T363 & T369 MIL-PRF-49137/2 (CX02 & CX12 Style)

Overview

KEMET's T363 and T369 series of radial dipped capacitors are manufactured to fulfill the requirements of MIL-PRF-49137 style CX02 and CX12, while maintaining all performance characteristics of the UltraDip II capacitors. In addition to the standard UltraDip II process testing, all products supplied to MIL-PRF-49137 are sampled on a lot-by-lot basis for Group A and Group B inspection to ensure compliance and also receives an additional post-process burn-in for at least two hours under accelerated voltage stress in excess of 125% of DC rated voltage. This post-process burn-in is equivalent to 200 hours under rated conditions.

Benefits

- Tape & Reel packaging per EIA Specification RS–468
- Laser-marked case
- Qualified to MIL–PRF–49137
- Capacitance values of 0.1 – 330 µF
- Tolerances of ±10% and ±20%
- Voltage rating of 6 – 50 VDC
- T363 case sizes: A, B, C, D
- T369 case sizes: A, B

Applications

Typical applications include filtering, bypassing, coupling, blocking, and RC timing circuits, or other applications that can benefit from compactness.

T363

T369

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Ordering Information

T	36X	A	105	M	035	A	S	
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Failure Rate	Termination Finish	Packaging
T = Tantalum	363 369	A, B, C, D	First two digits represent significant figures. Third digit specifies number of zeros to follow.	M = ±20% K = ±10%	006 = 6 010 = 10 015 = 15 020 = 20 025 = 25 035 = 35 050 = 50	Not Applicable	S = Standard	Blank = Bulk 7301 = Tape & Reel 7303 = Tape & Reel 7305 = Ammo 7317 = Ammo

Ordering Information – Defense MIL-PRF-49137/2 (CX02 and CX12 Style)

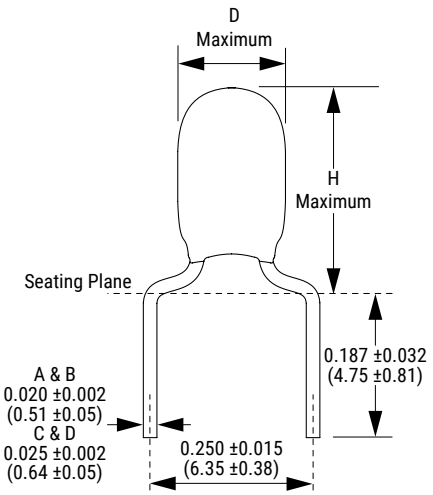
CX	J	225	K
Style	Voltage	Capacitance Code (pF)	Capacitance Tolerance
CX = Capacitors, Fixed, Solid Electrolyte, Tantalum,Polar, Conformal Coated, Nonhermetically Sealed. 02 /12 = Style	D = 6 V F = 10 V H = 15 V J = 20 V K = 25 V M = 35 V N = 50 V	First two digits represent significant figures. Third digit specifies number of zeros to follow.	M = ±20% K = ±10%

Performance Characteristics

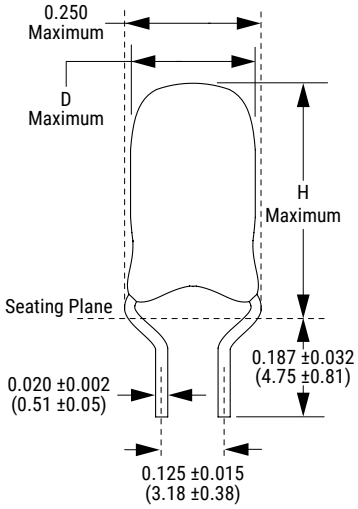
Item	Performance Characteristics
Operating Temperature	−55°C to 125°C
Rated Capacitance Range	0.1 – 330 µF at 120 Hz/25°C
Capacitance Tolerance	M tolerance ±20%, K tolerance ±10%
Rated Voltage Range	6 – 50 V
DF (120 Hz at 25°C)	Refer to Part Number Electrical Specification Table
Leakage Current	Refer to Part Number Electrical Specification Table (rated voltage up to 85°C)

Dimensions – Inches (Millimeters)

T363 (CX02)



T369 (CX12)



KEMET Case Size	Style	MIL Case Size	D Maximum Diameter	H Maximum Height	Lead Size Diameter
A	CX02	A	0.175 (4.45)	0.425 (10.80)	0.020
B		B	0.250 (6.35)	0.500 (12.70)	0.020
C		C	0.350 (8.89)	0.650 (16.51)	0.025
D		D	0.400 (10.16)	0.750 (19.05)	0.025
A	CX12	E	0.175 (4.45)	0.350 (8.89)	0.020
B		F	0.250 (6.35)	0.500 (12.70)	0.020

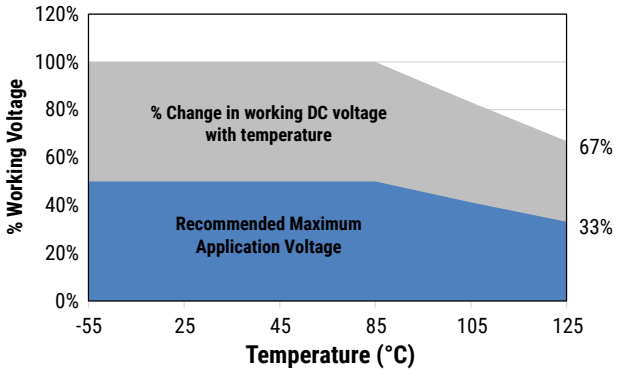
Table 1 - Ratings and Part Number Reference

Rated Voltage	Rated Capacitance	Case Code Case Size	KEMET Part Number	DC Leakage	DF % at 25°C	Military Part Number Per MIL-PRF-49137/2	
						CX02 (T363)	CX12 (T369)
(V) 85°C	µF			µA at 25°C Maximum/5 Minutes	120 Hz Maximum		
6	6.8	A	T36(1)A685(2)006AS	0.5	6.0	CX02D685(2)	CX12D685(2)
6	47.0	B	T36(1)B476(2)006AS	2.3	6.0	CX02D476(2)	CX12D476(2)
6	68.0	B	T36(1)B686(2)006AS	3.3	6.0	CX02D686(2)	CX12D686(2)
6	150.0	C	T363C157(2)006AS	7.2	8.0	CX02D157(2)	
6	330.0	D	T363D337(2)006AS	10.0	8.0	CX02D337(2)	
10	4.7	A	T36(1)A475(2)010AS	0.5	5.0	CX02F475(2)	CX12F475(2)
10	33.0	B	T36(1)B336(2)010AS	2.6	6.0	CX02F336(2)	CX12F336(2)
10	100.0	C	T363C107(2)010AS	8.0	8.0	CX02F107(2)	
10	220.0	D	T363D227(2)010AS	10.0	8.0	CX02F227(2)	
15	3.3	A	T36(1)A335(2)015AS	0.5	5.0	CX02H335(2)	CX12H335(2)
15	22.0	B	T36(1)B226(2)015AS	2.6	6.0	CX02H226(2)	CX12H226(2)
15	68.0	C	T363C686(2)015AS	8.2	6.0	CX02H686(2)	
15	150.0	D	T363D157(2)015AS	10.0	8.0	CX02H157(2)	
20	2.2	A	T36(1)A225(2)020AS	0.5	5.0	CX02J225(2)	CX12J225(2)
20	15.0	B	T36(1)B156(2)020AS	2.4	6.0	CX02J156(2)	CX12J156(2)
20	47.0	C	T363C476(2)020AS	7.5	6.0	CX02J476(2)	
20	100.0	D	T363D107(2)020AS	10.0	8.0	CX02J107(2)	
25	1.5	A	T36(1)A155(2)025AS	0.5	5.0	CX02K155(2)	CX12K155(2)
25	10.0	B	T36(1)B106(2)025AS	2.0	6.0	CX02K106(2)	CX12K106(2)
25	33.0	C	T363C336(2)025AS	6.6	6.0	CX02K336(2)	
25	68.0	D	T363D686(2)025AS	10.0	6.0	CX02K686(2)	
35	6.8	B	T36(1)B685(2)035AS	1.9	5.0	CX02M685(2)	CX12M685(2)
35	22.0	C	T363C226(2)035AS	6.2	6.0	CX02M226(2)	
35	33.0	D	T363D336(2)035AS	9.2	6.0	CX02M336(2)	
35	47.0	D	T363D476(2)035AS	10.0	6.0	CX02M476(2)	
50	0.1	A	T36(1)A104(2)050AS	0.5	3.0	CX02N104(2)	CX12N104(2)
50	0.15	A	T36(1)A154(2)050AS	0.5	3.0	CX02N154(2)	CX12N154(2)
50	0.22	A	T36(1)A224(2)050AS	0.5	3.0	CX02N224(2)	CX12N224(2)
50	0.33	A	T36(1)A334(2)050AS	0.5	3.0	CX02N334(2)	CX12N334(2)
50	0.47	A	T36(1)A474(2)050AS	0.5	3.0	CX02N474(2)	CX12N474(2)
50	0.68	A	T36(1)A684(2)050AS	0.5	3.0	CX02N684(2)	CX12N684(2)
50	1.0	A	T36(1)A105(2)050AS	0.5	3.0	CX02N105(2)	CX12N105(2)
50	1.5	B	T36(1)B155(2)050AS	0.6	5.0	CX02N155(2)	CX12N155(2)
50	2.2	B	T36(1)B225(2)050AS	0.9	5.0	CX02N225(2)	CX12N225(2)
50	3.3	B	T36(1)B335(2)050AS	1.3	5.0	CX02N335(2)	CX12N335(2)
50	4.7	B	T36(1)B475(2)050AS	1.9	5.0	CX02N475(2)	CX12N475(2)
50	6.8	C	T363B685(2)050AS	2.7	5.0	CX02N685(2)	
50	10.0	C	T363C106(2)050AS	4.0	6.0	CX02N106(2)	
50	15.0	C	T363C156(2)050AS	6.0	6.0	CX02N156(2)	
50	22.0	D	T363D226(2)050AS	8.8	6.0	CX02N226(2)	
(V) 85°C	µF	Case Size Code	µA at 25°C Maximum/5 Minutes	120 Hz Maximum	Ω at25°C 100 kHz Max	CX02 (T363)	CX12 (T369)
Rated Voltage	Rated Capacitance		DC Leakage	DF % at 25°C	ESR	Military Part Number Per MIL-PRF-49137/2	

(1) To complete KEMET Part Number, insert Series Designation as follows: "3" - T363 (CX02); "9" - T369 (CX12)
(2) To complete KEMET or military part number, insert M - 20%, K - ±10%. Designates Capacitance tolerance.

Recommended Voltage Derating Guidelines

	−55°C to 85°C	85°C to 125°C
% Change in working DC voltage with temperature	V_R	66% 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 that may be applied is limited by following criteria:

1. Dissipated power must not exceed the limits specified for the Series.
2. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
3. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage.

Thermal capacities for the various case sizes have been determined empirically and are listed below. The "ripple voltage" permissible may be calculated from the impedance and ESR data shown in the respective product section.

Temperature Compensation Multipliers for Maximum Power Dissipation		
T ≤ 25°C	T ≤ 85°C	T ≤ 125°C
1.00	0.90	0.40

T= Environmental Temperature

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

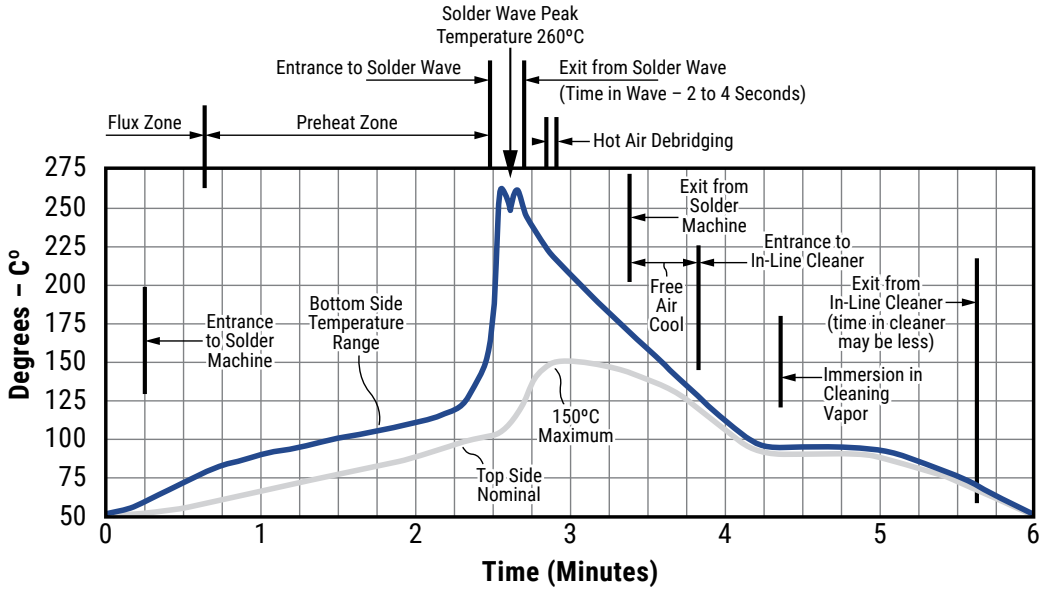
Case Size	Maximum Power Dissipation (Pmax) Watts at 25°C
A	0.050
B	0.075
C	0.090
D	0.135

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)Soldering Process

Optimum Solder Wave Profile



Reverse Voltage

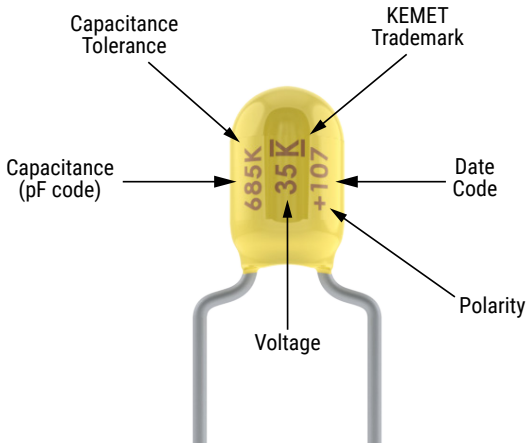
Although these are polar capacitors, some degree of transient voltage reversal is permissible, as seen below. The capacitors should not be operated continuously in reverse mode, even within these limits.

Temperature	Pecentage of Rated Voltage
+25°C	15
+85°C	5
+125°C	1

Mounting

All encased capacitors will pass the Resistance to Soldering Heat Test of MIL–STD–202, Method 210, Condition C. This test simulates wave solder of topside board mount product. This demonstration of resistance to solder heat is in accordance with what is believed to be the industry standard. More severe treatment must be considered reflective of an improper soldering process. The above figure is a recommended solder wave profile for both axial and radial leaded solid tantalum capacitors.Table 2 – Performance & Reliability: Test Methods and Conditions

Capacitor Marking



Storage

Tantalum molded radial/axial capacitors should be stored in normal working environments. KEMET recommends that maximum storage temperature not exceed 40°C and maximum storage humidity not exceed 60°C RH. Storage at high temperature may cause a small, temporary increase in leakage current (measured under standard conditions), but the original value is usually restored within a few minutes after application of rated voltage. Storage at high humidity may increase capacitance and dissipation factor. Solderability will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. For optimized solderability capacitors stock should be used promptly, preferably within three years of receipt.

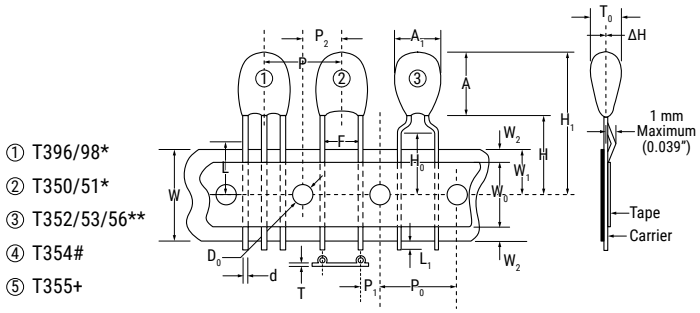
Tape & Reel Packaging Information

Table 2 – Packaging Quantity

Case Size	Standard Bulk Quantity	Standard Reel Quantity	Reel C-Spec	Ammo Pack Quantity
A	1,000	1,500	C-7301/7303	2,500
B	1,000	1,500		2,000
C	500	500		800
D	500	500	Pending	800

T363 A - D cases.
T369 A and B cases only.

Figure 1



Dimension	Symbol	Nominal mm (inch)		Tolerance mm (inch)	
Body Height (1)	A	17.0 (0.67)		Maximum	
Body Width (1)	A_1	15.24 (0.600)		Maximum	
Sprocket Hole Diameter	D_0	4.0 (0.157)		±0.3 (±0.012)	
Lead Diameter	d	0.51 (0.020)	0.64 (0.025)	±0.05 (±0.002)	
Lead Center (4)	F	See Note Below			
Component Base to Tape Center (4)	H	C-7301 16.0 (0.630)	C-7303 18.0 (0.709)	C-7301 ±0.5 (±0.02)	C-7303 Minimum
Lead Standoff Height	H_0	C-7301 16.0 (0.630)	C-7303 18.0 (0.709)	C-7301 ±0.5 (±0.02)	C-7303 Minimum
Component Height Above Tape Center	H_1	32.25 (1.270)		Maximum	
Component Alignment Front to Rear	ΔH	0		1.0 (0.039)	
Cut Out Length	L	11.0 (0.433)		Maximum	
Lead Protrusion	L_1	1.0 (0.039)		Maximum	
Component Pitch (5)	P	12.7 (0.500)		±1.0 (±0.039)	
Sprocket Hole Pitch (2)	P_0	12.7 (0.500)		±0.03 (±0.012)	
Sprocket Hole Center to Lead Center (3) (4)	P_1	See Note Below		±0.7 (±0.028)	
Sprocket Hole Center to Component Center (5)	P_2	See Note Below			
Body Thickness	T_0	10.2 (0.400)		Maximum	
Total Tape Thickness	T	0.7 (0.28)		±0.02 (±0.008)	
Carrier Tape Width	W	18.0 (0.709)		+1.0/−0.5 (+0.039/−0.020)	
Hold-Down Tape Width	W_0	15 mm (0.561)	6 mm (0.236)	+1.0/−0.8 (+0.039/−0.031	
Sprocket Hole Location	W_1	9.0 (0.354)		+0.075/−0.5 (+0.030/−0.020)	
Hold-Down Tape Location	W_2	12.0 (0.472)		Maximum	

Notes:

(1) See Dimensions table for specific values per case size.
(2) Cumulative pitch error ±1.0 mm (0.039) maximum in 20 consecutive sprocket hole locations.
(3) Measured at bottom of standoff.
(4) P_1 and F measured at egress from carrier tape.
(5) P and P2 measured at egress from carrier tape.

** Lead spacings are 2.5 mm (0.098") center to center (T350 A-H)*
*** Lead spacings are 5.0 mm (0.197") center to center*
 # Lead spacings are 6.35 mm (0.25") center to center
+ Lead spacings are 3.18 mm (0.125") center to center

F Dimensions:	P_1 Dimensions:
0.100" ±0.015	Lead Spacing
0.125" ±0.015	0.100" – 0.200 ±0.028"
0.200" ±0.015	0.125" – 0.187 ±0.028"
0.250" ±0.015"	0.200" – 0.150 ±0.028"
0.100" ±0.015 (3 leaded)	0.250" – 0.125 ±0.028"
	0.100" – 0.100 ±0.028" (3 leaded)

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