.5 (0.059)								2.0 ±0.1 (0.079 ±0.059)	30 (1.181)
16 mm											
Variable Dimensions — Millimeters (Inches)											
Tape Size	Pitch	B ₁ Maximum Note 4	E ₂ Minimum	F	P ₁	T ₂ Maximum	W Maximum	A ₀ , B ₀ & K ₀			
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 or 4.0 ±0.10 (0.079 ±0.002 or 0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5			
12 mm	Single (4 mm) & 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)				

1. The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.
2. The tape, with or without components, shall pass around R without damage (see Figure 4).
3. If S₁ < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).
4. B₁ dimension is a reference dimension for tape feeder clearance only.
5. The cavity defined by A₀, B₀ and K₀ shall surround the component with sufficient clearance that:
 - (a) the component does not protrude above the top surface of the carrier tape.
 - (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
 - (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes and 10° maximum for 16 mm tapes (see Figure 2).
 - (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape and to 1.0 mm maximum for 16 mm tape (see Figure 3).
 - (e) 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

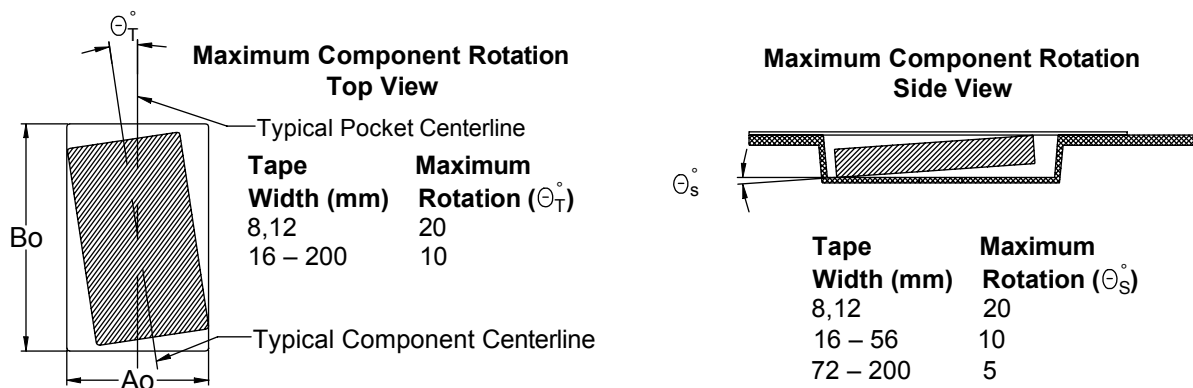


Figure 3 – Maximum Lateral Movement

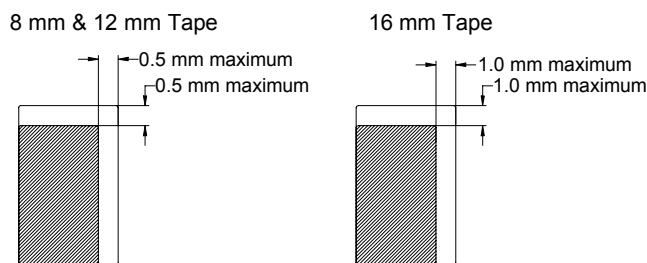


Figure 4 – Bending Radius

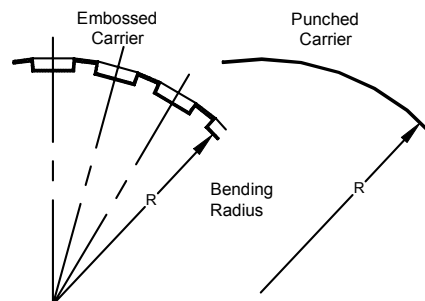


Figure 5 – Reel Dimensions

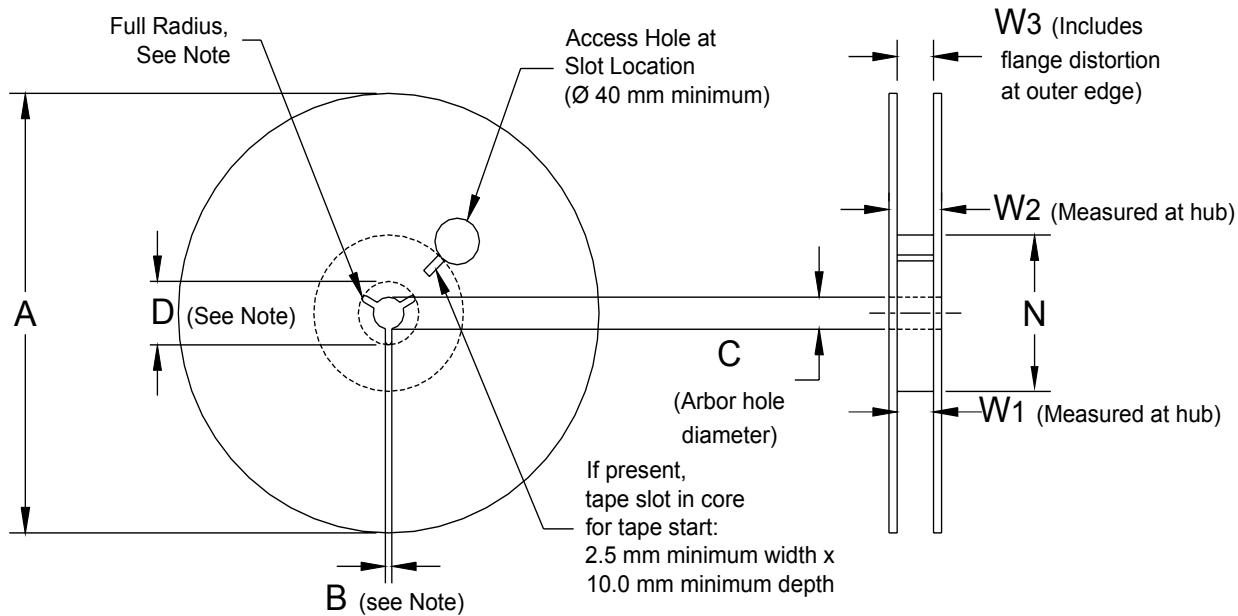


Table 5 – Reel Dimensions

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 ₁	W ₂ Maximum	W ₃
8 mm	50 (1.969)	8.4 +1.5/-0.0 (0.331 +0.059/-0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/-0.0 (0.488 +0.078/-0.0)	18.4 (0.724)	
16 mm		16.4 +2.0/-0.0 (0.646 +0.078/-0.0)	22.4 (0.882)	

Figure 6 – Tape Leader & Trailer Dimensions

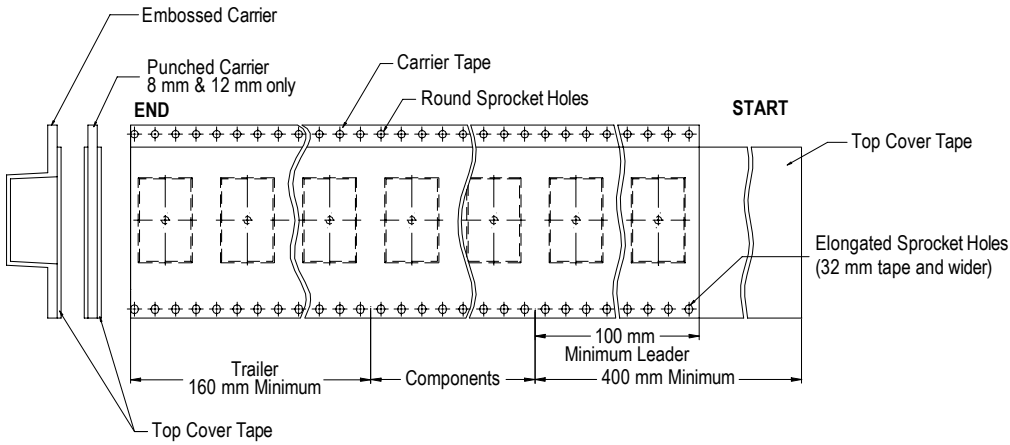
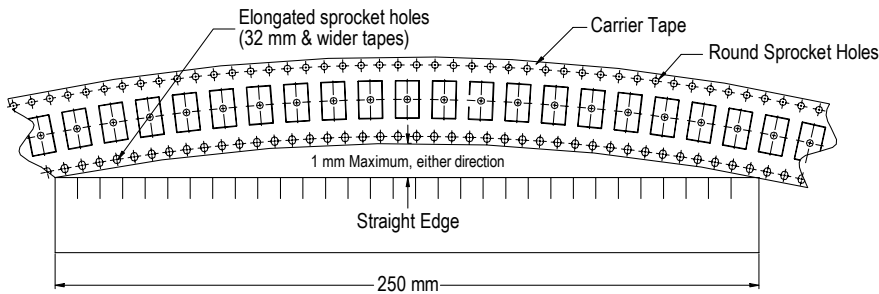


Figure 7 – Maximum Camber



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

Northeast

Wilmington, MA
Tel: 978-658-1663

Southeast

Lake Mary, FL
Tel: 407-855-8886

Central

Novi, MI
Tel: 248-994-1030

Irving, TX
Tel: 972-915-6041

West

Milpitas, CA
Tel: 408-433-9950

Mexico

Guadalajara, Jalisco
Tel: 52-33-3123-2141

Europe

Southern Europe

Sasso Marconi, Italy
Tel: 39-051-939111

Skopje, Macedonia
Tel: 389-2-55-14-623

Central Europe

Landsberg, Germany
Tel: 49-8191-3350800

Kamen, Germany
Tel: 49-2307-438110

Northern Europe

Wyboston, United Kingdom
Tel: 44-1480-273082

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: 86-10-5877-1075

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

Seoul, South Korea
Tel: 82-2-6294-0550

Taipei, Taiwan
Tel: 886-2-27528585

Southeast Asia

Singapore
Tel: 65-6701-8033

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.

Disclaimer

All product specifications, statements, information and data (collectively, the "Information") in this datasheet are subject to change. The customer is responsible for checking and verifying the extent to which the Information contained in this publication is applicable to an order at the time the order is placed.

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

Statements of suitability for certain applications are based on KEMET Electronics Corporation's ("KEMET") knowledge of typical operating conditions for such applications, but are not intended to constitute – and KEMET specifically disclaims – any warranty concerning suitability for a specific customer application or use. The 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 KEMET with reference to the use of KEMET's products is given gratis, and KEMET assumes no obligation or liability for the advice given or results obtained.

Although KEMET designs and manufactures its 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.