T541 COTS Polymer Electrolytic for High Reliability Applications, 2.5 – 63 VDC

Overview

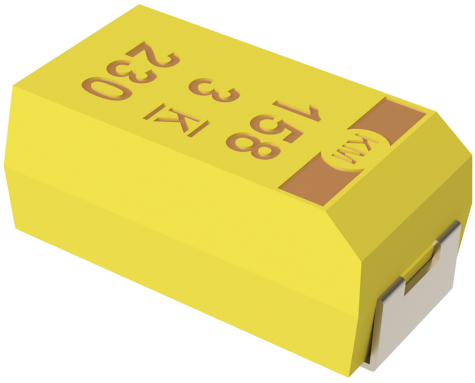
The KEMET Organic Capacitor (KO-CAP) is a solid electrolytic capacitor with a conductive polymer cathode capable of delivering very low ESR and improved capacitance retention at high frequencies. KO-CAP combines the low ESR of multilayer ceramic, the high capacitance of aluminum electrolytic and the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

The T541 COTS Polymer Electrolytic offers the same performance advantages as other KO-CAP series with screening options associated with high reliability ("Hi-Rel") applications. These Commerical-Off-The-Shelf (COTS) grade components are built with a tin-lead (SnPb) termination finish and offer several surge current screening options. The multiple-anode design of the T541 offers lower ESR options than the T540, resulting in high ripple current capability and higher frequency capacitance retention. The recommended application derating for these capacitors is 10 – 20%, rendering them suitable for application voltages from 2.25 to 50 VDC.

The T541 series is the first polymer electrolytic capacitor available with failure rate options as defined by KEMET's KO-CAP Reliability Assessment method. This method utilizes accelerated conditions (voltage & temperature) applied to board mounted samples to assess long term device reliability. The failure rates available are B (0.1%/Khours.), C (0.01%/Khours.) and D (0.001%/Khours). The KO-CAP Reliability Assessment method was developed based on over ten (10) years of research and is described in numerous papers available on www.kemet.com.

Benefits

- Approved for DLA Drawing 04052
- B, C and D failure rates available
- 100% accelerated steady state aging
- High frequency capacitance retention
- Very Low ESR values of 5 mΩ to 150 mΩ
- Surge current testing options
- Utilizes multiple anode technology
- Volumetrically efficient
- EIA standard case sizes
- KEMET's KO-CAP Reliability Assessment method



Applications

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

When extreme temperatures and humidity are taken into account, polymer capacitors offer a number of advantages over other types of capacitors. KEMET continues to investigate the behavior of polymer capacitors in extreme conditions. If you have questions about using these capacitors in a specific environment or application, we suggest you contact your local KEMET representative or Field Application Engineer. You may also refer to "Considerations for Polymer Capacitors in Extreme Environments" located at www.kemet.com/ExtremePolymerPaper.

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	541	D	157	M	10	A	H	65	10	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate/ Design	Termination Finish	Surge Option	ESR	Packaging (C-Spec)
T = Tantalum	541 = Polymer COTS Multiple Anode	D, X, Y	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 30 = ESR - Ultra Low ESR	Blank = 7" Reel 7280 = 13" Reel

** Select part numbers*
*** Before voltage aging*
**** After voltage aging*

Ordering Information – DLA Drawing 04052

04052-	001	A
Drawing Number	Dash Number	Surge Current Option
04052	See Part Number List	Blank = 4 cycles +25°C ±5°C Before Voltage Aging A = 10 cycles +25°C ±5°C After Voltage Aging B = 10 cycles −55°C +0°C/-5°C and +85°C ±5°C After Voltage Aging

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	−55°C to 125°C *
Rated Capacitance Range	10 – 1,500 µF @ 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 @ rated voltage, 2,000 hours 125°C @ 2/3 rated voltage, 2,000 hours		Δ C/C	Within -20%/+10% of initial value		
			DF	≤ initial limit		
			DCL**	1.25 x initial limit @ 125°C		
			ESR	2 x IL @ 105°C, 5 x IL @ 125°C		
Storage Life	125°C @ 0 volts, 2,000 hours		Δ C/C	Within -20%/+10% of initial value		
			DF	Within initial limits		
			DCL**	Within 2.0 x initial limit		
			ESR	Within 5.0 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		+25°C	−55°C	+85°C (1)	+125°C (2)
		Δ C/C	±5%	±10%	±20%	±30%
		DF	IL	IL	1.2 x IL	1.5 x IL
		DCL	IL	n/a	10 x IL	10 x IL
Surge Voltage	105°C, 1.32 x rated voltage, 33 Ω resistance, 1,000 cycles		Δ C/C	Within -20/+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.					

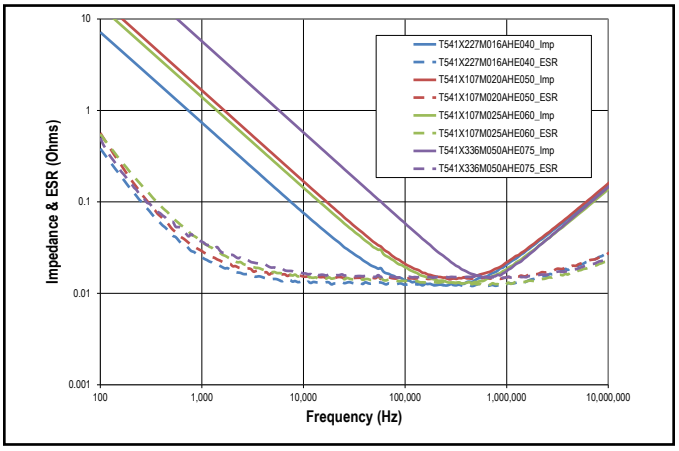
**IL = Initial limit*
*** The test voltage shall be maintained during the cool down from elevated test temperature to +25°C. After cool down, the capacitors shall be discharged for a minimum of 5 minutes. DC leakage measurements are allowed at this time.*
(1) ≥16V - D C/C = ±30%
(2) ≥16V - D C/C = ±40%

Certification

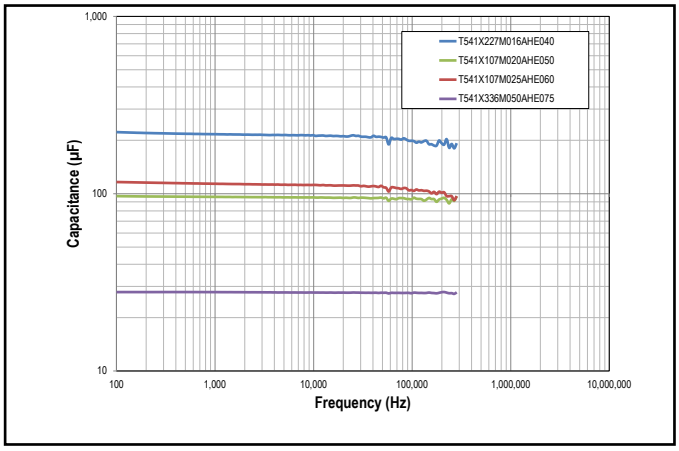
DLA Drawing 04052

Electrical Characteristics

ESR vs. Frequency



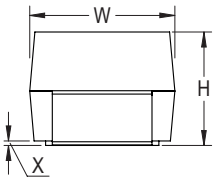
Capacitance vs. Frequency



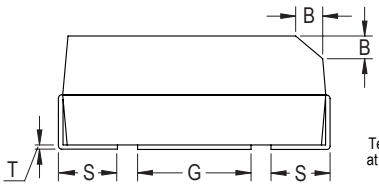
Dimensions – Millimeters (Inches)

Metric will govern

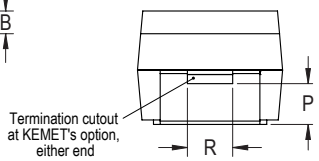
CATHODE (-) END VIEW



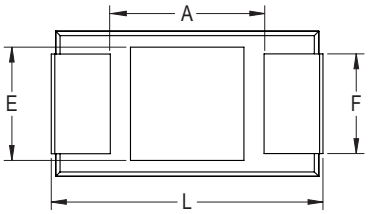
SIDE VIEW



ANODE (+) END VIEW



BOTTOM VIEW



Case Size		Component 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)
D	7343-31	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	2.8 ±0.3 (0.110 ±0.012)	2.4 (0.095)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	0.9 (0.035)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	307.51
X	7343-43	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	4.0 ±0.3 (0.157 ±0.012)	2.4 (0.095)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	410.89
Y	7343-40	7.3 ±0.3 (0.287 ±0.012)	4.3 ±0.3 (0.169 ±0.012)	3.8 ±0.2 (0.150 ±0.008)	2.4 (0.095)	1.3 (0.051)	0.5 (0.020)	0.10 ±0.10 (0.004 ±0.004)	1.7 (0.067)	1.0 (0.039)	0.13 (0.005)	3.8 (0.150)	3.5 (0.138)	3.5 (0.138)	378.06

Notes: (Ref) – Dimensions provided for reference only.
These weights are provided as reference. If exact weights are needed, please contact your KEMET Sales Representative

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DSCC Drawing Number 04052	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	Part Number	µA @ 25°C Maximum	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA at 45°C 100 kHz	°C
2.5	470	D/7343-31	T541D477M2R5AH(1)20	04052-002(2)	118	10	6	6519	125
2.5	470	D/7343-31	T541D477M2R5(3)H(1)20	N/A	118	10	6	6519	125
2.5	470	D/7343-31	T541D477M2R5AH(1)10	04052-003(2)	118	10	10	5050	125
2.5	470	D/7343-31	T541D477M2R5(3)H(1)10	N/A	118	10	10	5050	125
2.5	680	Y/7343-40	T541Y687M2R5AH(1)30	04052-005(2)	170	10	5	7253	125
2.5	680	Y/7343-40	T541Y687M2R5(3)H(1)30	N/A	170	10	5	7253	125
2.5	680	Y/7343-40	T541Y687M2R5AH(1)20	04052-006(2)	170	10	6	6621	125
2.5	680	Y/7343-40	T541Y687M2R5(3)H(1)20	N/A	170	10	6	6621	125
2.5	680	Y/7343-40	T541Y687M2R5AH(1)10	04052-042(2)	170	10	10	5128	125
2.5	680	Y/7343-40	T541Y687M2R5(3)H(1)10	N/A	170	10	10	5128	125
2.5	680	D/7343-31	T541D687M2R5AH(1)20	04052-007(2)	170	10	6	6519	125
2.5	680	D/7343-31	T541D687M2R5(3)H(1)20	N/A	170	10	6	6519	125
2.5	680	D/7343-31	T541D687M2R5AH(1)10	04052-008(2)	170	10	10	5050	125
2.5	680	D/7343-31	T541D687M2R5(3)H(1)10	N/A	170	10	10	5050	125
2.5	1000	X/7343-43	T541X108M2R5AH(1)30	04052-009(2)	250	10	5	7348	125
2.5	1000	X/7343-43	T541X108M2R5(3)H(1)30	N/A	250	10	5	7348	125
2.5	1000	X/7343-43	T541X108M2R5AH(1)20	04052-010(2)	250	10	6	6708	125
2.5	1000	X/7343-43	T541X108M2R5(3)H(1)20	N/A	250	10	6	6708	125
2.5	1000	X/7343-43	T541X108M2R5AH(1)10	04052-043(1)	250	10	10	5196	125
2.5	1000	X/7343-43	T541X108M2R5(3)H(1)10	N/A	250	10	10	5196	125
2.5	1500	X/7343-43	T541X158M2R5AH(1)30	04052-011(2)	375	10	5	7348	125
2.5	1500	X/7343-43	T541X158M2R5(3)H(1)30	N/A	375	10	5	7348	125
2.5	1500	X/7343-43	T541X158M2R5AH(1)20	04052-044(2)	375	10	6	6708	125
2.5	1500	X/7343-43	T541X158M2R5(3)H(1)20	N/A	375	10	6	6708	125
2.5	1500	X/7343-43	T541X158M2R5AH(1)10	04052-045(2)	375	10	10	5196	125
2.5	1500	X/7343-43	T541X158M2R5(3)H(1)10	N/A	375	10	10	5196	125
3	470	D/7343-31	T541D477M003AH(1)10	04052-012(2)	141	10	10	5050	125
3	470	D/7343-31	T541D477M003(3)H(1)10	N/A	141	10	10	5050	125
3	680	D/7343-31	T541D687M003AH(1)10	04052-013(2)	204	10	10	5050	125
3	680	D/7343-31	T541D687M003(3)H(1)10	N/A	204	10	10	5050	125
3	1000	X/7343-43	T541X108M003AH(1)10	04052-014(2)	300	10	10	5196	125
3	1000	X/7343-43	T541X108M003(3)H(1)10	N/A	300	10	10	5196	125
3	1500	X/7343-43	T541X158M003AH(1)10	04052-015(2)	450	10	8	5809	125
3	1500	X/7343-43	T541X158M003(3)H(1)10	N/A	450	10	8	5809	125
4	330	D/7343-31	T541D337M004AH(1)20	04052-017(2)	132	10	6	6519	125
4	330	D/7343-31	T541D337M004(3)H(1)20	N/A	132	10	6	6519	125
4	330	D/7343-31	T541D337M004AH(1)10	04052-046(2)	132	10	10	5050	125
4	330	D/7343-31	T541D337M004(3)H(1)10	N/A	132	10	10	5050	125
4	470	D/7343-31	T541D477M004AH(1)10	04052-018(2)	188	10	10	5050	125
4	470	D/7343-31	T541D477M004(3)H(1)10	N/A	188	10	10	5050	125
4	470	Y/7343-40	T541Y477M004AH(1)30	04052-019(2)	188	10	5	7253	125
4	470	Y/7343-40	T541Y477M004(3)H(1)30	N/A	188	10	5	7253	125
4	470	Y/7343-40	T541Y477M004AH(1)20	04052-020(2)	188	10	6	6621	125
4	470	Y/7343-40	T541Y477M004(3)H(1)20	N/A	188	10	6	6621	125
4	470	Y/7343-40	T541Y477M004AH(1)10	04052-047(2)	188	10	10	5128	125
4	470	Y/7343-40	T541Y477M004(3)H(1)10	N/A	188	10	10	5128	125
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	Part Number	µA @ 25°C Maximum	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	w/ΔT = 20°C @ −55°C to 105°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DSCC Drawing Number 04052	DC Leakage	DF	ESR	Maximum Allowable Ripple Current (A) 100 kHz	Maximum Operating Temp

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles −55°C and +85°C. Designates surge current option.
(2) To complete DLA part number, Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles −55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert 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 04052	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	Part Number	µA @ 25°C Maximum	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA at 45°C 100 kHz	°C
4	680	X/7343-43	T541X687M004AH(1)30	04052-021(2)	272	10	5	7348	125
4	680	X/7343-43	T541X687M004(3)H(1)30	N/A	272	10	5	7348	125
4	680	X/7343-43	T541X687M004AH(1)20	04052-022(2)	272	10	6	6708	125
4	680	X/7343-43	T541X687M004(3)H(1)20	N/A	272	10	6	6708	125
4	680	X/7343-43	T541X687M004AH(1)10	04052-023(2)	272	10	10	5196	125
4	680	X/7343-43	T541X687M004(3)H(1)10	N/A	272	10	10	5196	125
4	1000	X/7343-43	T541X108M004AH(1)20	04052-024(2)	400	10	6	6708	125
4	1000	X/7343-43	T541X108M004(3)H(1)20	N/A	400	10	6	6708	125
4	1000	X/7343-43	T541X108M004AH(1)10	04052-048(2)	400	10	10	5196	125
4	1000	X/7343-43	T541X108M004(3)H(1)10	N/A	400	10	10	5196	125
6.3	220	D/7343-31	T541D227M006AH(1)20	04052-026(2)	139	10	6	6519	125
6.3	220	D/7343-31	T541D227M006(3)H(1)20	N/A	139	10	6	6519	125
6.3	220	D/7343-31	T541D227M006AH(1)10	04052-049(2)	139	10	10	5050	125
6.3	220	D/7343-31	T541D227M006(3)H(1)10	N/A	139	10	10	5050	125
6.3	330	D/7343-31	T541D337M006AH(1)10	04052-027(2)	208	10	10	5050	125
6.3	330	D/7343-31	T541D337M006(3)H(1)10	N/A	208	10	10	5050	125
6.3	330	Y/7343-40	T541Y337M006AH(1)30	04052-028(2)	208	10	5	7253	125
6.3	330	Y/7343-40	T541Y337M006(3)H(1)30	N/A	208	10	5	7253	125
6.3	330	Y/7343-40	T541Y337M006AH(1)20	04052-029(2)	208	10	6	6621	125
6.3	330	Y/7343-40	T541Y337M006(3)H(1)20	N/A	208	10	6	6621	125
6.3	330	Y/7343-40	T541Y337M006AH(1)10	04052-030(2)	208	10	10	5128	125
6.3	330	Y/7343-40	T541Y337M006(3)H(1)10	N/A	208	10	10	5128	125
6.3	470	X/7343-43	T541X477M006AH(1)30	04052-031(2)	296	10	5	7348	125
6.3	470	X/7343-43	T541X477M006(3)H(1)30	N/A	296	10	5	7348	125
6.3	470	X/7343-43	T541X477M006AH(1)20	04052-032(2)	296	10	6	6708	125
6.3	470	X/7343-43	T541X477M006(3)H(1)20	N/A	296	10	6	6708	125
6.3	470	X/7343-43	T541X477M006AH(1)10	04052-033(2)	296	10	10	5196	125
6.3	470	X/7343-43	T541X477M006(3)H(1)10	N/A	296	10	10	5196	125
6.3	680	X/7343-43	T541X687M006AH(1)10	N/A	428	10	15	4243	125
10	150	D/7343-31	T541D157M010AH(1)20	04052-035(2)	150	10	6	6519	125
10	150	D/7343-31	T541D157M010(3)H(1)20	N/A	150	10	6	6519	125
10	150	D/7343-31	T541D157M010AH(1)10	04052-050(2)	150	10	10	5050	125
10	150	D/7343-31	T541D157M010(3)H(1)10	N/A	150	10	10	5050	125
10	220	D/7343-31	T541D227M010AH(1)20	04052-036(2)	220	10	6	6519	125
10	220	D/7343-31	T541D227M010(3)H(1)20	N/A	220	10	6	6519	125
10	220	D/7343-31	T541D227M010AH(1)10	04052-037(2)	220	10	10	5050	125
10	220	D/7343-31	T541D227M010(3)H(1)10	N/A	220	10	10	5050	125
10	220	Y/7343-40	T541Y227M010AH(1)20	04052-038(2)	220	10	6	6621	125
10	220	Y/7343-40	T541Y227M010(3)H(1)20	N/A	220	10	6	6621	125
10	220	Y/7343-40	T541Y227M010AH(1)10	04052-051(2)	220	10	10	5128	125
10	220	Y/7343-40	T541Y227M010(3)H(1)10	N/A	220	10	10	5128	125
10	330	X/7343-43	T541X337M010AH(1)30	04052-039(2)	330	10	5	7348	125
10	330	X/7343-43	T541X337M010(3)H(1)30	N/A	330	10	5	7348	125
10	330	X/7343-43	T541X337M010AH(1)20	04052-040(2)	330	10	6	6708	125
10	330	X/7343-43	T541X337M010(3)H(1)20	N/A	330	10	6	6708	125
10	330	X/7343-43	T541X337M010AH(1)10	04052-041(2)	330	10	10	5196	125
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	Part Number	µA @ 25°C Maximum	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	w/ΔT = 20°C @ −55°C to 105°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DSCC Drawing Number 04052	DC Leakage	DF	ESR	Maximum Allowable Ripple Current (A) 100 kHz	Maximum Operating Temp

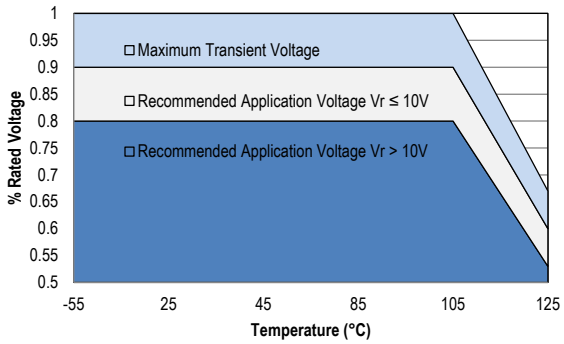
(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles −55°C and +85°C. Designates surge current option.
(2) To complete DLA part number, Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles −55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert 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 04052	DC Leakage	DF	ESR	Maximum Allowable Ripple Current	Maximum Operating Temp
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	Part Number	µA @ 25°C Maximum	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	mA at 45°C 100 kHz	°C
10	330	X/7343-43	T541X337M010(3)H(1)10	N/A	330	10	10	5196	125
10	470	X/7343-43	T541X477M010(3)H10	N/A	470	10	20	3674	125
16	150	X/7343-43	T541X157M016AH(1)20	04052-052(2)	240	10	25	3286	125
16	150	X/7343-43	T541X157M016(3)H(1)20	N/A	240	10	25	3286	125
16	150	X/7343-43	T541X157M016AH(1)10	04052-053(2)	240	10	40	2598	125
16	150	X/7343-43	T541X157M016(3)H(1)10	N/A	240	10	40	2598	125
16	220	X/7343-43	T541X227M016AH(1)20	04052-054(2)	352	10	25	3286	125
16	220	X/7343-43	T541X227M016(3)H(1)20	N/A	352	10	25	3286	125
16	220	X/7343-43	T541X227M016AH(1)10	04052-055(2)	352	10	40	2598	125
16	220	X/7343-43	T541X227M016(3)H(1)10	N/A	352	10	40	2598	125
16	330	X/7343-43	T541X337M016AH(1)20	04052-056(2)	528	10	25	3286	125
16	330	X/7343-43	T541X337M016(3)H(1)20	N/A	528	10	25	3286	125
16	330	X/7343-43	T541X337M016AH(1)10	04052-057(2)	528	10	50	2324	125
16	330	X/7343-43	T541X337M016(3)H(1)10	N/A	528	10	50	2324	125
20	100	X/7343-43	T541X107M020AH(1)10	04052-058(2)	200	10	50	2324	125
20	100	X/7343-43	T541X107M020(3)H(1)10	N/A	200	10	50	2324	125
25	68	X/7343-43	T541X686M025AH(1)10	04052-059(2)	170	10	50	2324	125
25	68	X/7343-43	T541X686M025(3)H(1)10	N/A	170	10	50	2324	125
25	100	X/7343-43	T541X107M025AH(1)10	04052-060(2)	250	10	60	2121	125
25	100	X/7343-43	T541X107M025(3)H(1)10	N/A	250	10	60	2121	125
30	47	X/7343-43	T541X476M030(3)H(1)10	N/A	141	10	50	2324	125
30	68	X/7343-43	T541X686M030(3)H(1)10	N/A	204	10	50	2324	125
30	68	X/7343-43	T541X686M030(3)H(1)20	N/A	204	10	35	2777	125
35	33	X/7343-43	T541X336M035AH(1)10	04052-061(2)	116	10	60	2121	125
35	33	X/7343-43	T541X336M035(4)H(1)10	N/A	116	10	60	2121	125
35	47	X/7343-43	T541X476M035AH(1)10	04052-062(2)	165	10	60	2121	125
35	47	X/7343-43	T541X476M035(4)H(1)10	N/A	165	10	60	2121	125
50	22	X/7343-43	T541X226M050AH(1)10	04052-063(2)	110	10	75	1897	125
50	22	X/7343-43	T541X226M050(4)H(1)10	N/A	110	10	75	1897	125
50	33	X/7343-43	T541X336M050AH(1)10	04052-064(2)	165	10	75	1897	125
50	33	X/7343-43	T541X336M050(4)H(1)10	N/A	165	10	75	1897	125
63	10	X/7343-43	T541X106M063AH(1)10	04052-067(2)	63	10	150	1342	125
63	10	X/7343-43	T541X106M063(4)H(1)10	N/A	63	10	150	1342	125
63	10	X/7343-43	T541X106M063AH(1)20	04052-066(2)	63	10	100	1643	125
63	10	X/7343-43	T541X106M063(4)H(1)20	N/A	63	10	100	1643	125
63	10	X/7343-43	T541X106M063AH(1)30	04052-065(2)	63	10	75	1897	125
63	10	X/7343-43	T541X106M063(4)H(1)30	N/A	63	10	75	1897	125
63	15	X/7343-43	T541X156M063AH(1)10	04052-068(2)	95	10	50	2324	125
63	15	X/7343-43	T541X156M063(4)H(1)10	N/A	95	10	50	2324	125
VDC @ 105°C	µF	KEMET/EIA	(See below for part options)	Part Number	µA @ 25°C Maximum	% @ 25°C 120 Hz Maximum	mΩ @ 25°C 100 kHz Maximum	w/ΔT = 20°C @ −55°C to 105°C	°C
Rated Voltage	Rated Capacitance	Case Code/ Case Size	KEMET Part Number	DSCC Drawing Number 04052	DC Leakage	DF	ESR	Maximum Allowable Ripple Current (A) 100 kHz	Maximum Operating Temp

(1) To complete KEMET part number, insert 65 = 4 cycles +25°C, 66 = 10 cycles +25°C, 67 = 10 cycles −55°C and +85°C. Designates surge current option.
(2) To complete DLA part number, Blank = None, A = 10 cycles +25°C ±5°C After Voltage Aging, B = 10 cycles −55°C and +85°C ±5°C After Voltage Aging.
(3) To complete KEMET part number for non-DLA, insert 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	
2.5 V ≤ V_R ≤ 10 V	90% of V_R	V_R	See Chart	67% of V_R
12.5 V ≤ V_R ≤ 63 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.

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)

KEMET Case Code	EIA Case Code	Maximum Power Dissipation (P max) mWatts @ 45°C with +30°C Rise
D	7343-31	255
Y	7343-40	263
X	7443-43	270

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

Reverse Voltage

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

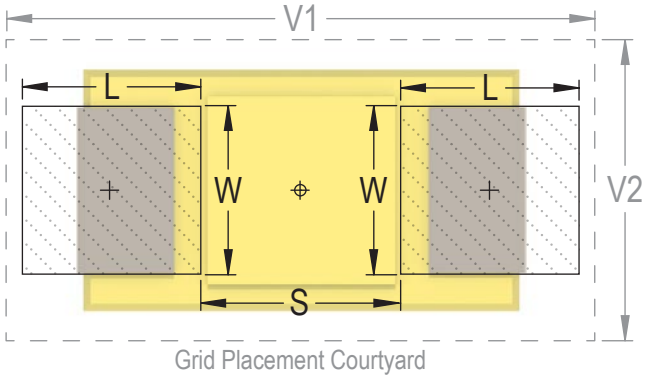
Temperature	Permissible Transient Reverse Voltage
25°C	15% of Rated Voltage
55°C	10% of Rated Voltage
85°C	5% of Rated Voltage
105°C	3% of Rated Voltage
125°C*	1% of Rated Voltage

**For series rated to 125°C*

Table 2 – Land Dimensions/Courtyard

KEMET	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
Case	EIA	W	L	S	V1	V2	W	L	S	V1	V2	W	L	S	V1	V2
D	7343–31	2.55	2.77	3.67	10.22	5.60	2.43	2.37	3.87	9.12	5.10	2.33	1.99	4.03	8.26	4.84
X[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 desity product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC–7351).*
[1] Height of these chips may create problems in wave soldering.
[2] Land pattern geometry is too small for silkscreen outline.



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.

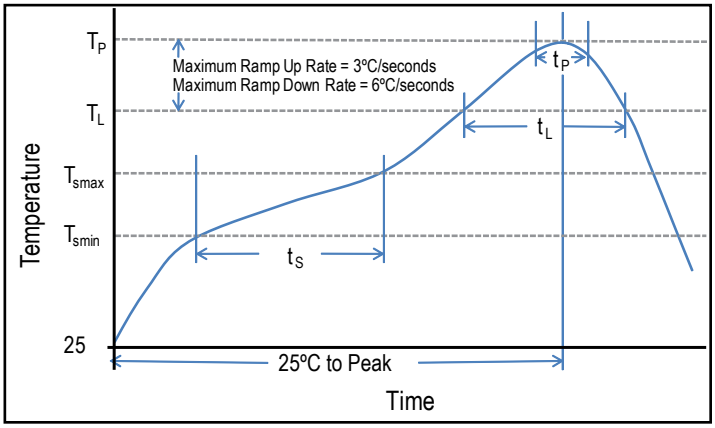
Please note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

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

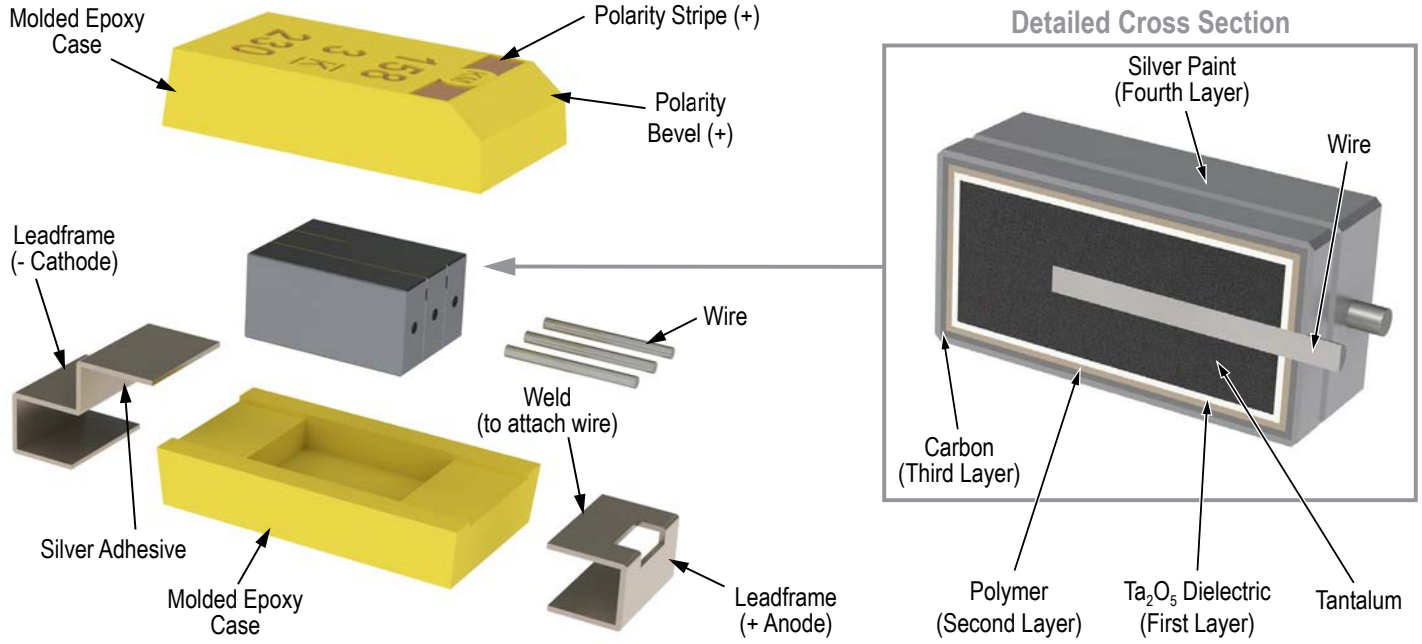
Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.
**Case Size D, E, P, Y, and X*
***Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z*



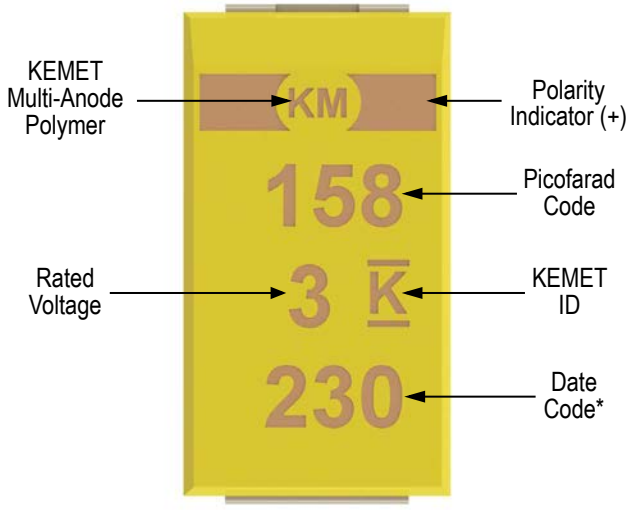
Storage

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

Tape & Reel Packaging Information

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

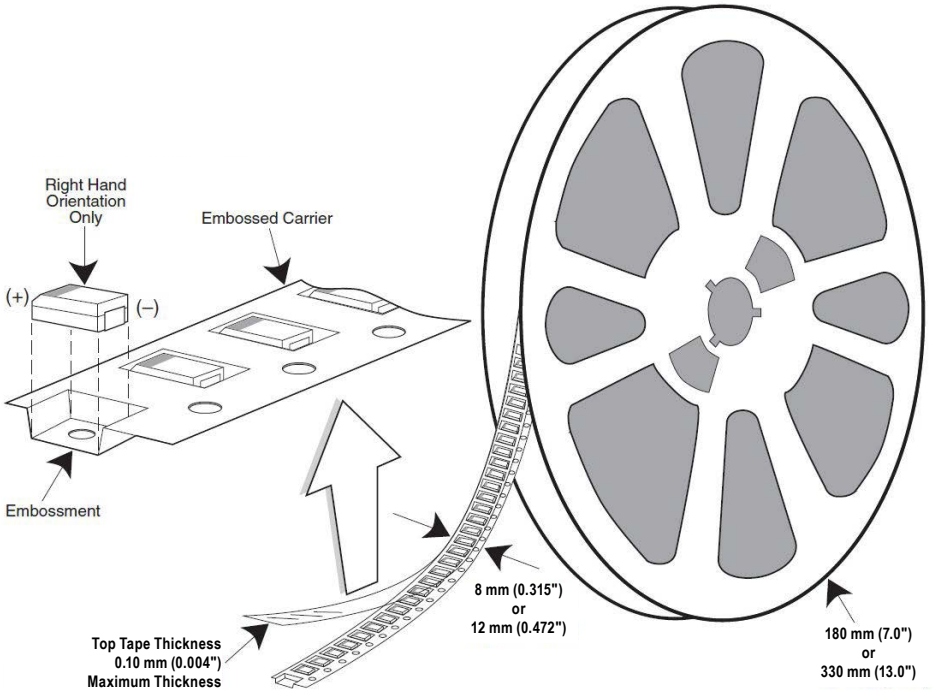


Table 3 – Packaging Quantity

Case Code		Tape Width (mm)	7" Reel*	13" Reel*
KEMET	EIA			
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

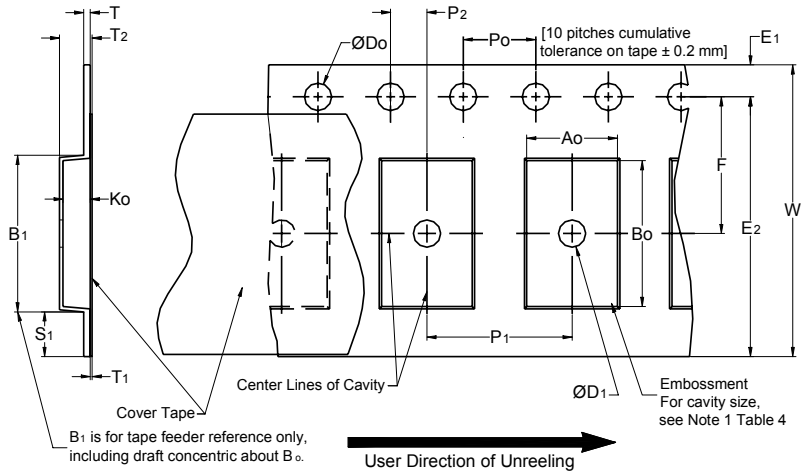


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

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)				30 (1.181)			
16 mm					2.0 ±0.1 (0.079 ±0.059)				

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

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

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

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

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

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

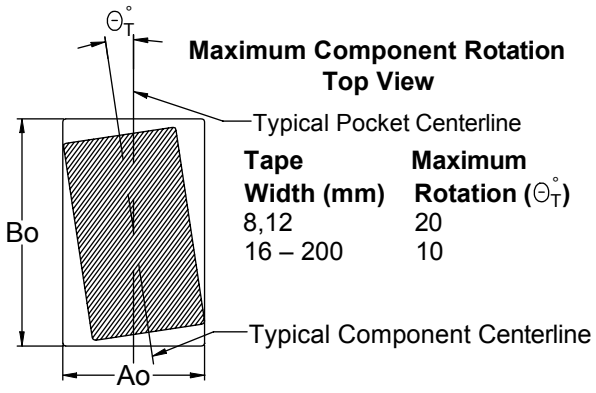
Packaging Information Performance Notes

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



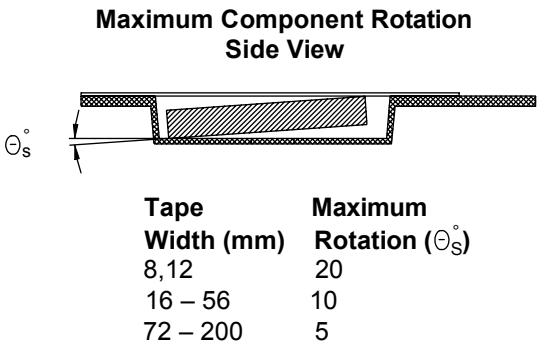


Figure 3 – Maximum Lateral Movement

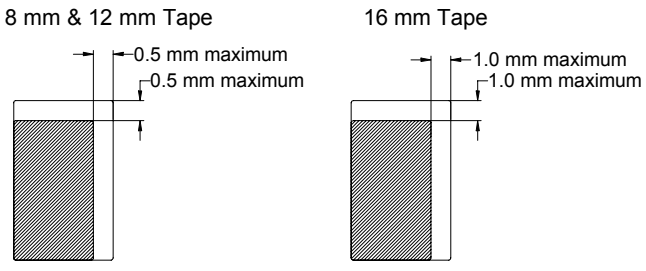


Figure 4 – Bending Radius

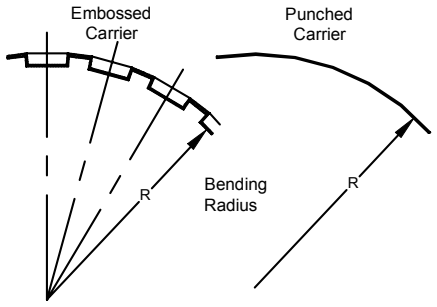
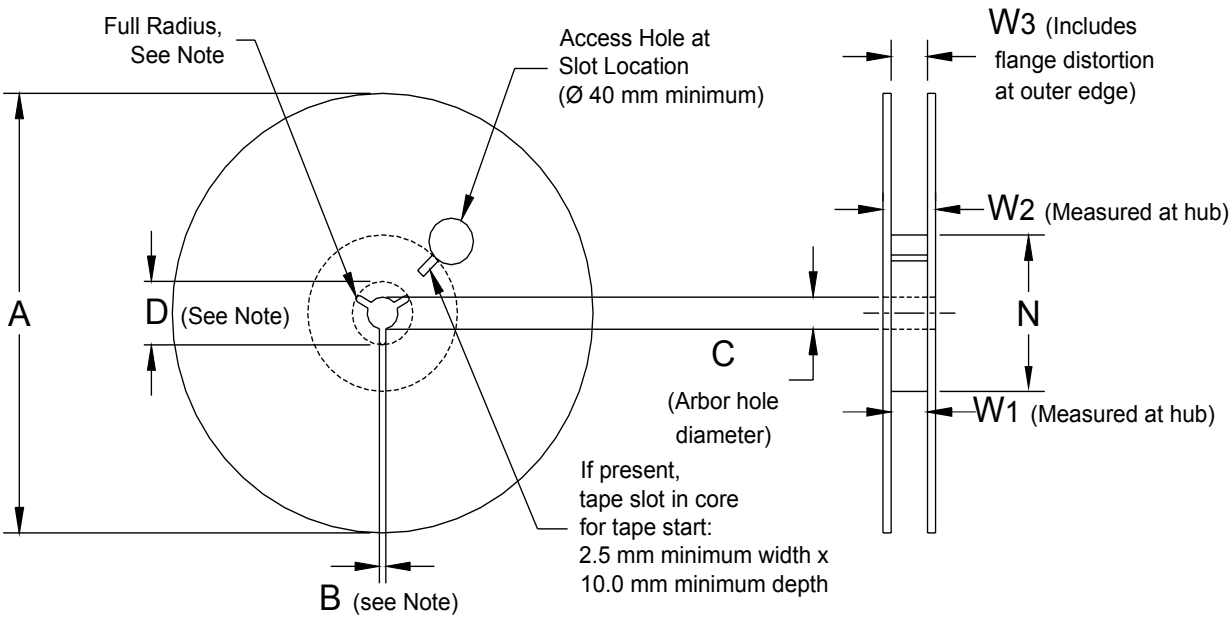


Figure 5 – Reel Dimensions



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

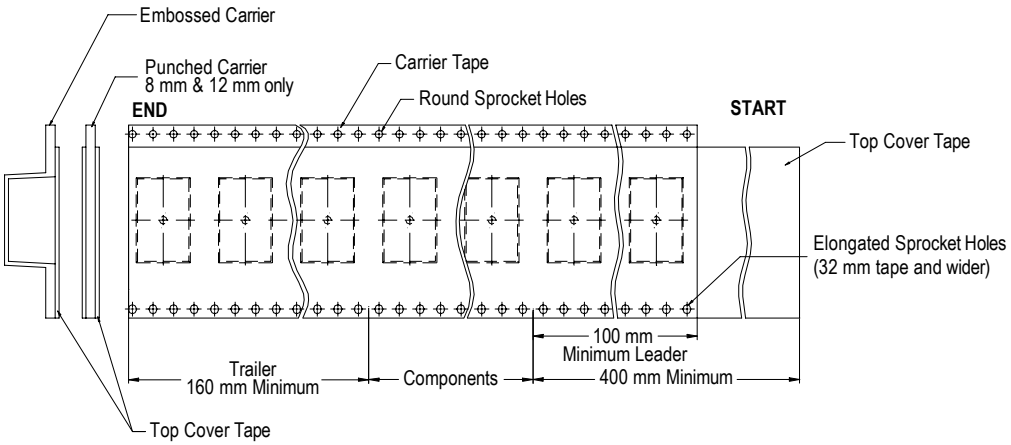
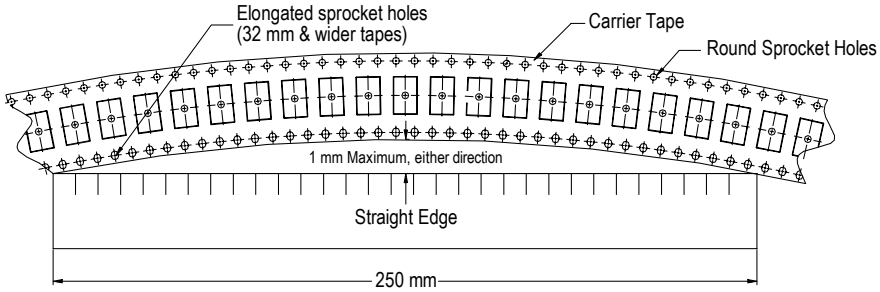


Figure 7 – Maximum Camber



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