

Overview

The T496 Series of tantalum chip capacitors offers a “fail safe” design. The built-in fuse element offers excellent protection from damaging short circuit conditions in applications where damaging high fault currents exist. Protection from costly circuit damage due to reversed installation is offered with this device.

Applications

Typical applications include decoupling and filtering in computing and telecommunications end applications, such as high-end servers requiring built-in fuse capability.

Benefits

- Meets or exceeds EIA Standard 535BAAC
- Approved to DSCC drawing 04053
- Patented fuse assembly
- Optional gold-plated terminations
- Built-in fuse protects against short circuit mode
- 100% surge current test on C, D, and X sizes
- Halogen-free epoxy
- Capacitance values of 0.15 μ F to 330 μ F
- Tolerances of $\pm 10\%$ and $\pm 20\%$
- Voltage rating of 4 – 50 VDC
- Fuse activation, 25°C: within 1 second at fault currents of 4 amps and higher
- Continuous current capability: 0.75 amps
- Post actuation resistance, 25°C: 10 M Ω , minimum
- Test tabs on side of case bypass the capacitor element to allow direct testing of the fuse assembly
- RoHS Compliant and lead-free terminations
- Operating temperature range of -55°C to +125°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 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	496	X	227	M	010	A	T	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/Design	Lead Material	Packaging (C-Spec)
T = Tantalum	Fail Safe	B, C, D, X	First two digits represent significant figures. Third digit specifies number of zeros.	K = $\pm 10\%$ M = $\pm 20\%$	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)	Blank = 7" Reel 7280 = 13" Reel

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 125°C
Rated Capacitance Range	0.15 – 477 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	$\leq 0.01 \text{ CV } (\mu\text{A})$ 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%
		DF	IL	1.5 x IL	1.5 x IL
		DCL	IL	n/a	10 x IL
Surge Voltage	25°C and 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		

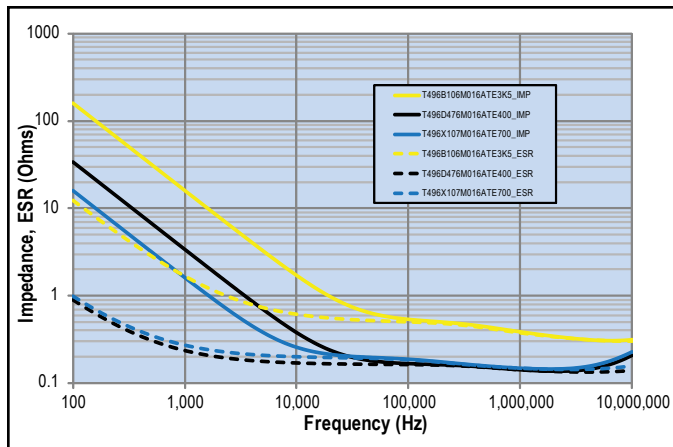
*IL = Initial limit

Certification

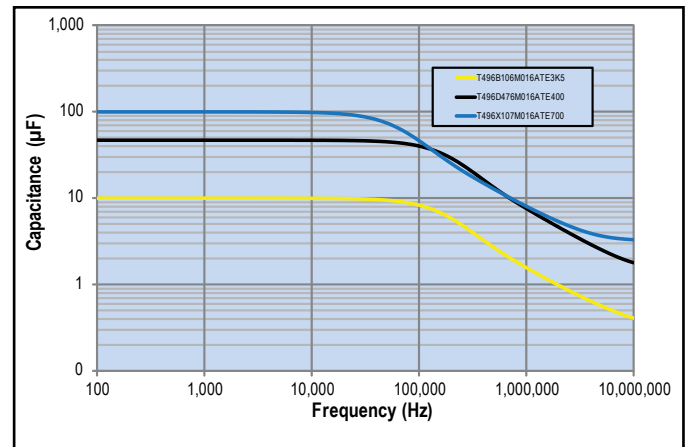
DSCC Drawing 04053

Electrical Characteristics

ESR vs. Frequency

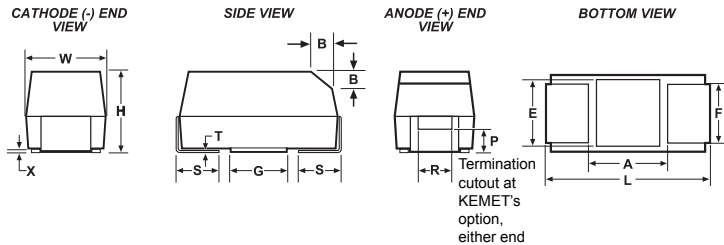


Capacitance vs. Frequency



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 ±0.2 (0.138 ±0.008)	2.8 ±0.2 (0.110 ±0.008)	1.9 ±0.2 (0.075 ±0.008)	2.2 (.087)	0.8 (.031)	0.4 (.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 ±0.03)	3.2 ±0.3 (0.126 ±0.012)	2.5 ±0.3 (0.098 ±0.012)	2.2 (.087)	1.3 (.051)	0.5 (.020)	0.10 ±0.10 (0.004 ±0.004)	0.9 (0.035)	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 (.094)	1.3 (.051)	0.5 (.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 (.094)	1.3 (.051)	0.5 (.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 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			Moisture Sensitivity
VDC	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) 100 kHz 25°C	(mA) 100 kHz +85°C	(mA) 100 kHz +125°C	Reflow Temp ≤ 260°C
4	68	C/6032-28	T496C686(1)004A(2)E1K6	2.7	6.0	1600	262	236	105	1
4	68	C/6032-28	T496C686(1)004A(2)E400	2.7	6.0	400	524	472	210	1
4	100	C/6032-28	T496C107(1)004A(2)E1K2	4.0	8.0	1200	303	273	121	1
4	150	D/7343-31	T496D157(1)004A(2)E800	6.0	8.0	800	433	390	173	1
4	150	C/6032-28	T496C157(1)004A(2)E1K2	6.0	8.0	1200	303	273	121	1
4	220	D/7343-31	T496D227(1)004A(2)E700	8.8	8.0	700	463	417	185	1
4	220	D/7343-31	T496D227(1)004A(2)E400	8.8	8.0	400	612	551	245	1
4	330	D/7343-31	T496D337(1)004A(2)E700	13.2	8.0	700	463	417	185	1
4	330	D/7343-31	T496D337(1)004A(2)E400	13.2	8.0	400	612	551	245	1
4	330	X/7343-43	T496X337(1)004A(2)E700	13.2	8.0	700	486	437	194	1
4	470	X/7343-43	T496X477(1)004A(2)E500	18.8	8.0	500	574	517	230	1
6.3	4.7	B/3528-21	T496B475(1)006A(2)E3K5	0.3	6.0	3500	156	140	62	1
6.3	6.8	B/3528-21	T496B685(1)006A(2)E3K5	0.4	6.0	3500	156	140	62	1
6.3	10	B/3528-21	T496B106(1)006A(2)E3K5	0.6	6.0	3500	156	140	62	1
6.3	15	C/6032-28	T496C156(1)006A(2)E2K0	0.9	6.0	2000	235	212	94	1
6.3	22	B/3528-21	T496B226(1)006A(2)E3K5	1.4	6.0	3500	156	140	62	1
6.3	22	B/3528-21	T496B226(1)006A(2)E1K5	1.4	6.0	1500	238	214	95	1
6.3	22	C/6032-28	T496C226(1)006A(2)E2K0	1.4	6.0	2000	235	212	94	1
6.3	33	C/6032-28	T496C336(1)006A(2)E2K0	2.1	6.0	2000	235	212	94	1
6.3	33	C/6032-28	T496C336(1)006A(2)E600	2.1	6.0	600	428	385	171	1
6.3	47	C/6032-28	T496C476(1)006A(2)E1K6	3.0	6.0	1600	262	236	105	1
6.3	47	C/6032-28	T496C476(1)006A(2)E600	3.0	6.0	600	428	385	171	1
6.3	47	D/7343-31	T496D476(1)006A(2)E1K0	3.0	6.0	1000	387	348	155	1
6.3	68	C/6032-28	T496C686(1)006A(2)E1K2	4.3	6.0	1200	303	273	121	1
6.3	68	D/7343-31	T496D686(1)006A(2)E1K0	4.3	6.0	1000	387	348	155	1
6.3	100	X/7343-43	T496X107(1)006A(2)E900	6.3	8.0	900	428	385	171	1
6.3	100	X/7343-43	T496X107(1)006A(2)E300	6.3	8.0	300	742	668	297	1
6.3	100	D/7343-31	T496D107(1)006A(2)E800	6.3	8.0	800	433	390	173	1
6.3	100	D/7343-31	T496D107(1)006A(2)E400	6.3	8.0	400	612	551	245	1
6.3	100	C/6032-28	T496C107(1)006A(2)E400	6.3	8.0	400	524	472	210	1
6.3	150	X/7343-43	T496X157(1)006A(2)E300	9.5	8.0	300	742	668	297	1
6.3	150	D/7343-31	T496D157(1)006A(2)E700	9.5	8.0	700	463	417	185	1
6.3	150	D/7343-31	T496D157(1)006A(2)E300	9.5	8.0	300	707	636	283	1
6.3	220	X/7343-43	T496X227(1)006A(2)E700	13.9	8.0	700	486	437	194	1
6.3	220	X/7343-43	T496X227(1)006A(2)E300	13.9	8.0	300	742	668	297	1
6.3	220	D/7343-31	T496D227(1)006A(2)E700	13.9	8.0	700	463	417	185	1
6.3	220	D/7343-31	T496D227(1)006A(2)E300	13.9	8.0	300	707	636	283	1
6.3	330	X/7343-43	T496X337(1)006A(2)E500	20.8	8.0	500	574	517	230	1
6.3	330	X/7343-43	T496X337(1)006A(2)E300	20.8	8.0	300	742	668	297	1
10	3.3	B/3528-21	T496B335(1)010A(2)E3K5	0.3	6.0	3500	156	140	62	1
10	4.7	B/3528-21	T496B475(1)010A(2)E3K5	0.5	6.0	3500	156	140	62	1
10	6.8	B/3528-21	T496B685(1)010A(2)E3K5	0.7	6.0	3500	156	140	62	1
10	10	C/6032-28	T496C106(1)010A(2)E2K0	1.0	6.0	2000	235	212	94	1
10	15	B/3528-21	T496B156(1)010A(2)E3K5	1.5	6.0	3500	156	140	62	1
10	15	C/6032-28	T496C156(1)010A(2)E2K0	1.5	6.0	2000	235	212	94	1
10	15	C/6032-28	T496C156(1)010A(2)E600	1.5	6.0	600	428	385	171	1
10	22	C/6032-28	T496C226(1)010A(2)E2K0	2.2	6.0	2000	235	212	94	1
10	22	C/6032-28	T496C226(1)010A(2)E500	2.2	6.0	500	469	422	188	1
10	33	D/7343-31	T496D336(1)010A(2)E1K0	3.3	6.0	1000	387	348	155	1
10	33	D/7343-31	T496D336(1)010A(2)E400	3.3	6.0	400	612	551	245	1
VDC	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) 100 kHz 25°C	(mA) 100 kHz +85°C	(mA) 100 kHz +125°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Moisture Sensitivity

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

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates Termination Finish. Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. 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			Moisture Sensitivity
VDC	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) 100 kHz 25°C	(mA) 100 kHz +85°C	(mA) 100 kHz +125°C	Reflow Temp ≤ 260°C
10	33	C/6032-28	T496C336(1)010A(2)E1K6	3.3	6.0	1600	262	236	105	1
10	33	C/6032-28	T496C336(1)010A(2)E400	3.3	6.0	400	524	472	210	1
10	47	D/7343-31	T496D476(1)010A(2)E1K0	4.7	6.0	1000	387	348	155	1
10	47	D/7343-31	T496D476(1)010A(2)E400	4.7	6.0	400	612	551	245	1
10	47	C/6032-28	T496C476(1)010A(2)E1K2	4.7	6.0	1200	303	273	121	1
10	47	C/6032-28	T496C476(1)010A(2)E400	4.7	6.0	400	524	472	210	1
10	68	X/7343-43	T496X686(1)010A(2)E900	6.8	6.0	900	428	385	171	1
10	68	D/7343-31	T496D686(1)010A(2)E800	6.8	6.0	800	433	390	173	1
10	68	D/7343-31	T496D686(1)010A(2)E400	6.8	6.0	400	612	551	245	1
10	100	X/7343-43	T496X107(1)010A(2)E400	10.0	8.0	400	642	578	257	1
10	100	D/7343-31	T496D107(1)010A(2)E700	10.0	8.0	700	463	417	185	1
10	100	D/7343-31	T496D107(1)010A(2)E400	10.0	8.0	400	612	551	245	1
10	150	X/7343-43	T496X157(1)010A(2)E700	15.0	8.0	700	486	437	194	1
10	150	X/7343-43	T496X157(1)010A(2)E400	15.0	8.0	400	642	578	257	1
10	150	D/7343-31	T496D157(1)010A(2)E700	15.0	8.0	700	463	417	185	1
10	150	D/7343-31	T496D157(1)010A(2)E400	15.0	8.0	400	612	551	245	1
10	220	X/7343-43	T496X227(1)010A(2)E500	22.0	8.0	500	574	517	230	1
10	220	X/7343-43	T496X227(1)010A(2)E300	22.0	8.0	300	742	668	297	1
10	220	D/7343-31	T496D227(1)010A(2)E300	22.0	8.0	300	707	636	283	1
16	2.2	B/3528-21	T496B225(1)016A(2)E3K5	0.4	6.0	3500	156	140	62	1
16	3.3	B/3528-21	T496B335(1)016A(2)E3K5	0.5	6.0	3500	156	140	62	1
16	3.3	B/3528-21	T496B335(1)016A(2)E2K1	0.5	6.0	2100	201	181	80	1
16	4.7	B/3528-21	T496B475(1)016A(2)E3K5	0.8	6.0	3500	156	140	62	1
16	4.7	B/3528-21	T496B475(1)016A(2)E1K6	0.8	6.0	1600	230	207	92	1
16	6.8	C/6032-28	T496C685(1)016A(2)E2K0	1.1	6.0	2000	235	212	94	1
16	6.8	C/6032-28	T496C685(1)016A(2)E600	1.1	6.0	600	428	385	171	1
16	10	B/3528-21	T496B106(1)016A(2)E3K5	1.6	6.0	3500	156	140	62	1
16	10	C/6032-28	T496C106(1)016A(2)E2K0	1.6	6.0	2000	235	212	94	1
16	10	C/6032-28	T496C106(1)016A(2)E700	1.6	6.0	700	396	356	158	1
16	15	C/6032-28	T496C156(1)016A(2)E2K0	2.4	6.0	2000	235	212	94	1
16	15	C/6032-28	T496C156(1)016A(2)E600	2.4	6.0	600	428	385	171	1
16	22	D/7343-31	T496D226(1)016A(2)E1K0	3.5	6.0	1000	387	348	155	1
16	22	D/7343-31	T496D226(1)016A(2)E500	3.5	6.0	500	548	493	219	1
16	22	C/6032-28	T496C226(1)016A(2)E1K6	3.5	6.0	1600	262	236	105	1
16	22	C/6032-28	T496C226(1)016A(2)E1K0	3.5	6.0	1000	332	299	133	1
16	33	D/7343-31	T496D336(1)016A(2)E1K0	5.3	6.0	1000	387	348	155	1
16	33	D/7343-31	T496D336(1)016A(2)E400	5.3	6.0	400	612	551	245	1
16	47	X/7343-43	T496X476(1)016A(2)E900	7.5	6.0	900	428	385	171	1
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16	47	D/7343-31	T496D476(1)016A(2)E800	7.5	6.0	800	433	390	173	1
16	47	D/7343-31	T496D476(1)016A(2)E400	7.5	6.0	400	612	551	245	1
16	68	D/7343-31	T496D686(1)016A(2)E400	10.9	8.0	400	612	551	245	1
16	100	X/7343-43	T496X107(1)016A(2)E700	16.0	8.0	700	486	437	194	1
20	1.5	B/3528-21	T496B155(1)020A(2)E5K0	0.3	6.0	5000	130	117	52	1
20	2.2	B/3528-21	T496B225(1)020A(2)E3K5	0.4	6.0	3500	156	140	62	1
20	2.2	B/3528-21	T496B225(1)020A(2)E1K6	0.4	6.0	1600	230	207	92	1
20	3.3	B/3528-21	T496B335(1)020A(2)E3K5	0.7	6.0	3500	156	140	62	1
20	4.7	C/6032-28	T496C475(1)020A(2)E2K0	0.9	6.0	2000	235	212	94	1
20	6.8	C/6032-28	T496C685(1)020A(2)E2K0	1.4	6.0	2000	235	212	94	1
20	6.8	C/6032-28	T496C685(1)020A(2)E600	1.4	6.0	600	428	385	171	1
VDC	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) 100 kHz 25°C	(mA) 100 kHz +85°C	(mA) 100 kHz +125°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Moisture Sensitivity

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

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates Termination Finish. Refer to Ordering Information for additional detail.

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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			Moisture Sensitivity
VDC	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) 100 kHz 25°C	(mA) 100 kHz +85°C	(mA) 100 kHz +125°C	Reflow Temp ≤ 260°C
20	10	C/6032-28	T496C106(1)020A(2)E2K0	2.0	6.0	2000	235	212	94	1
20	10	C/6032-28	T496C106(1)020A(2)E800	2.0	6.0	800	371	334	148	1
20	15	D/7343-31	T496D156(1)020A(2)E1K0	3.0	6.0	1000	387	348	155	1
20	15	D/7343-31	T496D156(1)020A(2)E500	3.0	6.0	500	548	493	219	1
20	15	C/6032-28	T496C156(1)020A(2)E500	3.0	6.0	500	469	422	188	1
20	22	D/7343-31	T496D226(1)020A(2)E1K0	4.4	6.0	1000	387	348	155	1
20	22	D/7343-31	T496D226(1)020A(2)E500	4.4	6.0	500	548	493	219	1
20	33	X/7343-43	T496X336(1)020A(2)E900	6.6	6.0	900	428	385	171	1
20	33	X/7343-43	T496X336(1)020A(2)E400	6.6	6.0	400	642	578	257	1
20	33	D/7343-31	T496D336(1)020A(2)E400	6.6	6.0	400	612	551	245	1
20	47	X/7343-43	T496X476(1)020A(2)E300	9.4	6.0	300	742	668	297	1
20	47	D/7343-31	T496D476(1)020A(2)E300	9.4	6.0	300	707	636	283	1
25	0.68	B/3528-21	T496B684(1)025A(2)E6K5	0.2	4.0	6500	114	103	46	1
25	1	B/3528-21	T496B105(1)025A(2)E5K0	0.3	4.0	5000	130	117	52	1
25	1	B/3528-21	T496B105(1)025A(2)E3K5	0.3	4.0	3500	156	140	62	1
25	1.5	B/3528-21	T496B155(1)025A(2)E5K0	0.4	6.0	5000	130	117	52	1
25	1.5	B/3528-21	T496B155(1)025A(2)E1K6	0.4	6.0	1600	230	207	92	1
25	2.2	C/6032-28	T496C225(1)025A(2)E3K5	0.6	6.0	3500	177	159	71	1
25	3.3	C/6032-28	T496C335(1)025A(2)E2K5	0.8	6.0	2500	210	189	84	1
25	3.3	C/6032-28	T496C335(1)025A(2)E2K1	0.8	6.0	2100	229	206	92	1
25	4.7	B/3528-21	T496B475(1)025A(2)E4K0	1.2	6.0	4000	146	131	58	1
25	4.7	C/6032-28	T496C475(1)025A(2)E2K5	1.2	6.0	2500	210	189	84	1
25	4.7	C/6032-28	T496C475(1)025A(2)E1K3	1.2	6.0	1300	291	262	116	1
25	6.8	C/6032-28	T496C685(1)025A(2)E2K0	1.7	6.0	2000	235	212	94	1
25	6.8	C/6032-28	T496C685(1)025A(2)E600	1.7	6.0	600	428	385	171	1
25	10	C/6032-28	T496C106(1)025A(2)E600	2.5	6.0	600	428	385	171	1
25	10	D/7343-31	T496D106(1)025A(2)E1K2	2.5	6.0	1200	354	319	142	1
25	10	D/7343-31	T496D106(1)025A(2)E600	2.5	6.0	600	500	450	200	1
25	15	C/6032-28	T496C156(1)025A(2)E750	3.8	6.0	750	383	345	153	1
25	15	D/7343-31	T496D156(1)025A(2)E1K0	3.8	6.0	1000	387	348	155	1
25	15	D/7343-31	T496D156(1)025A(2)E500	3.8	6.0	500	548	493	219	1
25	22	X/7343-43	T496X226(1)025A(2)E900	5.5	6.0	900	428	385	171	1
25	22	X/7343-43	T496X226(1)025A(2)E400	5.5	6.0	400	642	578	257	1
25	22	D/7343-31	T496D226(1)025A(2)E800	5.5	6.0	800	433	390	173	1
25	22	D/7343-31	T496D226(1)025A(2)E400	5.5	6.0	400	612	551	245	1
35	0.47	B/3528-21	T496B474(1)035A(2)E8K0	0.2	4.0	8000	103	93	41	1
35	0.47	B/3528-21	T496B474(1)035A(2)E2K6	0.2	4.0	2600	181	163	72	1
35	0.68	B/3528-21	T496B684(1)035A(2)E6K5	0.2	4.0	6500	114	103	46	1
35	1	B/3528-21	T496B105(1)035A(2)E5K0	0.4	4.0	5000	130	117	52	1
35	1	B/3528-21	T496B105(1)035A(2)E3K1	0.4	4.0	3100	166	149	66	1
35	1.5	C/6032-28	T496C155(1)035A(2)E4K5	0.5	6.0	4500	156	140	62	1
35	1.5	C/6032-28	T496C155(1)035A(2)E2K6	0.5	6.0	2600	206	185	82	1
35	2.2	C/6032-28	T496C225(1)035A(2)E3K5	0.8	6.0	3500	177	159	71	1
35	2.2	C/6032-28	T496C225(1)035A(2)E1K6	0.8	6.0	1600	262	236	105	1
35	3.3	C/6032-28	T496C335(1)035A(2)E2K5	1.2	6.0	2500	210	189	84	1
35	3.3	C/6032-28	T496C335(1)035A(2)E900	1.2	6.0	900	350	315	140	1
35	4.7	D/7343-31	T496D475(1)035A(2)E1K5	1.6	6.0	1500	316	284	126	1
35	4.7	D/7343-31	T496D475(1)035A(2)E700	1.6	6.0	700	463	417	185	1
35	6.8	D/7343-31	T496D685(1)035A(2)E1K3	2.4	6.0	1300	340	306	136	1
35	6.8	D/7343-31	T496D685(1)035A(2)E750	2.4	6.0	750	447	402	179	1
VDC	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) 100 kHz 25°C	(mA) 100 kHz +85°C	(mA) 100 kHz +125°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Moisture Sensitivity

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

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates Termination Finish. Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. 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			Moisture Sensitivity
VDC	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) 100 kHz 25°C	(mA) 100 kHz +85°C	(mA) 100 kHz +125°C	Reflow Temp ≤ 260°C
35	10	X/7343-43	T496X106(1)035A(2)E1K0	3.5	6.0	1000	406	365	162	1
35	10	X/7343-43	T496X106(1)035A(2)E500	3.5	6.0	500	574	517	230	1
35	10	D/7343-31	T496D106(1)035A(2)E400	3.5	6.0	400	612	551	245	1
35	15	X/7343-43	T496X156(1)035A(2)E900	5.3	6.0	900	428	385	171	1
35	15	X/7343-43	T496X156(1)035A(2)E500	5.3	6.0	500	574	517	230	1
35	15	D/7343-31	T496D156(1)035A(2)E500	5.3	6.0	500	548	493	219	1
35	22	X/7343-43	T496X226(1)035A(2)E300	7.7	6.0	300	742	668	297	1
50	0.15	B/3528-21	T496B154(1)050A(2)E16K	0.1	4.0	16000	73	66	29	1
50	0.22	B/3528-21	T496B224(1)050A(2)E14K	0.1	4.0	14000	78	70	31	1
50	0.22	B/3528-21	T496B224(1)050A(2)E10K	0.1	4.0	10000	92	83	37	1
50	0.33	B/3528-21	T496B334(1)050A(2)E10K	0.2	4.0	10000	92	83	37	1
50	0.33	B/3528-21	T496B334(1)050A(2)E2K6	0.2	4.0	2600	181	163	72	1
50	0.47	C/6032-28	T496C474(1)050A(2)E8K0	0.2	4.0	8000	117	105	47	1
50	0.47	C/6032-28	T496C474(1)050A(2)E1K9	0.2	4.0	1900	241	217	96	1
50	0.68	C/6032-28	T496C684(1)050A(2)E7K0	0.3	4.0	7000	125	113	50	1
50	0.68	C/6032-28	T496C684(1)050A(2)E1K7	0.3	4.0	1700	254	229	102	1
50	1	C/6032-28	T496C105(1)050A(2)E5K5	0.5	4.0	5500	141	127	56	1
50	1	C/6032-28	T496C105(1)050A(2)E2K7	0.5	4.0	2700	202	182	81	1
50	1.5	C/6032-28	T496C155(1)050A(2)E5K0	0.8	6.0	5000	148	133	59	1
50	1.5	C/6032-28	T496C155(1)050A(2)E2K0	0.8	6.0	2000	235	212	94	1
50	2.2	D/7343-31	T496D225(1)050A(2)E2K5	1.1	6.0	2500	245	221	98	1
50	2.2	D/7343-31	T496D225(1)050A(2)E900	1.1	6.0	900	408	367	163	1
50	3.3	D/7343-31	T496D335(1)050A(2)E2K0	1.7	6.0	2000	274	247	110	1
50	3.3	D/7343-31	T496D335(1)050A(2)E1K0	1.7	6.0	1000	387	348	155	1
50	4.7	X/7343-43	T496X475(1)050A(2)E1K5	2.4	6.0	1500	332	299	133	1
50	4.7	X/7343-43	T496X475(1)050A(2)E400	2.4	6.0	400	642	578	257	1
50	4.7	D/7343-31	T496D475(1)050A(2)E400	2.4	6.0	400	612	551	245	1
VDC	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) 100 kHz 25°C	(mA) 100 kHz +85°C	(mA) 100 kHz +125°C	Reflow Temp ≤ 260°C
Rated Voltage	Rated Cap	Case Code/ Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current			Moisture Sensitivity

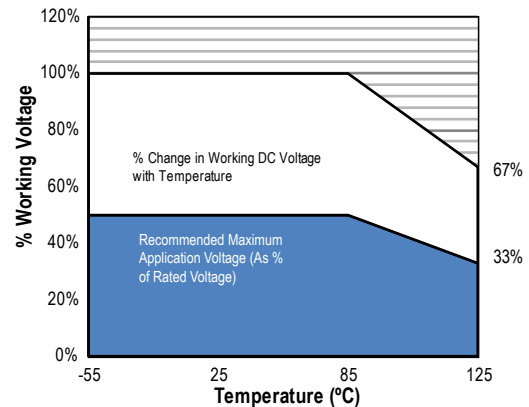
1) To complete KEMET part number, insert M for ± 20% or K for ± 10%. Designates Capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates Termination Finish. Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. 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_R	67% of V_R
Recommended Maximum Application Voltage	50% of V_R	33% of V_R



Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage 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 Power Dissipation		
$T \leq 25^\circ\text{C}$	$T \leq 85^\circ\text{C}$	$T \leq 125^\circ\text{C}$
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.

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

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

I = rms ripple current (amperes)

E = rms ripple voltage (volts)

P_{max} = maximum power dissipation (watts)

R = ESR at specified frequency (ohms)

Z = Impedance at specified frequency (ohms)

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.

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
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 ¹	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 ²	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 ²	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 ¹	7343-43	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
Y ¹	7343-40	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84

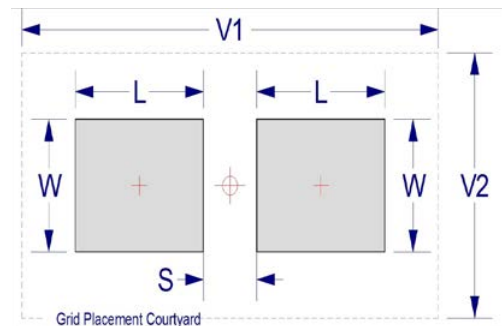
Density Level A: For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

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

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

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

² Land pattern geometry is too small for silkscreen outline.



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.

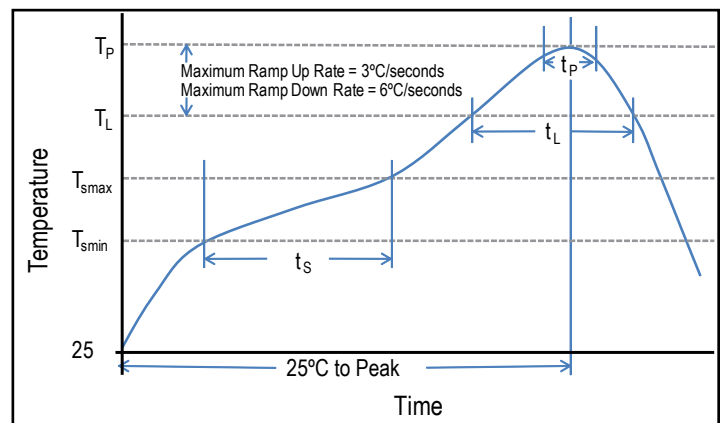
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

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

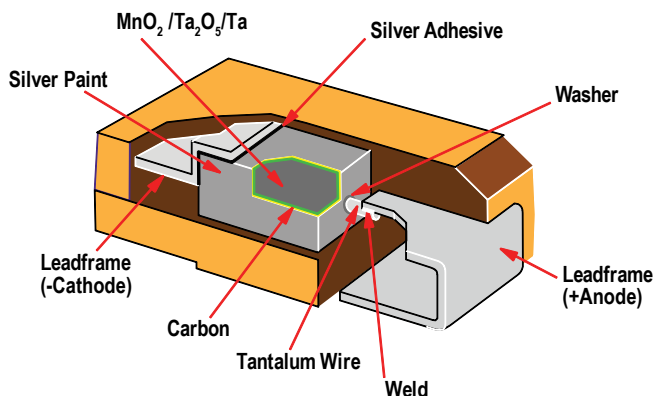
Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.

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

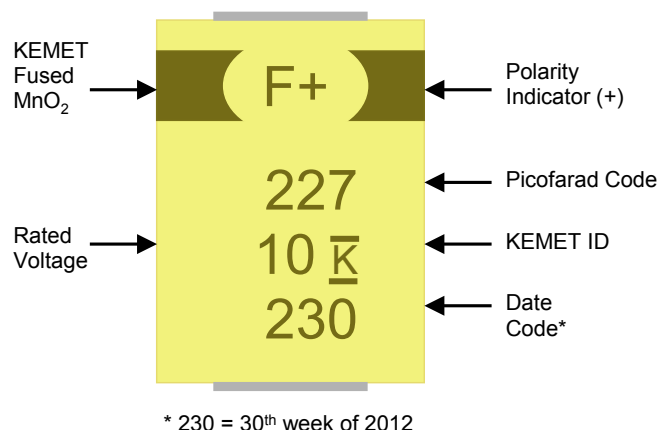
**Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



Construction



Capacitor Marking



Date Code *	
1 st digit = Last number of Year	9 = 2009 0 = 2010 1 = 2011 2 = 2012 3 = 2013 4 = 2014
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

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.

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 481-1: Embossed Carrier Taping of Surface Mount Components for Automatic Handling*. This packaging system is compatible with all tape-fed automatic pick-and-place systems.

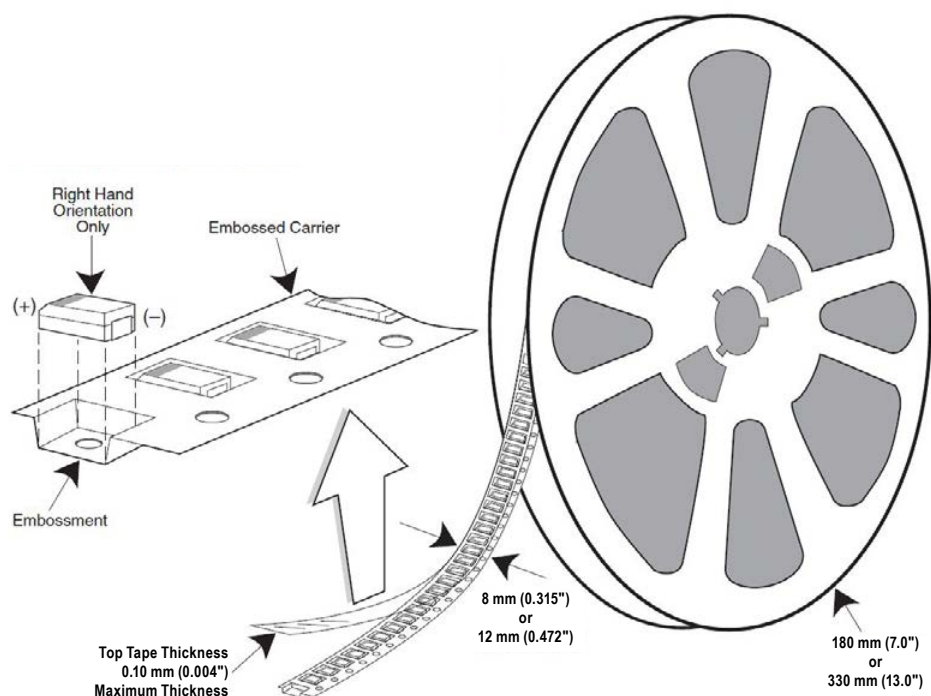
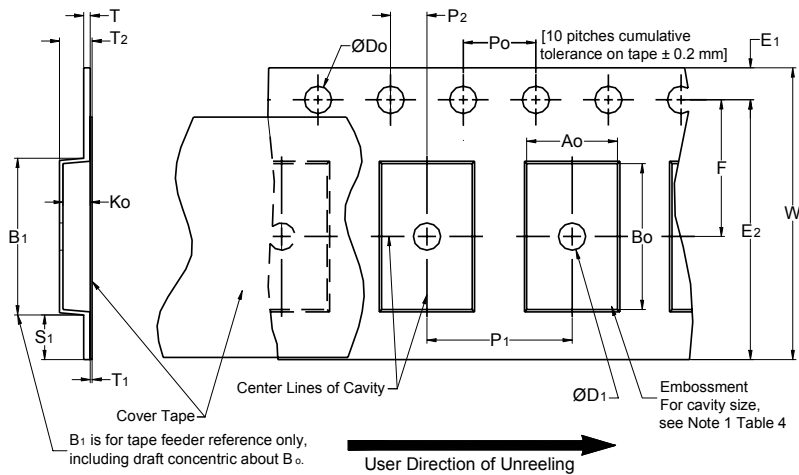


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
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/T428P	7360-38	12	500	2,000
H	7360-20	12	1,000	2,500

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

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions**Table 4 – Embossed (Plastic) Carrier Tape Dimensions**

Metric will govern

Constant Dimensions — Millimeters (Inches)									
Tape Size	D ₀	D ₁ Minimum Note 1	E ₁	P ₀	P ₂	R Reference Note 2	S ₁ Minimum Note 3	T Maximum	T ₁ Maximum
8 mm	1.5 +0.10/-0.0 (0.059 +0.004/-0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			
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)	4.0 ±0.10 (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)	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)	5.5 ±0.05 (0.217 ±0.002)	8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	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 5).
- 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).
- B₁ dimension is a reference dimension for tape feeder clearance only.
- The cavity defined by A₀, B₀ and K₀ 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

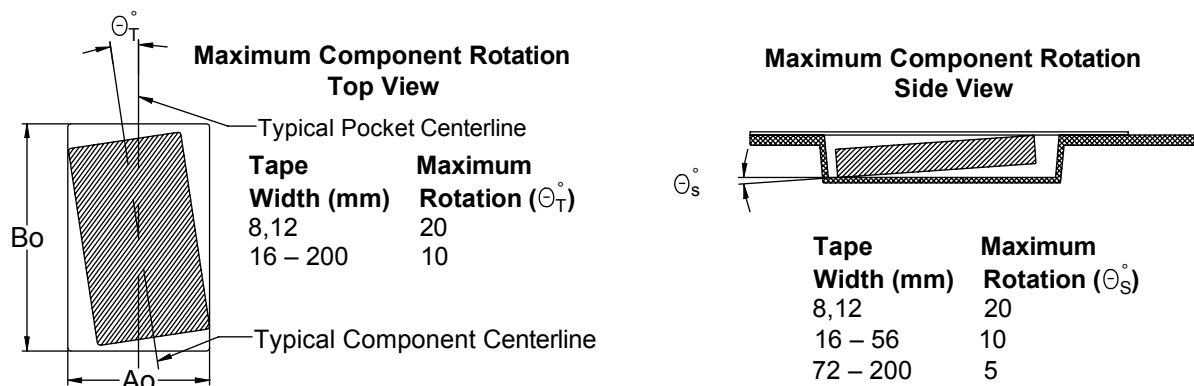


Figure 3 – Maximum Lateral Movement

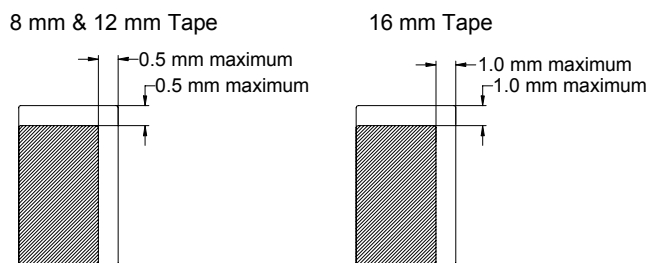


Figure 4 – Bending Radius

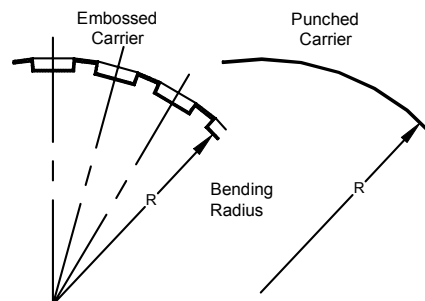
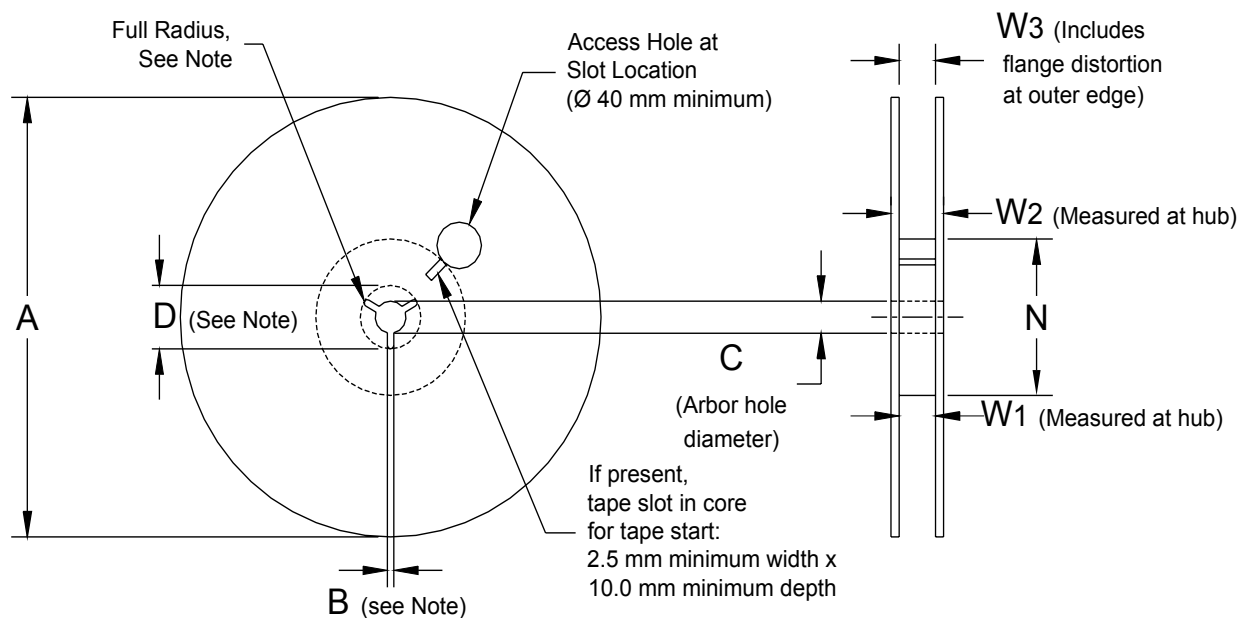


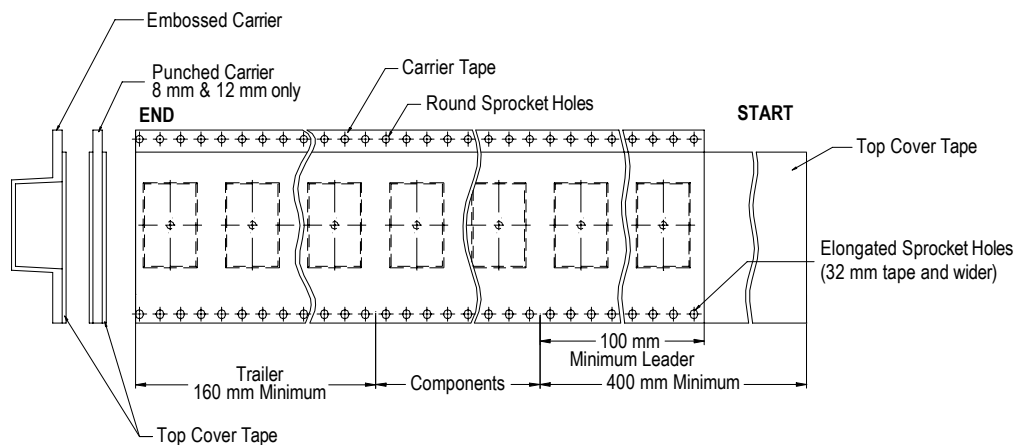
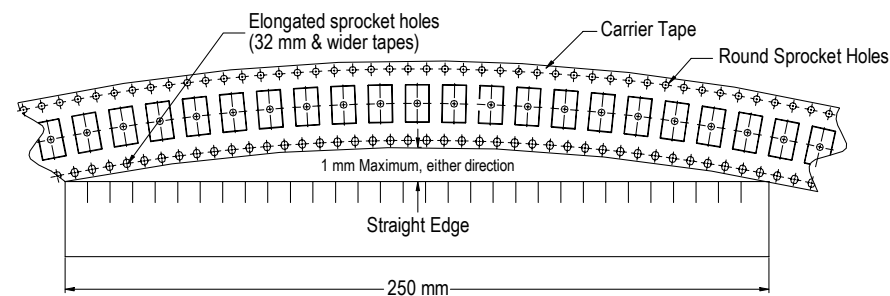
Figure 5 – Reel Dimensions

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 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**

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