



# Tantalum Leaded Capacitors

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The Capacitance Company

# **KEMET**

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**Tantalum Hermetically Sealed/Axial Capacitors**

Military Ordering Information	4
Military Marking Information	4
Military Approval Levels	5
Performance Characteristics	5
T110/T212 (CSR13) MIL-PRF-39003/1 Series	
Outline Drawing	6
Dimensions	6
Ordering & T110 Marking Information	6
Ratings and Part Number Reference	7-19
T111/T213 (CSR91) MIL-PRF-39003/4 Series	
Outline Drawing	20
Dimensions	20
Ordering & T111 Marking Information	20
Ratings and Part Number Reference	20-23
T222 (CSR09) MIL-PRF-39003/2 Series	
Outline Drawing	24
Dimensions	24
Ordering & Military Marking Information	24
Ratings and Part Number Reference	25-26
T140/T242 (CSR23) MIL-PRF-39003/3 Series	
Outline Drawing	27
Dimensions	27
T140 Marking Information	27
Ratings and Part Number Reference	27-30
T252 (CSR33) MIL-PRF-39003/6 Series	
Outline Drawing	31
Dimensions	31
Ordering Information	31
Ratings and Part Number Reference	32-33
T262 (CSR21) MIL-PRF-39003/9 Series	
Outline Drawing	34
Dimensions	34
Ordering Information	34
Ratings and Part Number Reference	35-36
T216 (CSS13) & T256 (CSS33) MIL-PRF-39003/10 Series	
Outline Drawing	37
Dimensions	37
Ordering Information	37
Military Ordering Information	38
Marking Information	38
Ratings and Part Number Reference	38-41

**Tantalum Molded Axial/Radial Capacitors**

T322/T323 (CX01 & CX05) MIL-PRF-49137/1 & 5 Series — Axial	
Performance Characteristics	42
Outline Drawing	43
Dimensions	43
Ordering Information	43
Ratings and Part Number Reference	44-48

T330 & T340 Series — Radial	
Performance Characteristics	49
T330 Outline Drawing	50
T330 Dimensions	50
T330 Ordering Information	50
T330 Marking Information	50
T330 Ratings and Part Number Reference	51-52
T340 Outline Drawing	53
T340 Dimensions	53
T340 Ordering Information	53
T340 Marking Information	54
T340 Ratings and Part Number Reference	55-57

T370/T378 (CX06) MIL-PRF-49137/6 Series — Radial	
Performance Characteristics	58
Outline Drawing	59
Dimensions	59
Marking Information	59
Ordering Information	59
Ratings and Part Number Reference	60

**Tantalum Dipped Radial Capacitors**

Performance Characteristics	61
T35X Series	
Outline Drawing	62
Dimensions	62
Lead Configuration	62
Ordering Information	63
Marking Information	63
Ratings and Part Number Reference	63-65
T363 (CX02) & T369 (CX12) MIL-PRF-49137/2 Series	
Outline Drawing	66
Dimensions	66
Marking Information	66
Ordering Information	66
Ratings and Part Number Reference	67
T368 Series	
Outline Drawing	68
Dimensions	68
Ratings and Part Number Reference	68
T396 & T398 Series	
Outline Drawing	69
Dimensions	69
Ordering Information	69
Ratings and Part Number Reference	70

**Tantalum Axial Tape & Reel Packaging Information** 71

**Tantalum Radial Tape & Reel Packaging Information** 72

**Tantalum Leaded Packaging Quantities** 73-74

**Application Notes for Solid Tantalum Capacitors** 75-83

**IMPORTANT NOTICE**

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Finally, KEMET Electronics Corporation does not assume any responsibility for the correctness of the information contained in this catalog. All design characteristics, specifications, tolerances, and the like are subject to change without notice.

**ORDERING INFORMATION (OBSOLETE\*)**

**TYPE** \_\_\_\_\_  
 Capacitors, Fixed, Solid Electrolyte, Tantalum  
 Established Reliability

**STYLE** \_\_\_\_\_  
 Tubular Case — Always Sleeved

09 — Miniature — T222  
 13 — Standard — T212  
 21 — Standard, low ESR — T262  
 23 — Extended Range — T242  
 33 — Extended Range, Low Leakage — T252  
 91 — Non-Polar — T213

**VOLTAGE** \_\_\_\_\_

**CSR XX B 565 K M**

**FAILURE RATE LEVEL  
 IN % PER 1000 HOURS  
 GRADED EXPONENTIAL**

A — Not Applicable M — 1%/k hrs.  
 B — 0.1%/k hrs. P — 0.1%/k hrs.  
 C — 0.01%/k hrs. R — 0.01%/k hrs.  
 D — 0.001%/k hrs. S — 0.001%/k hrs.

**CAPACITANCE  
 TOLERANCE**

J — ± 5%  
 K — ± 10%  
 M — ± 20%

**CAPACITANCE**  
 Expressed in picofarads (1 microfarad = 1,000,000 picofarads). First two digits represent significant figures. Last digit specifies the number of zeros to follow.

Symbol	VDC Working		VDC Surge	
	85°C	125°C	85°C	125°C
B	6	4	8	5
C	10	7	13	9
D	15	10	20	12
E	20	13	26	16
F	35	23	46	28
G	50	33	65	40
H	75	50	98	64
J	100	67	130	86

**Examples**

565 — 5,600,000 = 5.60 µF    563 — 56,000 = .056 µF  
 564 — 560,000 = .56 µF

\* This Military Part Numbering System is obsolete in accordance with the current specifications. The correct current designation for a CSR part number is the MIL Specification Number, followed by the Specification (slash) Sheet Number and Dash Number (i.e. — MIL-PRF-39003/01-2270). However, the part number breakdown shown above is still widely used and is shown for reference.

**MILITARY CAPACITOR APPROVED FAILURE RATE LEVELS AND MARKINGS PER MIL-PRF-39003 FOR CSR09 (T222 A & B CASE SIZES ONLY), CSR13 (T212), CSR21 (T262), CSR23 (T242) & CSR33 (T252) CAPACITORS**

**KEMET APPROVED FAILURE RATE LEVELS — MIL-PRF-39003/H (EXPONENTIAL)**

STYLE	DESCRIPTION	KEMET SERIES	APPROVED FAILURE RATE LEVEL
CSR09	Polar-Subminiature	T222	S (0.001%/k hrs.)
CSR13	Polar-Standard MIL Range	T212	S (0.001%/k hrs.)
CSR21	Polar-Standard Low ESR MIL Range	T262	S (0.001%/k hrs.)
CSR23	Polar-Extended Range	T242	S (0.001%/k hrs.)

STYLE	DESCRIPTION	KEMET SERIES	APPROVED FAILURE RATE LEVEL
CSR33	Polar-Extended Range Low Leakage	T252	S (0.001%/k hrs.)
CSR91	Non-Polar	T213	S (0.001%/k hrs.)

**MILITARY MARKING**

**A CASE**

39003	Military specification number
01 - K	Specification sheet number and trademark
9002J	Military dash number and "J" for JAN
+333	Polarity, date code (1st digit indicates year and the next two digits indicate the week)
XY	Lot symbol

**C & D CASES**

M39003	Military specification number
01 - 8222J	Specification sheet number, Military dash number, and "J" for JAN
+8.2 µF	Positive terminal identifier and capacitance value
10% 50V	Capacitance tolerance and voltage
31433	Source code
0333 XY K	Date code, lot code, and trademark

**B CASE**

M39003	Military specification number
01 -	Specification sheet number
8006J	Military dash number and "J" for JAN
31433	Source code
+333 XY	Polarity, date code (1st digit indicates year and the next two digits indicate the week), lot symbol

**CSR91 (T213) CAPACITORS**

**A, B, C & D CASES**

M39003	Military specification number
04 - 0980J	Specification sheet number, Military dash number, and "J" for JAN
1 µF	Capacitance value
10% 20VNP	Capacitance tolerance and voltage rating
0333 XY 31433	Date code, lot code, and source code

(See page 38 for CSS Marking)

**KEMET APPROVED FAILURE RATE LEVELS — MIL-PRF-39003/H (GRADED)**

STYLE	DESCRIPTION	KEMET SERIES	APPROVED FAILURE RATE LEVEL*
CSR09	Polar-Subminiature	T222	D (0.001%/k hrs.)
CSR13*	Polar-Standard MIL Case	T212	D (0.001%/k hrs.)
CSS13**	Polar-Standard MIL Case	T216	C (0.01%/k hrs.)
CSR21	Polar-Standard Low ESR MIL Case	T262	D (0.001%/k hrs.)
CSR23*	Polar-Extended Range	T242	D (0.001%/k hrs.)

\*Not approved to 'D' Failure Rate Level on all voltages and capacitance values.

\*\*MIL-PRF-39003/10 for space applications.

STYLE	DESCRIPTION	KEMET SERIES	APPROVED FAILURE RATE LEVEL*
CSR33*	Polar-Extended Range Low Leakage	T252	D (0.001%/k hrs.)
CSS33**	Polar-Extended Range Low Leakage	T256	C (0.01%/k hrs.)
CSR91*	Non-Polar	T213	D (0.001%/k hrs.)

\*Not approved to 'D' Failure Rate Level on all voltages and capacitance values.

\*\*MIL-PRF-39003/10 for space applications.

Tantalum Hermetically Sealed

**PERFORMANCE CHARACTERISTICS**

- **CAPACITANCE/VOLTAGE RANGE:** .0023-1200µF, 6-125 Volts.
- **CAPACITANCE TOLERANCE:** Available in standard EIA values with ±20%, ±10% and ±5% tolerances.
- **DISSIPATION FACTOR:** Maximum DF limits are shown in corresponding series part number listings on pages 7-41. See Application Notes Section, page 76 for additional description.
- **DC LEAKAGE CURRENT:** Each corresponding part number table lists maximum leakage current for each capacitor on pages 7-41. See Application Notes Section, page 76 for additional description.
- **RATED VOLTAGE; WORKING VOLTAGE; SURGE VOLTAGE; REVERSE VOLTAGE:** See Application Notes Section, Pages 76 & 77 for description.
- **IMPEDANCE and ESR:** See Application Notes Section, pages 77 & 78 for description. Reference ESR values are shown for commercial hermetically sealed capacitors on page 19.

- **AC RIPPLE VOLTAGE:** Permissible AC ripple voltage is related to the ESR of the capacitor and the power dissipation capabilities of a particular case size. Thermal capacities for the various case sizes have been determined empirically and are listed below. For additional description see page 78.

Standard Case Size	Watts	T222
A	.09	.070
B	.100	.090
C	.125	—
D	.180	—

Maximum Power Dissipation: 25°C Ambient

- **ENVIRONMENTAL CONSIDERATIONS:**
  - Shock Test: MIL-STD-202, Method 213
  - Thermal Shock, MIL-STD-202, Method 107, Condition B.
  - Moisture Resistance: MIL-STD-202, Method 106.
  - Solderability: MIL-STD-202, Method 208

For additional Environmental Test Information see pages 80, 81 and 82.

- **LEAD MATERIAL:** Standard leads are solder-coated nickel per MIL-STD-1276.
- **INSULATING SLEEVES:** The standard insulating material used in transparent high temperature plastic, having 2000 volt dielectric strength, excellent dimensional stability and chemical and cold flow resistance.
- **LEAD TAPE and REEL:** Reeling per specification RS-296. See pages 71 and 73 for additional information.

KEMET standard hermetic sealed T110 Series are desirable for use in high humidity environments. They are ruggedly built, designed for miniaturized circuitry, and are especially suited for coupling, bypass, filtering and R-C timing circuits. They exhibit excellent stability, extremely low DC leakage current, dissipation factor, and ESR/impedance over a wide temperature and frequency range.

Available in standard EIA capacitance values from .0047-330  $\mu$ F in  $\pm 20\%$ ,  $\pm 10\%$ , and  $\pm 5\%$  tolerances and working voltages from 6-125 VDC.

Higher CV values in comparable case sizes are available in KEMET T140 Series. Refer to page 27.

Included in the following Series table is a complete listing of CSR13 qualified MIL-PRF-39003 capacitors. KEMET is approved to manufacture the S (0.001%/k hrs.) Exponential & D (0.001%/k hrs.) Graded failure rate levels.

KEMET is now offering low ESR limits in the T110 Series. See ESR chart on page 19. You may order the lower ESR by using Customer Specification 2864 as the last four digits of the part number.

**Effective September 30, 2005, the KEMET T110 Series is RoHS Compliant.**

### CAPACITOR OUTLINE DRAWINGS



### DIMENSIONS — INCHES & (MILLIMETERS)

CASE SIZE	UNINSULATED		INSULATED		B $\pm 0.002$ (.05)	C MAX.
	D $\pm 0.005$ (.13)	L $\pm 0.031$ (.79)	D $\pm 0.010$ (.25)	L $\pm 0.031$ (.79)		
A	0.125 (3.18)	0.250 (6.35)	0.135 (3.43)	0.286 (7.26)	0.020 (.51)	0.422 (10.72)
B	0.175 (4.45)	0.438 (11.13)	0.185 (4.70)	0.474 (12.04)	0.020 (.51)	0.610 (15.49)
C	0.279 (7.09)	0.650 (16.51)	0.289 (7.34)	0.686 (17.42)	0.025 (.64)	0.822 (20.88)
D	0.341 (8.66)	0.750 (19.05)	0.351 (8.92)	0.786 (19.96)	0.025 (.64)	0.922 (23.42)

### ORDERING INFORMATION\*



### MARKING INFORMATION

Marking: Unless otherwise specified by special order, standard marking of T110 Series capacitor consists of the following:

#### A, B, C & D CASES

+K 10%	— Polarity, Manufacturer's Identification and Capacitance Tol.
R56 $\mu$ F	— Nominal Capacitance — ( $\mu$ F) ("R" indicates decimal)
100V	— Voltage
0312	— Date Code (e.g.: 0312)

\* For Military Marking, see page 4.

















**RATINGS & PART NUMBER REFERENCE**

CAPACITANCE μF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T110			MIL-PRF-39003 (CSR13) CAPACITORS								KEMET EQUIVALENT MILITARY PART NUMBER
			KEMET PART NUMBER	D.C. LEAKAGE μA@25°C MAX.	MAX. DISSIPATION FACTOR %@25°C, 120Hz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)								
						MIL-PRF-39003/1H EXPONENTIAL				MIL-PRF-39003/1H GRADED				
						M (1.0)	P (0.1)	R (0.01)	S (0.001)	B (0.1)	C (0.01)	D (0.001)		
<b>50 VOLT RATING AT 85°C — 33 VOLT RATING AT 125°C (Cont'd)</b>														
18.0	C	10	T110C186K050AS	4.5	4	2379	2619	2859	3099	6232	7232	8232	T212C186K050(2)S	
18.0	C	20	T110C186M050AS	4.5	4									
<b>22.0</b>	<b>D</b>	<b>5</b>	<b>T110D226J050AS</b>	<b>5.5</b>	<b>4</b>	<b>5094</b>	<b>5294</b>	<b>5494</b>	<b>5694</b>	<b>6233</b>	<b>7233</b>	<b>8233</b>	<b>T212D226J050(2)S</b>	
<b>22.0</b>	<b>D</b>	<b>10</b>	<b>T110D226K050AS</b>	<b>5.5</b>	<b>4</b>	<b>2380</b>	<b>2620</b>	<b>2860</b>	<b>3100</b>	<b>6234</b>	<b>7234</b>	<b>8234</b>	<b>T212D226K050(2)S</b>	
<b>22.0</b>	<b>D</b>	<b>20</b>	<b>T110D226M050AS</b>	<b>5.5</b>	<b>4</b>	<b>2381</b>	<b>2621</b>	<b>2861</b>	<b>3101</b>	<b>6235</b>	<b>7235</b>	<b>8235</b>	<b>T212D226M050(2)S</b>	
<b>60 VOLT RATING AT 85°C — 40 VOLT RATING AT 125°C</b>														
0.0047	A	5,10,20	T110A472(1)060AS	0.3	3									
0.0056	A	5,10,20	T110A562(1)060AS	0.3	3									
0.0068	A	5,10,20	T110A682(1)060AS	0.3	3									
0.0082	A	5,10,20	T110A822(1)060AS	0.3	3									
0.01	A	5,10,20	T110A103(1)060AS	0.3	3									
0.012	A	5,10,20	T110A123(1)060AS	0.3	3									
0.015	A	5,10,20	T110A153(1)060AS	0.3	3									
0.018	A	5,10,20	T110A183(1)060AS	0.3	3									
0.022	A	5,10,20	T110A223(1)060AS	0.3	3									
0.027	A	5,10,20	T110A273(1)060AS	0.3	3									
0.033	A	5,10,20	T110A333(1)060AS	0.3	3									
0.039	A	5,10,20	T110A393(1)060AS	0.3	3									
0.047	A	5,10,20	T110A473(1)060AS	0.3	3									
0.056	A	5,10,20	T110A563(1)060AS	0.3	3									
0.068	A	5,10,20	T110A683(1)060AS	0.3	3									
0.082	A	5,10,20	T110A823(1)060AS	0.3	3									
0.1	A	5,10,20	T110A104(1)060AS	0.5	3									
0.12	A	5,10,20	T110A124(1)060AS	0.5	3									
0.15	A	5,10,20	T110A154(1)060AS	0.5	3									
0.18	A	5,10,20	T110A184(1)060AS	0.5	3									
0.22	A	5,10,20	T110A224(1)060AS	0.5	3									
0.27	A	5,10,20	T110A274(1)060AS	0.5	3									
0.33	A	5,10,20	T110A334(1)060AS	0.5	3									
0.39	A	5,10,20	T110A394(1)060AS	0.5	3									
0.47	A	5,10,20	T110A474(1)060AS	0.5	3									
0.56	A	5,10,20	T110A564(1)060AS	0.5	3									
0.68	A	5,10,20	T110A684(1)060AS	0.5	3									
0.82	B	5,10,20	T110B824(1)060AS	0.5	3									
1.0	B	5,10,20	T110B105(1)060AS	0.5	3									
1.2	B	5,10,20	T110B125(1)060AS	0.5	4									
1.5	B	5,10,20	T110B155(1)060AS	0.5	4									
1.8	B	5,10,20	T110B185(1)060AS	0.5	4									
2.2	B	5,10,20	T110B225(1)060AS	1.0	4									
2.7	B	5,10,20	T110B275(1)060AS	1.0	4									
3.3	B	5,10,20	T110B335(1)060AS	1.5	4									
3.9	B	5,10,20	T110B395(1)060AS	1.5	4									
4.7	C	5,10,20	T110C475(1)060AS	2.0	4									
5.6	C	5,10,20	T110C565(1)060AS	2.0	4									
6.8	C	5,10,20	T110C685(1)060AS	3.0	4									
8.2	C	5,10,20	T110C825(1)060AS	4.0	4									
10.0	C	5,10,20	T110C106(1)060AS	5.0	4									
12.0	C	5,10,20	T110C126(1)060AS	5.0	4									
15.0	D	5,10,20	T110D156(1)060AS	4.0	4									
18.0	D	5,10,20	T110D186(1)060AS	5.0	4									
22.0	D	5,10,20	T110D226(1)060AS	6.0	4									
<b>75 VOLT RATING AT 85°C — 50 VOLT RATING AT 125°C</b>														
0.0047	A	5,10,20	T110A472(1)075AS	0.3	2									
0.0056	A	5,10,20	T110A562(1)075AS	0.3	2									
0.0068	A	5,10,20	T110A682(1)075AS	0.3	2									
0.0082	A	5,10,20	T110A822(1)075AS	0.3	2									
0.01	A	5,10,20	T110A103(1)075AS	0.3	2									

(1) To complete T110 Series part number, insert Capacitance Tolerance Symbol in the 9th Character as shown on Page 6.

(2) To complete the T212 Series Part Number, insert Failure Rate Symbol in the 13th Character.

**Bold Face** lines indicate popular part types and values.











**TANTALUM HERMETICALLY SEALED / AXIAL — MIL-PRF-39003**  
**T110 SERIES — POLAR TYPE & T212 (CSR13)**

**RATINGS & PART NUMBER REFERENCE**

CAPACITANCE μF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T110			MIL-PRF-39003 (CSR13) CAPACITORS								KEMET EQUIVALENT MILITARY PART NUMBER
			KEMET PART NUMBER	D.C. LEAKAGE μA@25°C MAX.	MAX. DISSIPATION FACTOR %@25°C, 120Hz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)								
						MIL-PRF-39003/1H EXPONENTIAL				MIL-PRF-39003/1H GRADED				
						M (1.0)	P (0.1)	R (0.01)	S (0.001)	B (0.1)	C (0.01)	D (0.001)		
<b>100 VOLT RATING AT 85°C — 67 VOLT RATING AT 125°C (Cont'd)</b>														
1.2	B	5	T110B125J100AS	0.5	3	5151	5351	5551	5751	6377	7377	*	T212B125J100(2)S	
1.2	B	10	T110B125K100AS	0.5	3	2467	2707	2947	3187	6378	7378	*	T212B125K100(2)S	
1.2	B	20	T110B125M100AS	0.5	3									
1.5	B	5	T110B155J100AS	0.7	3	5152	5352	5552	5752	6379	7379	*	T212B155J100(2)S	
1.5	B	10	T110B155K100AS	0.7	3	2468	2708	2948	3188	6380	7380	*	T212B155K100(2)S	
1.5	B	20	T110B155M100AS	0.7	3	2469	2709	2949	3189	6381	7381	*	T212B155M100(2)S	
1.8	B	5	T110B185J100AS	0.7	3	5153	5353	5553	5753	6382	7382	*	T212B185J100(2)S	
1.8	B	10	T110B185K100AS	0.7	3	2470	2710	2950	3190	6383	7383	*	T212B185K100(2)S	
1.8	B	20	T110B185M100AS	0.7	3									
2.2	B	5	T110B225J100AS	0.9	3	5154	5354	5554	5754	6384	7384	*	T212B225J100(2)S	
2.2	B	10	T110B225K100AS	0.9	3	2471	2711	2951	3191	6385	7385	*	T212B225K100(2)S	
2.2	B	20	T110B225M100AS	0.9	3	2472	2712	2952	3192	6386	7386	*	T212B225M100(2)S	
2.7	B	5	T110B275J100AS	1.1	3	5155	5355	5555	5755	6387	7387	*	T212B275J100(2)S	
2.7	B	10	T110B275K100AS	1.1	3	2473	2713	2953	3193	6388	7388	*	T212B275K100(2)S	
2.7	B	20	T110B275M100AS	1.1	3									
3.3	C	5	T110C335J100AS	1.5	3	5156	5356	5556	5756	6389	*	*	T212C335J100(2)S	
3.3	C	10	T110C335K100AS	1.5	3	5157	5357	5557	5757	6390	*	*	T212C335K100(2)S	
3.3	C	20	T110C335M100AS	1.5	3	5158	5358	5558	5758	6391	*	*	T212C335M100(2)S	
3.9	C	5	T110C395J100AS	1.5	3	5159	5359	5559	5759	6392	*	*	T212C395J100(2)S	
3.9	C	10	T110C395K100AS	1.5	3	5160	5360	5560	5760	6393	*	*	T212C395K100(2)S	
4.7	C	5	T110C475J100AS	2.5	3	5161	5361	5561	5761	6394	*	*	T212C475J100(2)S	
4.7	C	10	T110C475K100AS	2.5	3	5162	5362	5562	5762	6395	*	*	T212C475K100(2)S	
4.7	C	20	T110C475M100AS	2.5	3	5163	5363	5563	5763	6396	*	*	T212C475M100(2)S	
5.6	C	5	T110C565J100AS	2.5	3	5164	5364	5564	5764	6397	*	*	T212C565J100(2)S	
5.6	C	10	T110C565K100AS	2.5	3	5165	5365	5565	5765	6398	*	*	T212C565K100(2)S	
6.8	C	5	T110C685J100AS	2.5	3	5166	5366	5566	5766	6399	*	*	T212C685J100(2)S	
6.8	C	10	T110C685K100AS	2.5	3	5167	5367	5567	5767	6400	*	*	T212C685K100(2)S	
6.8	C	20	T110C685M100AS	2.5	3	5168	5368	5568	5768	6401	*	*	T212C685M100(2)S	
8.2	D	5,10,20	T110D825(1)100AS	5.0	3									
10.0	D	5,10,20	T110D106(1)100AS	5.0	3									
<b>125 VOLT RATING AT 85°C — 82 VOLT RATING AT 125°</b>														
0.0047	A	5,10,20	T110A472(1)125AS	0.5	3									
0.0056	A	5,10,20	T110A562(1)125AS	0.5	3									
0.0068	A	5,10,20	T110A682(1)125AS	0.5	3									
0.0082	A	5,10,20	T110A822(1)125AS	0.5	3									
0.01	A	5,10,20	T110A103(1)125AS	0.5	3									
0.012	A	5,10,20	T110A123(1)125AS	0.5	3									
0.015	A	5,10,20	T110A153(1)125AS	0.5	3									
0.018	A	5,10,20	T110A183(1)125AS	0.5	3									
0.022	A	5,10,20	T110A223(1)125AS	0.5	3									
0.027	A	5,10,20	T110A273(1)125AS	0.5	3									
0.033	A	5,10,20	T110A333(1)125AS	0.5	3									
0.039	A	5,10,20	T110A393(1)125AS	1.5	3									
0.047	A	5,10,20	T110A473(1)125AS	1.5	3									
0.056	A	5,10,20	T110A563(1)125AS	1.5	3									
0.068	A	5,10,20	T110A683(1)125AS	1.5	3									
0.082	A	5,10,20	T110A823(1)125AS	1.5	3									
0.1	A	5,10,20	T110A104(1)125AS	1.5	3									
0.12	A	5,10,20	T110A124(1)125AS	1.5	3									
0.15	A	5,10,20	T110A154(1)125AS	1.5	3									
0.18	A	5,10,20	T110A184(1)125AS	1.5	3									
0.22	A	5,10,20	T110A224(1)125AS	1.5	3									
0.27	A	5,10,20	T110A274(1)125AS	1.5	3									
0.33	A	5,10,20	T110A334(1)125AS	1.5	3									
0.39	B	5,10,20	T110B394(1)125AS	1.5	3									
0.47	B	5,10,20	T110B474(1)125AS	1.5	3									
0.56	B	5,10,20	T110B564(1)125AS	1.5	3									
0.68	B	5,10,20	T110B684(1)125AS	1.5	3									
0.82	B	5,10,20	T110B824(1)125AS	1.5	3									

(1) To complete T110 Series Part Number, insert Capacitance Tolerance Symbol in the 9th Character as shown on Page 6.

(2) To complete the T212 Series Part Number, insert Failure Rate Symbol in the 13th Character.

**Bold Face** lines indicate popular part types and values.

\*Note: C failure rate — Not QPL for 7389 thru 7401.

D failure rate — Not QPL for -8304 thru -8401.



Primarily designed for use in tuned low frequency circuits, phasing low voltage AC motors, servo systems and other applications where reversal of polarity is a primary consideration. The T111 unit consists of two polar T110 Series hermetically sealed tantalum capacitors, electrically and mechanically connected back-to-back and supported by an outer

corrosion-resistant metal sleeve. They exhibit comparable electrical and performance characteristics of T110 Series. Available in capacitance values ranging from .0023 to 160  $\mu\text{F}$  in  $\pm 20\%$ ,  $\pm 10\%$ , and  $\pm 5\%$  tolerances in working voltages from 6 to 100 VDC at  $+85^\circ\text{C}$ . Also, the following table includes M39003/4 QPL Product.

### DIMENSIONS — INCHES & (MILLIMETERS)

### MARKING INFORMATION\* A, B, C & D CASES

CASE SIZE	B $\pm 0.002$ ( $\pm .05$ )	UNINSULATED		INSULATED		C MAX.
		D $\pm 0.010$ ( $\pm .25$ )	L $\pm 0.031$ ( $\pm .79$ )	D $\pm 0.010$ ( $\pm .25$ ) -0.015 ( $-.38$ )	L $\pm 0.031$ ( $\pm .79$ )	
A	0.020 (.51)	0.147 (3.73)	0.565 (14.35)	0.161 (4.09)	0.575 (14.61)	0.750 (19.05)
B	0.020 (.51)	0.194 (4.93)	0.916 (23.27)	0.207 (5.26)	0.955 (24.26)	1.130 (28.70)
C	0.025 (.64)	0.300 (7.62)	1.340 (34.04)	0.314 (7.98)	1.350 (34.29)	1.525 (38.74)
D	0.025 (.64)	0.362 (9.19)	1.540 (39.12)	0.376 (9.55)	1.550 (39.37)	1.725 (43.82)

K 10%	—	Manufacturer's Classification and Tolerance
6R0 $\mu\text{F}$	—	Normal Capacitance — ( $\mu\text{F}$ ) ("R" indicates decimal)
20V	—	Voltage
0325AB	—	Date Code and Batch Code

### CAPACITOR OUTLINE DRAWINGS



\* For Military Marking, see page 4.

### RATINGS & PART NUMBER REFERENCE

CAPACITANCE $\mu\text{F}$	CASE SIZE	CAPACITANCE TOLERANCE $\pm\%$	KEMET T111 SERIES			MIL-PRF-39003 (CSR91) CAPACITORS							
			KEMET PART NUMBER	D.C. LEAKAGE $\mu\text{A}@25^\circ\text{C}$ MAX.	MAX. DISSIP- ATION FACTOR $\%@25^\circ\text{C}$ , 120Hz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)				KEMET EQUIVALENT MILITARY PART NUMBER			
						MIL-PRF-39003/4C EXPONENTIAL				MIL-PRF-39003/4C GRADED			
<b>6 VOLT RATING AT 85°C — 4 VOLT RATING AT 125°C</b>													
2.8	A	10	T111A285K006AS	0.3	4	0221	0441	0661	0881	3001	4001	5001	T213A285K006(1)S
3.4	A	10	T111A345K006AS	0.3	6	0222	0442	0662	0882	3002	4002	5002	T213A345K006(1)S
3.4	A	20	T111A345M006AS	0.3	6	0223	0443	0663	0883	3003	4003	5003	T213A345M006(1)S
23.0	B	10	T111B236K006AS	1.5	6	0224	0444	0664	0884	3004	4004	5004	T213B236K006(1)S
23.0	B	20	T111B236M006AS	1.5	6	0225	0445	0665	0885	3005	4005	5005	T213B236M006(1)S
28.0	B	10	T111B286K006AS	1.5	6	0226	0446	0666	0886	3006	4006	5006	T213B286K006(1)S
75.0	C	10	T111C756K006AS	4.5	6	0227	0447	0667	0887	3007	4007	5007	T213C756K006(1)S
75.0	C	20	T111C756M006AS	4.5	6	0228	0448	0668	0888	3008	4008	5008	T213C756M006(1)S
90.0	C	10	T111C906K006AS	4.5	6	0229	0449	0669	0889	3009	4009	5009	T213C906K006(1)S
90.0	C	20	T111C906M006AS	5.5	6	0230	0450	0670	0890				T213C906M006(1)S
130.0	D	10	T111D137K006AS	6.0	8	0231	0451	0671	0891	3010	4010	5010	T213D137K006(1)S
130.0	D	20	T111D137M006AS	6.0	8	0232	0452	0672	0892				T213D137M006(1)S
160.0	D	10	T111D167K006AS	7.5	8	0233	0453	0673	0893	3011	4011	5011	T213D167K006(1)S
160.0	D	20	T111D167M006AS	7.5	8	0234	0454	0674	0894	3012	4012	5012	T213D167M006(1)S
<b>10 VOLT RATING AT 85°C — 7 VOLT RATING AT 125°C</b>													
1.9	A	10	T111A195K010AS	0.3	4	0235	0455	0675	0895	3013	4013	5013	T213A195K010(1)S
2.3	A	10	T111A235K010AS	0.4	4	0236	0456	0676	0896	3014	4014	5014	T213A235K010(1)S
2.3	A	20	T111A235M010AS	0.4	4	0237	0457	0677	0897	3015	4015	5015	T213A235M010(1)S
13.0	B	10	T111B136K010AS	2.0	6	0238	0458	0678	0898	3016	4016	5016	T213B136K010(1)S
16.0	B	10	T111B166K010AS	2.0	6	0239	0459	0679	0899	3017	4017	5017	T213B166K010(1)S
16.0	B	20	T111B166M010AS	2.0	6	0240	0460	0680	0900	3018	4018	5018	T213B166M010(1)S
19.0	B	10	T111B196K010AS	2.0	6	0241	0461	0681	0901	3019	4019	5019	T213B196K010(1)S
41.0	C	10	T111C416K010AS	3.0	6	0242	0462	0682	0902	3020	4020	5020	T213C416K010(1)S
50.0	C	10	T111C506K010AS	5.0	6	0243	0463	0683	0903	3021	4021	5021	T213C506K010(1)S
50.0	C	20	T111C506M010AS	5.0	6	0244	0464	0684	0904	3022	4022	5022	T213C506M010(1)S
60.0	C	10	T111C606K010AS	6.0	6	0245	0465	0685	0905	3023	4023	5023	T213C606K010(1)S
60.0	C	20	T111C606M010AS	6.0	6	0246	0466	0686	0906				T213C606M010(1)S
90.0	D	10	T111D906K010AS	9.0	6	0247	0467	0687	0907	3024	4024	5024	T213D906K010(1)S
110.0	D	10	T111D117K010AS	10.0	8	0248	0468	0688	0908	3025	4025	5025	T213D117K010(1)S
110.0	D	20	T111D117M010AS	10.0	8	0249	0469	0689	0909	3026	4026	5026	T213D117M010(1)S

(1) To complete T213 Series Part Number, insert Failure Rate Symbol in the 13th Character as shown on Page 6.  
\*For ordering information see page 4 (military) and page 6.







KEMET ultra-miniature T222 Series solid tantalum capacitors are designed especially for miniaturization.

The T222 Series capacitors employ a unique glass-to-metal compression end seal which has no protruding eyelet. This flush end seal construction makes T222 Series capacitors ideally suited for all miniature high density packaging applications. The capacitors con-

sist of a dry porous tantalum pellet hermetically sealed in a solder coated metal case with solder coated alloy 52 and solder coated nickel leads.

The T222 series is approved to MIL-PRF-39003/2, all ratings and failure rates.

### CAPACITOR OUTLINE DRAWINGS



### DIMENSIONS — INCHES & (MILLIMETERS)

CASE SIZE	UNINSULATED		INSULATED		B WIRE DIAMETER
	D $\pm 0.005$ ( $\pm .13$ )	L	D	L	
A	.085 (2.16)	.245 + .015 (6.22 + .38) - .010 (-.25)	.090 $\pm$ .009 (2.29 $\pm$ .23)	.250 + .031 (6.35 + .79) - .015 (-.38)	.016 + .005 (.41 + .13) - .001 (-.03)
B	.127 (3.23)	.375 $\pm$ .015 (.53 $\pm$ .38)	.138 $\pm$ .010 (3.51 $\pm$ .25)	.390 $\pm$ .015 (9.91 $\pm$ .38)	.016 + .005 (.41 + .13) - .001 (-.03)

### ORDERING INFORMATION

**T 222 A 225 K 010 B S C\***

**TANTALUM** — T

**SERIES (CSR09)** — 222

**CASE SIZE** — A / B

**PICOFARAD CODE** — A 225  
First two digits represent significant figures.  
3rd digit specifies no. of zeros to follow.

**CAPACITANCE TOLERANCE** — K  $\pm 10$  J  $\pm 5$

**VOLTAGE** — 010  
at 85°C

**LEAD MATERIAL** — S — Standard  
Positive: Alloy 52 (solder coated)  
Negative: Solder coated nickel

**FAILURE RATE LEVEL\*\***

<b>GRADED</b>	<b>EXPONENTIAL</b>
B — 0.1%/k hrs.	M — 1%/k hrs.
C — 0.01%/k hrs.	P — 0.1%/k hrs.
D — 0.001%/k hrs.	R — 0.01%/k hrs.
.	S — 0.001%/k hrs.

**SPECIFICATION**  
All capacitors are sleeved unless specified.

**\*Part Number Example: T222A225K010BS (14 digits - no spaces)**

**\*\*Failure Rates apply only to military products**  
**For Military Ordering, see page 4.**

### CSR09 CAPACITOR MARKINGS PER MIL-PRF-39003

39003	— Military specification number
02 - K	— Specification sheet number and trademark
2961J	— Nonsignificant dash number and "J" for JAN
+333	— Polarity, date code (1st digit indicates year and the next two digits indicate the week)
XX	— and lot symbol





RATINGS & PART NUMBER REFERENCE

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T222 SERIES			MIL-PRF-39003 (CSR09) CAPACITORS						
			KEMET PART NUMBER	D.C. LEAKAGE µA@25°C MAX.	MAX. DISSI- PATION FACTOR %@25°C, 120Hz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)						
						MIL-PRF-39003/2D EXPONENTIAL				MIL-PRF-39003/2D GRADED		
						M (1.0)	P (0.1)	R (0.01)	S (0.001)	B (0.1)	C (0.01)	D (0.001)
<b>50 VOLT RATING AT 85°C — 33 VOLT RATING AT 125°C</b>												
0.22	A	5	T222A224J050(1)S	0.6	3	1030	1090	1150	1210	2051	3051	4051
0.22	A	10	T222A224K050(1)S	0.6	3	0030	0090	0150	0210	2052	3052	4052
0.27	A	5	T222A274J050(1)S	0.6	3	1031	1091	1151	1211	2053	3053	4053
<b>0.27</b>	<b>A</b>	<b>10</b>	<b>T222A274K050(1)S</b>	<b>0.6</b>	<b>3</b>	<b>0031</b>	<b>0091</b>	<b>0151</b>	<b>0211</b>	<b>2054</b>	<b>3054</b>	<b>4054</b>
1.5	B	5	T222B155J050(1)S	1.4	3	1032	1092	1152	1212	2055	3055	4055
1.5	B	10	T222B155K050(1)S	1.4	3	0032	0092	0152	0212	2056	3056	4056
1.8	B	5	T222B185J050(1)S	1.4	3	1033	1093	1153	1213	2057	3057	4057
<b>1.8</b>	<b>B</b>	<b>10</b>	<b>T222B185K050(1)S</b>	<b>1.4</b>	<b>3</b>	<b>0033</b>	<b>0093</b>	<b>0153</b>	<b>0213</b>	<b>2058</b>	<b>3058</b>	<b>4058</b>
<b>75 VOLT RATING AT 85°C — 50 VOLT RATING AT 125°C</b>												
0.047	A	5	T222A473J075(1)S	0.6	3	1034	1094	1154	1214	2059	3059	4059
0.047	A	10	T222A473K075(1)S	0.6	3	0034	0094	0154	0214	2060	3060	4060
0.056	A	5	T222A563J075(1)S	0.6	3	1035	1095	1155	1215	2061	3061	4061
0.056	A	10	T222A563K075(1)S	0.6	3	0035	0095	0155	0215	2062	3062	4062
0.068	A	5	T222A683J075(1)S	0.6	3	1036	1096	1156	1216	2063	3063	4063
0.068	A	10	T222A683K075(1)S	0.6	3	0036	0096	0156	0216	2064	3064	4064
0.082	A	5	T222A823J075(1)S	0.6	3	1037	1097	1157	1217	2065	3065	4065
0.082	A	10	T222A823K075(1)S	0.6	3	0037	0097	0157	0217	2066	3066	4066
0.10	A	5	T222A104J075(1)S	0.6	3	1038	1098	1158	1218	2067	3067	4067
<b>0.10</b>	<b>A</b>	<b>10</b>	<b>T222A104K075(1)S</b>	<b>0.6</b>	<b>3</b>	<b>0038</b>	<b>0098</b>	<b>0158</b>	<b>0218</b>	<b>2068</b>	<b>3068</b>	<b>4068</b>
0.12	A	5	T222A124J075(1)S	0.6	3	1039	1099	1159	1219	2069	3069	4069
0.12	A	10	T222A124K075(1)S	0.6	3	0039	0099	0159	0219	2070	3070	4070
0.15	A	5	T222A154J075(1)S	0.6	3	1040	1100	1160	1220	2071	3071	4071
0.15	A	10	T222A154K075(1)S	0.6	3	0040	0100	0160	0220	2072	3072	4072
0.18	A	5	T222A184J075(1)S	0.6	3	1041	1101	1161	1221	2073	3073	4073
0.18	A	10	T222A184K075(1)S	0.6	3	0041	0101	0161	0221	2074	3074	4074
0.22	B	5	T222B224J075(1)S	0.6	3	1042	1102	1162	1222	2075	3075	4075
0.22	B	10	T222B224K075(1)S	0.6	3	0042	0102	0162	0222	2076	3076	4076
0.27	B	5	T222B274J075(1)S	0.6	3	1043	1103	1163	1223	2077	3077	4077
0.27	B	10	T222B274K075(1)S	0.6	3	0043	0103	0163	0223	2078	3078	4078
0.33	B	5	T222B334J075(1)S	0.6	3	1044	1104	1164	1224	2079	3079	4079
0.33	B	10	T222B334K075(1)S	0.6	3	0044	0104	0164	0224	2080	3080	4080
0.39	B	5	T222B394J075(1)S	0.6	3	1045	1105	1165	1225	2081	3081	4081
0.39	B	10	T222B394K075(1)S	0.6	3	0045	0105	0165	0225	2082	3082	4082
0.47	B	5	T222B474J075(1)S	0.6	3	1046	1106	1166	1226	2083	3083	4083
0.47	B	10	T222B474K075(1)S	0.6	3	0046	0106	0166	0226	2084	3084	4084
0.56	B	5	T222B564J075(1)S	0.6	3	1047	1107	1167	1227	2085	3085	4085
0.56	B	10	T222B564K075(1)S	0.6	3	0047	0107	0167	0227	2086	3086	4086
0.68	B	5	T222B684J075(1)S	0.6	3	1048	1108	1168	1228	2087	3087	4087
0.68	B	10	T222B684K075(1)S	0.6	3	0048	0108	0168	0228	2088	3088	4088
0.82	B	5	T222B824J075(1)S	0.7	3	1049	1109	1169	1229	2089	3089	4089
0.82	B	10	T222B824K075(1)S	0.7	3	0049	0109	0169	0229	2090	3090	4090
1.0	B	5	T222B105J075(1)S	0.9	3	1050	1110	1170	1230	2091	3091	4091
1.0	B	10	T222B105K075(1)S	0.9	3	0050	0110	0170	0230	2092	3092	4092
1.2	B	5	T222B125J075(1)S	0.9	3	1051	1111	1171	1231	2093	3093	4093
1.2	B	10	T222B125K075(1)S	0.9	3	0051	0111	0171	0231	2094	3094	4094

(1) To complete Part Number, insert Failure Rate Symbol in the 13th Character as shown on Page 24.

**Bold Face** lines indicate popular part types and values

# TANTALUM HERMETICALLY SEALED / AXIAL — MIL-PRF-39003

## T140 SERIES — POLAR TYPE & T242 (CSR23)



KEMET standard MIL case hermetically sealed T140 Series (Extended Capacitance Range) are compact, ruggedly built, designed for miniaturized circuitry, and are especially suited for coupling, bypass, filtering and R-C timing circuits. They exhibit excellent stability, low DC leakage current, dissipation factor, and ESR/impedance over a wide temperature and frequency range.

Available in standard EIA capacitance values from .82-1200  $\mu\text{F}$  in  $\pm 20\%$ ,  $\pm 10\%$ , and  $\pm 5\%$  tolerances and working voltages from 6-60 VDC.

Included in the following Series table is a complete listing of CSR23 qualified MIL-C-39003/3 capacitors.

### DIMENSIONS — INCHES & (MILLIMETERS)

CASE SIZE	UNINSULATED		INSULATED		B $\pm 0.002$ (.05)	C MAX.
	D $\pm 0.005$ (.13)	L $\pm 0.031$ (.79)	D $\pm 0.010$ (.25)	L $\pm 0.031$ (.79)		
A	0.125 (3.18)	0.250 (6.35)	0.135 (3.43)	0.286 (7.26)	0.020 (.51)	0.422 (10.72)
B	0.175 (4.45)	0.438 (11.13)	0.185 (4.70)	0.474 (12.04)	0.020 (.51)	0.610 (15.49)
C	0.279 (7.09)	0.650 (16.51)	0.289 (7.34)	0.686 (17.42)	0.025 (.64)	0.822 (20.88)
D	0.341 (8.66)	0.750 (19.05)	0.351 (8.92)	0.786 (19.96)	0.025 (.64)	0.922 (23.42)

### MARKING INFORMATION\*

#### A, B, C & D CASES

+K 10%	— Polarity, Manufacturer's Identification and Capacitance Tol.
5R6 $\mu\text{F}$	— Normal Capacitance — ( $\mu\text{F}$ ) ("R" indicates decimal)
10V	— Voltage
0312	— Date Code (e.g.: 0312)

\* For Military Marking, see page 4.

### CAPACITOR OUTLINE DRAWINGS



Effective September 30, 2005, the KEMET T140 Series is RoHS compliant by ordering the "T" (100% tin) end termination in the 14th position of the part number.

### RATINGS & PART NUMBER REFERENCE

CAPACITANCE $\mu\text{F}$	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T140			MIL-PRF-39003 (CSR23) CAPACITORS								KEMET EQUIVALENT MILITARY PART NUMBER	
			KEMET PART NUMBER	D.C. LEAKAGE $\mu\text{A}@25^\circ\text{C}$ MAX.	MAX. DISSIPATION FACTOR %@25°C, 120Hz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)									
						MIL-PRF-39003/3F EXPONENTIAL				MIL-PRF-39003/3F GRADED					
						M (1.0)	P (0.1)	R (0.01)	S (0.001)	B (0.1)	C (0.01)	D (0.001)			
<b>6 VOLT RATING AT 85°C — 4 VOLT RATING AT 125°C</b>															
8.2	A	10, 20	T140A825(1)006AS	0.9	6										
<b>10.0</b>	<b>A</b>	<b>10</b>	<b>T140A106K006AS</b>	<b>0.9</b>	<b>6</b>	<b>0101</b>	<b>0201</b>	<b>0301</b>	<b>0401</b>	<b>2001</b>	<b>3001</b>	<b>4001</b>	<b>T242A106K006(2)S</b>		
<b>10.0</b>	<b>A</b>	<b>20</b>	<b>T140A106M006AS</b>	<b>0.9</b>	<b>6</b>	<b>0102</b>	<b>0202</b>	<b>0302</b>	<b>0402</b>	<b>2002</b>	<b>3002</b>	<b>4002</b>	<b>T242A106M006(2)S</b>		
12.0	A	10	T140A126K006AS	1.0	6	0103	0203	0303	0403	2003	3003	4003	T242A126K006(2)S		
12.0	A	20	T140A126M006AS	1.0	6										
68.0	B	10, 20	T140B686(1)006AS	3.0	6										
82.0	B	10, 20	T140B826(1)006AS	3.0	6										
<b>100.0</b>	<b>B</b>	<b>10</b>	<b>T140B107K006AS</b>	<b>6.0</b>	<b>6</b>	<b>0104</b>	<b>0204</b>	<b>0304</b>	<b>0404</b>	<b>2004</b>	<b>3004</b>	<b>4004</b>	<b>T242B107K006(2)S</b>		
<b>100.0</b>	<b>B</b>	<b>20</b>	<b>T140B107M006AS</b>	<b>6.0</b>	<b>6</b>	<b>0105</b>	<b>0205</b>	<b>0305</b>	<b>0405</b>	<b>2005</b>	<b>3005</b>	<b>4005</b>	<b>T242B107M006(2)S</b>		
220.0	C	10, 20	T140C227(1)006AS	10.0	8										
270.0	C	10, 20	T140C277(1)006AS	10.0	8										
330.0	C	10	T140C337K006AS	10.0	8	0106	0206	0306	0406	2006	3006	4006	T242C337K006(2)S		
330.0	C	20	T140C337M006AS	10.0	8	0107	0207	0307	0407	2007	3007	4007	T242C337M006(2)S		
390.0	C	10	T140C397K006AS	10.0	10	0108	0208	0308	0408	2008	3008	4008	T242C397K006(2)S		
390.0	C	20	T140C397M006AS	10.0	10										
<b>470.0</b>	<b>C</b>	<b>10</b>	<b>T140C477K006AS</b>	<b>10.0</b>	<b>10</b>	<b>0109</b>	<b>0209</b>	<b>0309</b>	<b>0409</b>	<b>2009</b>	<b>3009</b>	<b>4009</b>	<b>T242C477K006(2)S</b>		
<b>470.0</b>	<b>C</b>	<b>20</b>	<b>T140C477M006AS</b>	<b>10.0</b>	<b>10</b>	<b>0110</b>	<b>0210</b>	<b>0310</b>	<b>0410</b>	<b>2010</b>	<b>3010</b>	<b>4010</b>	<b>T242C477M006(2)S</b>		
560.0	D	10, 20	T140D567(1)006AS	20.0	10										
680.0	D	10	T140D687K006AS	20.0	10	0111	0211	0311	0411	2011	3011	4011	T242D687K006(2)S		
680.0	D	20	T140D687M006AS	20.0	10	0112	0212	0312	0412	2012	3012	4012	T242D687M006(2)S		
820.0	D	10	T140D827K006AS	20.0	10	0113	0213	0313	0413	2013	3013	4013	T242D827K006(2)S		
820.0	D	20	T140D827M006AS	20.0	10										
<b>1000.0</b>	<b>D</b>	<b>10</b>	<b>T140D108K006AS</b>	<b>20.0</b>	<b>10</b>	<b>0114</b>	<b>0214</b>	<b>0314</b>	<b>0414</b>	<b>2014</b>	<b>3014</b>	<b>4014</b>	<b>T242D108K006(2)S</b>		
<b>1000.0</b>	<b>D</b>	<b>20</b>	<b>T140D108M006AS</b>	<b>20.0</b>	<b>10</b>	<b>0115</b>	<b>0215</b>	<b>0315</b>	<b>0415</b>	<b>2015</b>	<b>3015</b>	<b>4015</b>	<b>T242D108M006(2)S</b>		
1200.0	D	20	T140D128M006AS	20.0	10										

(1) To complete T140 Series Part Number, insert Capacitance Tolerance Symbol in the 9th Character as shown on Page 6.

(2) To complete the T242 Series Part Number, insert Failure Rate Symbol in the 13th Character.

**Bold Face** lines indicate popular part types and values.

For ordering information, see page 4 (Military) and Page 6.

T140/T242 Series Tantalum  
Hermetically Sealed

**RATINGS & PART NUMBER REFERENCE**

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T140			MIL-PRF-39003 (CSR23) CAPACITORS								KEMET EQUIVALENT MILITARY PART NUMBER			
			KEMET PART NUMBER	D.C. LEAKAGE µA@25°C MAX.	MAX. DISSIPATION FACTOR %@25°C, 120Hz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)											
						MIL-PRF-39003/3F EXPONENTIAL				MIL-PRF-39003/3F GRADED							
						M (1.0)	P (0.1)	R (0.01)	S (0.001)	B (0.1)	C (0.01)	D (0.001)					
<b>10 VOLT RATING AT 85°C — 7 VOLT RATING AT 125°C</b>																	
5.6	A	10, 20	T140A565(1)010AS	1.0	4												
6.8	A	10	T140A685K010AS	1.0	6	0116	0216	0316	0416	2016	3016	4016	T242A685K010(2)S				
6.8	A	20	T140A685M010AS	1.0	6	0117	0217	0317	0417	2017	3017	4017	T242A685M010(2)S				
<b>8.2</b>	<b>A</b>	<b>10</b>	<b>T140A825K010AS</b>	<b>1.2</b>	<b>6</b>	<b>0118</b>	<b>0218</b>	<b>0318</b>	<b>0418</b>	<b>2018</b>	<b>3018</b>	<b>4018</b>	<b>T242A825K010(2)S</b>				
<b>8.2</b>	<b>A</b>	<b>20</b>	<b>T140A825M010AS</b>	<b>1.2</b>	<b>6</b>												
47.0	B	10	T140B476K010AS	4.0	6	0119	0219	0319	0419	2019	3019	4019	T242B476K010(2)S				
47.0	B	20	T140B476M010AS	4.0	6	0120	0220	0320	0420	2020	3020	4020	T242B476M010(2)S				
56.0	B	10	T140B566K010AS	5.0	6	0121	0221	0321	0421	2021	3021	4021	T242B566K010(2)S				
56.0	B	20	T140B566M010AS	5.0	6												
<b>68.0</b>	<b>B</b>	<b>10</b>	<b>T140B686K010AS</b>	<b>6.0</b>	<b>6</b>	<b>0122</b>	<b>0222</b>	<b>0322</b>	<b>0422</b>	<b>2022</b>	<b>3022</b>	<b>4022</b>	<b>T242B686K010(2)S</b>				
<b>68.0</b>	<b>B</b>	<b>20</b>	<b>T140B686M010AS</b>	<b>6.0</b>	<b>6</b>	<b>0123</b>	<b>0223</b>	<b>0323</b>	<b>0423</b>	<b>2023</b>	<b>3023</b>	<b>4023</b>	<b>T242B686M010(2)S</b>				
<b>82.0</b>	<b>B</b>	<b>10</b>	<b>T140B826K010AS</b>	<b>7.0</b>	<b>6</b>	<b>0124</b>	<b>0224</b>	<b>0324</b>	<b>0424</b>	<b>2024</b>	<b>3024</b>	<b>4024</b>	<b>T242B826K010(2)S</b>				
<b>82.0</b>	<b>B</b>	<b>20</b>	<b>T140B826M010AS</b>	<b>7.0</b>	<b>6</b>												
150.0	C	10, 20	T140C157(1)010AS	8.0	8												
180.0	C	10, 20	T140C187(1)010AS	8.0	8												
<b>220.0</b>	<b>C</b>	<b>10</b>	<b>T140C227K010AS</b>	<b>12.0</b>	<b>8</b>	<b>0125</b>	<b>0225</b>	<b>0325</b>	<b>0425</b>	<b>2025</b>	<b>3025</b>	<b>4025</b>	<b>T242C227K010(2)S</b>				
<b>220.0</b>	<b>C</b>	<b>20</b>	<b>T140C227M010AS</b>	<b>12.0</b>	<b>8</b>	<b>0126</b>	<b>0226</b>	<b>0326</b>	<b>0426</b>	<b>2026</b>	<b>3026</b>	<b>4026</b>	<b>T242C227M010(2)S</b>				
270.0	C	10	T140C277K010AS	13.0	8	0127	0227	0327	0427	2027	3027	4027	T242C277K010(2)S				
270.0	C	20	T140C277M010AS	13.0	8												
330.0	D	10, 20	T140D337(1)010AS	16.0	8												
390.0	D	10	T140D397K010AS	16.0	10	0128	0228	0328	0428	2028	3028	4028	T242D397K010(2)S				
390.0	D	20	T140D397M010AS	16.0	10												
470.0	D	10	T140D477K010AS	16.0	10	0129	0229	0329	0429	2029	3029	4029	T242D477K010(2)S				
470.0	D	20	T140D477M010AS	16.0	10	0130	0230	0330	0430	2030	3030	4030	T242D477M010(2)S				
<b>560.0</b>	<b>D</b>	<b>10</b>	<b>T140D567K010AS</b>	<b>20.0</b>	<b>10</b>	<b>0131</b>	<b>0231</b>	<b>0331</b>	<b>0431</b>	<b>2031</b>	<b>3031</b>	<b>4031</b>	<b>T242D567K010(2)S</b>				
<b>560.0</b>	<b>D</b>	<b>20</b>	<b>T140D567M010AS</b>	<b>20.0</b>	<b>10</b>												
<b>15 VOLT RATING AT 85°C — 10 VOLT RATING AT 125°C</b>																	
3.9	A	10, 20	T140A395(1)015AS	1.0	4												
4.7	A	10	T140A475K015AS	1.0	4	0132	0232	0332	0432	2032	3032	4032	T242A475K015(2)S				
4.7	A	20	T140A475M015AS	1.0	4	0133	0233	0333	0433	2033	3033	4033	T242A475M015(2)S				
5.6	A	10	T140A565K015AS	1.3	4	0134	0234	0334	0434	2034	3034	4034	T242A565K015(2)S				
5.6	A	20	T140A565M015AS	1.3	4												
27.0	B	10, 20	T140B276(1)015AS	3.0	6												
33.0	B	10	T140B336K015AS	5.0	6	0135	0235	0335	0435	2035	3035	4035	T242B336K015(2)S				
33.0	B	20	T140B336M015AS	5.0	6	0136	0236	0336	0436	2036	3036	4036	T242B336M015(2)S				
<b>39.0</b>	<b>B</b>	<b>10</b>	<b>T140B396K015AS</b>	<b>5.3</b>	<b>6</b>	<b>0137</b>	<b>0237</b>	<b>0337</b>	<b>0437</b>	<b>2037</b>	<b>3037</b>	<b>4037</b>	<b>T242B396K015(2)S</b>				
<b>39.0</b>	<b>B</b>	<b>20</b>	<b>T140B396M015AS</b>	<b>5.3</b>	<b>6</b>												
82.0	C	10, 20	T140C826(1)015AS	8.0	6												
100.0	C	10, 20	T140C107(1)015AS	10.0	6												
120.0	C	10, 20	T140C127(1)015AS	10.0	6												
150.0	C	10	T140C157K015AS	15.0	8	0138	0238	0338	0438	2038	3038	4038	T242C157K015(2)S				
150.0	C	20	T140C157M015AS	15.0	8	0139	0239	0339	0439	2039	3039	4039	T242C157M015(2)S				
<b>180.0</b>	<b>C</b>	<b>10</b>	<b>T140C187K015AS</b>	<b>15.0</b>	<b>8</b>	<b>0140</b>	<b>0240</b>	<b>0340</b>	<b>0440</b>	<b>2040</b>	<b>3040</b>	<b>4040</b>	<b>T242C187K015(2)S</b>				
<b>180.0</b>	<b>C</b>	<b>20</b>	<b>T140C187M015AS</b>	<b>15.0</b>	<b>8</b>												
220.0	D	10	T140D227K015AS	20.0	8	0141	0241	0341	0441	2041	3041	4041	T242D227K015(2)S				
220.0	D	20	T140D227M015AS	20.0	8	0142	0242	0342	0442	2042	3042	4042	T242D227M015(2)S				
270.0	D	10	T140D277K015AS	20.0	8	0143	0243	0343	0443	2043	3043	4043	T242D277K015(2)S				
270.0	D	20	T140D277M015AS	20.0	8												
<b>330.0</b>	<b>D</b>	<b>10</b>	<b>T140D337K015AS</b>	<b>20.0</b>	<b>8</b>	<b>0144</b>	<b>0244</b>	<b>0344</b>	<b>0444</b>	<b>2044</b>	<b>3044</b>	<b>4044</b>	<b>T242D337K015(2)S</b>				
<b>330.0</b>	<b>D</b>	<b>20</b>	<b>T140D337M015AS</b>	<b>20.0</b>	<b>8</b>	<b>0145</b>	<b>0245</b>	<b>0345</b>	<b>0445</b>	<b>2045</b>	<b>3045</b>	<b>4045</b>	<b>T242D337M015(2)S</b>				

(1) To complete T140 Series Part Number, insert Capacitance Tolerance Symbol in the 9th Character as shown on Page 6.  
(2) To complete the T242 Series Part Number, insert Failure Rate Symbol in the 13th Character.

RATINGS & PART NUMBER REFERENCE

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T140			MIL-PRF-39003 (CSR23) CAPACITORS							KEMET EQUIVALENT MILITARY PART NUMBER
			KEMET PART NUMBER	D.C. LEAKAGE µA@25°C MAX.	MAX. DISSIPATION FACTOR %@25°C, 120Hz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)							
						MIL-PRF-39003/3F EXPONENTIAL				MIL-PRF-39003/3F GRADED			
						M (1.0)	P (0.1)	R (0.01)	S (0.001)	B (0.1)	C (0.01)	D (0.001)	
<b>20 VOLT RATING AT 85°C — 13 VOLT RATING AT 125°C</b>													
2.7	A	10	T140A275K020AS	0.8	4	0146	0246	0346	0446	2046	3046	4046	T242A275K020(2)S
2.7	A	20	T140A275M020AS	0.8	4								
3.3	A	10	T140A335K020AS	1.0	4	0147	0247	0347	0447	2047	3047	4047	T242A335K020(2)S
3.3	A	20	T140A335M020AS	1.0	4	0148	0248	0348	0448	2048	3048	4048	T242A335M020(2)S
3.9	A	10	T140A395K020AS	1.2	4	0149	0249	0349	0449	2049	3049	4049	T242A395K020(2)S
3.9	A	20	T140A395M020AS	1.2	4								
18.0	B	10	T140B186K020AS	3.0	6	0150	0250	0350	0450	2050	3050	4050	T242B186K020(2)S
18.0	B	20	T140B186M020AS	3.0	6								
<b>22.0</b>	<b>B</b>	<b>10</b>	<b>T140B226K020AS</b>	<b>3.0</b>	<b>6</b>	<b>0151</b>	<b>0251</b>	<b>0351</b>	<b>0451</b>	<b>2051</b>	<b>3051</b>	<b>4051</b>	<b>T242B226K020(2)S</b>
<b>22.0</b>	<b>B</b>	<b>20</b>	<b>T140B226M020AS</b>	<b>3.0</b>	<b>6</b>	<b>0152</b>	<b>0252</b>	<b>0352</b>	<b>0452</b>	<b>2052</b>	<b>3052</b>	<b>4052</b>	<b>T242B226M020(2)S</b>
<b>27.0</b>	<b>B</b>	<b>10</b>	<b>T140B276K020AS</b>	<b>4.0</b>	<b>6</b>	<b>0153</b>	<b>0253</b>	<b>0353</b>	<b>0453</b>	<b>2053</b>	<b>3053</b>	<b>4053</b>	<b>T242B276K020(2)S</b>
<b>27.0</b>	<b>B</b>	<b>20</b>	<b>T140B276M020AS</b>	<b>4.0</b>	<b>6</b>								
56.0	C	10	T140C566K020AS	7.0	6	0154	0254	0354	0454	2054	3054	4054	T242C566K020(2)S
56.0	C	20	T140C566M020AS	7.0	6								
68.0	C	10	T140C686K020AS	8.0	6	0155	0255	0355	0455	2055	3055	4055	T242C686K020(2)S
68.0	C	20	T140C686M020AS	8.0	6	0156	0256	0356	0456	2056	3056	4056	T242C686M020(2)S
82.0	C	10	T140C826K020AS	10.0	6	0157	0257	0357	0457	2057	3057	4057	T242C826K020(2)S
82.0	C	20	T140C826M020AS	10.0	6								
<b>100.0</b>	<b>C</b>	<b>10</b>	<b>T140C107K020AS</b>	<b>12.0</b>	<b>6</b>	<b>0158</b>	<b>0258</b>	<b>0358</b>	<b>0458</b>	<b>2058</b>	<b>3058</b>	<b>4058</b>	<b>T242C107K020(2)S</b>
<b>100.0</b>	<b>C</b>	<b>20</b>	<b>T140C107M020AS</b>	<b>12.0</b>	<b>6</b>	<b>0159</b>	<b>0259</b>	<b>0359</b>	<b>0459</b>	<b>2059</b>	<b>3059</b>	<b>4059</b>	<b>T242C107M020(2)S</b>
120.0	C	10	T140C127K020AS	12.0	6	0160	0260	0360	0460	2060	3060	4060	T242C127K020(2)S
120.0	C	20	T140C127M020AS	12.0	6								
150.0	D	10	T140D157K020AS	15.0	8	0161	0261	0361	0461	2061	3061	4061	T242D157K020(2)S
150.0	D	20	T140D157M020AS	15.0	8	0162	0262	0362	0462	2062	3062	4062	T242D157M020(2)S
<b>180.0</b>	<b>D</b>	<b>10</b>	<b>T140D187K020AS</b>	<b>15.0</b>	<b>8</b>	<b>0163</b>	<b>0263</b>	<b>0363</b>	<b>0463</b>	<b>2063</b>	<b>3063</b>	<b>4063</b>	<b>T242D187K020(2)S</b>
<b>180.0</b>	<b>D</b>	<b>20</b>	<b>T140D187M020AS</b>	<b>15.0</b>	<b>8</b>								
<b>30 VOLT RATING AT 85°C — 20 VOLT RATING AT 125°C</b>													
1.2	A	10, 20	T140A125(1)030AS	1.0	4								
1.5	A	10, 20	T140A155(1)030AS	1.0	4								
1.8	A	10, 20	T140A185(1)030AS	1.0	4								
<b>2.2</b>	<b>A</b>	<b>10, 20</b>	<b>T140A225(1)030AS</b>	<b>1.0</b>	<b>4</b>								
<b>2.7</b>	<b>A</b>	<b>10, 20</b>	<b>T140A275(1)030AS</b>	<b>1.0</b>	<b>4</b>								
12.0	B	10, 20	T140B126(1)030AS	3.0	4								
15.0	B	10, 20	T140B156(1)030AS	3.0	4								
<b>18.0</b>	<b>B</b>	<b>10, 20</b>	<b>T140B186(1)030AS</b>	<b>3.0</b>	<b>4</b>								
<b>33.0</b>	<b>C</b>	<b>10, 20</b>	<b>T140C336(1)030AS</b>	<b>6.0</b>	<b>6</b>								
<b>39.0</b>	<b>C</b>	<b>10, 20</b>	<b>T140C396(1)030AS</b>	<b>6.0</b>	<b>6</b>								
<b>47.0</b>	<b>C</b>	<b>10, 20</b>	<b>T140C476(1)030AS</b>	<b>7.0</b>	<b>6</b>								
<b>56.0</b>	<b>C</b>	<b>10, 20</b>	<b>T140C566(1)030AS</b>	<b>7.0</b>	<b>6</b>								
<b>68.0</b>	<b>C</b>	<b>10, 20</b>	<b>T140C686(1)030AS</b>	<b>7.0</b>	<b>6</b>								
82.0	D	10, 20	T140D826(1)030AS	10.0	6								
<b>100.0</b>	<b>D</b>	<b>10, 20</b>	<b>T140D107(1)030AS</b>	<b>10.0</b>	<b>8</b>								

(1) To complete T140 Series Part Number, insert Capacitance Tolerance Symbol in the 9th Character as shown on Page 6.

(2) To complete the T242 Series Part Number, insert Failure Rate Symbol in the 13th Character.

**Bold Face** lines indicate popular part types and values.

T140/T242 Series Tantalum  
Hermetically Sealed

**RATINGS & PART NUMBER REFERENCE**

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T140			MIL-PRF-39003 (CSR23) CAPACITORS								KEMET EQUIVALENT MILITARY PART NUMBER	
			KEMET PART NUMBER	D.C. LEAKAGE µA@25°C MAX.	MAX. DISSIPATION FACTOR %@25°C, 120Hz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)									
						MIL-PRF-39003/3F EXPONENTIAL				MIL-PRF-39003/3F GRADED					
						M (1.0)	P (0.1)	R (0.01)	S (0.001)	B (0.1)	C (0.01)	D (0.001)			
<b>35 VOLT RATING AT 85°C — 23 VOLT RATING AT 125°C</b>															
1.2	A	10, 20	T140A125(1)035AS	0.6	4										
1.5	A	10, 20	T140A155(1)035AS	0.8	4										
1.8	A	10	T140A185K035AS	1.0	4	0164	0264	0364	0464	2064	3064	4064		T242A185K035(2)S	
1.8	A	20	T140A185M035AS	1.0	4										
8.2	B	10	T140B825K035AS	3.0	4	0165	0265	0365	0465	2065	3065	4065		T242B825K035(2)S	
8.2	B	20	T140B825M035AS	3.0	4										
<b>10.0</b>	<b>B</b>	<b>10</b>	<b>T140B106K035AS</b>	<b>3.0</b>	<b>4</b>	<b>0166</b>	<b>0266</b>	<b>0366</b>	<b>0466</b>	<b>2066</b>	<b>3066</b>	<b>4066</b>		<b>T242B106K035(2)S</b>	
<b>10.0</b>	<b>B</b>	<b>20</b>	<b>T140B106M035AS</b>	<b>3.0</b>	<b>4</b>	<b>0167</b>	<b>0267</b>	<b>0367</b>	<b>0467</b>	<b>2067</b>	<b>3067</b>	<b>4067</b>		<b>T242B106M035(2)S</b>	
27.0	C	10, 20	T140C276(1)035AS	7.0	6										
33.0	C	10	T140C336K035AS	8.0	6	0168	0268	0368	0468	2068	3068	4068		T242C336K035(2)S	
33.0	C	20	T140C336M035AS	8.0	6	0169	0269	0369	0469	2069	3069	4069		T242C336M035(2)S	
39.0	C	10	T140C396K035AS	10.0	6	0170	0270	0370	0470	2070	3070	4070		T242C396K035(2)S	
39.0	C	20	T140C396M035AS	10.0	6										
<b>47.0</b>	<b>C</b>	<b>10</b>	<b>T140C476K035AS</b>	<b>10.0</b>	<b>6</b>	<b>0171</b>	<b>0271</b>	<b>0371</b>	<b>0471</b>	<b>2071</b>	<b>3071</b>	<b>4071</b>		<b>T242C476K035(2)S</b>	
<b>47.0</b>	<b>C</b>	<b>20</b>	<b>T140C476M035AS</b>	<b>10.0</b>	<b>6</b>	<b>0172</b>	<b>0272</b>	<b>0372</b>	<b>0472</b>	<b>2072</b>	<b>3072</b>	<b>4072</b>		<b>T242C476M035(2)S</b>	
56.0	D	10	T140D566K035AS	12.0	6	0173	0273	0373	0473	2073	3073	4073		T242D566K035(2)S	
56.0	D	20	T140D566M035AS	12.0	6										
<b>68.0</b>	<b>D</b>	<b>10</b>	<b>T140D686K035AS</b>	<b>12.0</b>	<b>6</b>	<b>0174</b>	<b>0274</b>	<b>0374</b>	<b>0474</b>	<b>2074</b>	<b>3074</b>	<b>4074</b>		<b>T242D686K035(2)S</b>	
<b>68.0</b>	<b>D</b>	<b>20</b>	<b>T140D686M035AS</b>	<b>12.0</b>	<b>6</b>	<b>0175</b>	<b>0275</b>	<b>0375</b>	<b>0475</b>	<b>2075</b>	<b>3075</b>	<b>4075</b>		<b>T242D686M035(2)S</b>	
82.0	D	10, 20	T140D826(1)035AS	20.0	8										
100.0	D	10, 20	T140D107(1)035AS	20.0	8										
<b>50 VOLT RATING AT 85°C — 33 VOLT RATING AT 125°C</b>															
1.2	A	10	T140A125K050AS	0.6	4	0176	0276	0376	0476	2076	3076	4076		T242A125K050(2)S	
1.2	A	20	T140A125M050AS	0.6	4										
1.5	A	10	T140A155K050AS	0.8	4	0177	0277	0377	0477	2077	3077	4077		T242A155K050(2)S	
1.5	A	20	T140A155M050AS	0.8	4	0178	0278	0378	0478	2078	3078	4078		T242A155M050(2)S	
5.6	B	10	T140B565K050AS	2.5	4	0179	0279	0379	0479	2079	3079	4079		T242B565K050(2)S	
5.6	B	20	T140B565M050AS	2.5	4										
<b>6.8</b>	<b>B</b>	<b>10</b>	<b>T140B685K050AS</b>	<b>2.5</b>	<b>4</b>	<b>0180</b>	<b>0280</b>	<b>0380</b>	<b>0480</b>	<b>2080</b>	<b>3080</b>	<b>4080</b>		<b>T242B685K050(2)S</b>	
<b>6.8</b>	<b>B</b>	<b>20</b>	<b>T140B685M050AS</b>	<b>2.5</b>	<b>4</b>	<b>0181</b>	<b>0281</b>	<b>0381</b>	<b>0481</b>	<b>2081</b>	<b>3081</b>	<b>4081</b>		<b>T242B685M050(2)S</b>	
<b>22.0</b>	<b>C</b>	<b>10</b>	<b>T140C226K050AS</b>	<b>7.0</b>	<b>6</b>	<b>0182</b>	<b>0282</b>	<b>0382</b>	<b>0482</b>	<b>2082</b>	<b>3082</b>	<b>4082</b>		<b>T242C226K050(2)S</b>	
<b>22.0</b>	<b>C</b>	<b>20</b>	<b>T140C226M050AS</b>	<b>7.0</b>	<b>6</b>	<b>0183</b>	<b>0283</b>	<b>0383</b>	<b>0483</b>	<b>2083</b>	<b>3083</b>	<b>4083</b>		<b>T242C226M050(2)S</b>	
<b>27.0</b>	<b>C</b>	<b>10</b>	<b>T140C276K050AS</b>	<b>8.0</b>	<b>6</b>	<b>0184</b>	<b>0284</b>	<b>0384</b>	<b>0484</b>	<b>2084</b>	<b>3084</b>	<b>4084</b>		<b>T242C276K050(2)S</b>	
<b>27.0</b>	<b>C</b>	<b>20</b>	<b>T140C276M050AS</b>	<b>8.0</b>	<b>6</b>										
33.0	D	10	T140D336K050AS	10.0	6	0185	0285	0385	0485	2085	*	*		T242D336K050(2)S	
33.0	D	20	T140D336M050AS	10.0	6	0186	0286	0386	0486	2086	*	*		T242D336M050(2)S	
<b>39.0</b>	<b>D</b>	<b>10</b>	<b>T140D396K050AS</b>	<b>10.0</b>	<b>6</b>	<b>0187</b>	<b>0287</b>	<b>0387</b>	<b>0487</b>	<b>2087</b>	*	*		<b>T242D396K050(2)S</b>	
<b>39.0</b>	<b>D</b>	<b>20</b>	<b>T140D396M050AS</b>	<b>10.0</b>	<b>6</b>						*	*			
47.0	D	20	T140D476M050AS	10.0	6										
<b>60 VOLT RATING AT 85°C — 40 VOLT RATING AT 125°C</b>															
0.82	A	10, 20	T140A824(1)060AS	0.5	4										
1.0	A	10, 20	T140A105(1)060AS	0.5	4										
4.7	B	10, 20	T140B475(1)060AS	3.0	4										
5.6	B	10, 20	T140B565(1)060AS	3.0	4										
15.0	C	10, 20	T140C156(1)060AS	5.0	6										
18.0	C	10, 20	T140C186(1)060AS	6.0	6										
<b>22.0</b>	<b>C</b>	<b>10, 20</b>	<b>T140C226(1)060AS</b>	<b>7.0</b>	<b>6</b>										
27.0	D	10, 20	T140D276(1)060AS	10.0	6										
<b>33.0</b>	<b>D</b>	<b>10, 20</b>	<b>T140D336(1)060AS</b>	<b>10.0</b>	<b>6</b>										

(1) To complete T140 Series Part Number, insert Capacitance Tolerance Symbol in the 9th Character as shown on Page 6.

(2) To complete the T242 Series Part Number, insert Failure Rate Symbol in the 13th Character.

\*Note: C Failure Rate not QPL for -3085 thru 3087

D Failure Rate not QPL for -4085 thru 4087

**Bold Face** lines indicate popular part types and values.

Available from 1.2  $\mu$ F to 1000  $\mu$ F, 6VDC to 50 VDC, these high capacitance-to-volume ratio, hermetically sealed solid tantalum capacitors are offered in standard MIL style A, B, C, and D cases. They meet or exceed the environmental and mechanical requirements of MIL-C-39003. Designed to operate from -55°C to +125°C, they exhibit

exceptionally low DC leakage, dissipation factor and impedance characteristics. They are ideal for coupling, bypass, filtering and timing circuits, and are excellent substitutes for wet tantalums in low voltage applications. They are available in style CSR33 (T252 Series) per MIL-PRF-39003/06.

T252 Series Tantalum  
Hermetically Sealed

**CAPACITOR OUTLINE DRAWINGS**



**DIMENSIONS — INCHES & (MILLIMETERS)**

CASE SIZE	UNINSULATED		INSULATED		B ±0.002 (±.05)	C MAX.
	D ±0.005 (±.13)	L ±0.031 (±.79)	D ±0.010 (±.25)	L ±0.031 (±.79)		
A	0.125 (3.18)	0.250 (6.35)	0.135 (3.43)	0.286 (7.26)	0.020 (.51)	0.422 (10.72)
B	0.175 (4.45)	0.438 (11.13)	0.185 (4.70)	0.474 (12.04)	0.020 (.51)	0.610 (15.49)
C	0.279 (7.09)	0.650 (16.51)	0.289 (7.34)	0.686 (17.42)	0.025 (.64)	0.822 (20.88)
D	0.341 (8.66)	0.750 (19.05)	0.351 (8.92)	0.786 (19.96)	0.025 (.64)	0.922 (23.42)

**ORDERING INFORMATION**



For Military Marking Information, see page 4.



**TANTALUM HERMETICALLY SEALED / AXIAL — MIL-PRF-39003  
T252 (CSR33) SERIES**

**RATINGS & PART NUMBER REFERENCE**

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T252 SERIES						MIL-PRF-39003 (CSR33) CAPACITORS				KEMET EQUIVALENT MILITARY PART NUMBER
			D.C. LEAKAGE µA@25°C MAX.	MAX. DISSI- PATION FACTOR %@25°C, 120Hz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)								
					MIL-PRF-39003/6C EXPONENTIAL				MIL-PRF-39003/6C GRADED				
					M (1.0)	P (0.1)	R (0.01)	S (0.001)	B (0.1)	C (0.01)	D (0.001)		
<b>6 VOLT RATING AT 85°C</b>													
10.0	A	10	0.5	6	0001	0101	0201	0301	2001	3001	4001	T252A106K006(1)S	
10.0	A	20	0.5	6	0002	0102	0202	0302	2002	3002	4002	T252A106M006(1)S	
12.0	A	10	0.5	6	0003	0103	0203	0303	2003	3003	4003	T252A126K006(1)S	
100.0	B	10	1.0	8	0004	0104	0204	0304	2004	3004	4004	T252B107K006(1)S	
100.0	B	20	1.0	8	0005	0105	0205	0305	2005	3005	4005	T252B107M006(1)S	
330.0	C	10	2.0	8	0006	0106	0206	0306	2006	3006	4006	T252C337K006(1)S	
330.0	C	20	2.0	8	0007	0107	0207	0307	2007	3007	4007	T252C337M006(1)S	
390.0	C	10	2.0	10	0008	0108	0208	0308	2008	3008	4008	T252C397K006(1)S	
470.0	C	10	2.0	10	0009	0109	0209	0309	2009	3009	4009	T252C477K006(1)S	
470.0	C	20	2.0	10	0010	0110	0210	0310	2010	3010	4010	T252C477M006(1)S	
680.0	D	10	5.0	10	0011	0111	0211	0311	2011	3011	4011	T252D687K006(1)S	
680.0	D	20	5.0	10	0012	0112	0212	0312	2012	3012	4012	T252D687M006(1)S	
820.0	D	10	5.0	10	0013	0113	0213	0313	2013	3013	4013	T252D827K006(1)S	
1000.0	D	10	5.0	10	0014	0114	0214	0314	2014	3014	4014	T252D108K006(1)S	
1000.0	D	20	5.0	10	0015	0115	0215	0315	2015	3015	4015	T252D108M006(1)S	
<b>10 VOLT RATING AT 85°C</b>													
6.8	A	10	.5	6	0016	0116	0216	0316	2016	3016	4016	T252A685K010(1)S	
6.8	A	20	.5	6	0017	0117	0217	0317	2017	3017	4017	T252A685M010(1)S	
8.2	A	10	.5	6	0018	0118	0218	0318	2018	3018	4018	T252A825K010(1)S	
47.0	B	10	1.0	6	0019	0119	0219	0319	2019	3019	4019	T252B476K010(1)S	
47.0	B	20	1.0	6	0020	0120	0220	0320	2020	3020	4020	T252B476M010(1)S	
56.0	B	10	1.0	6	0021	0121	0221	0321	2021	3021	4021	T252B566K010(1)S	
68.0	B	10	1.0	6	0022	0122	0222	0322	2022	3022	4022	T252B686K010(1)S	
68.0	B	20	1.0	6	0023	0123	0223	0323	2023	3023	4023	T252B686M010(1)S	
82.0	B	10	1.0	6	0024	0124	0224	0324	2024	3024	4024	T252B826K010(1)S	
220.0	C	10	1.0	8	0025	0125	0225	0325	2025	3025	4025	T252C227K010(1)S	
220.0	C	20	1.0	8	0026	0126	0226	0326	2026	3026	4026	T252C227M010(1)S	
270.0	C	10	2.0	8	0027	0127	0227	0327	2027	3027	4027	T252C277K010(1)S	
390.0	D	10	2.0	10	0028	0128	0228	0328	2028	3028	4028	T252D397K010(1)S	
470.0	D	10	4.0	10	0029	0129	0229	0329	2029	3029	4029	T252D477K010(1)S	
470.0	D	20	4.0	10	0030	0130	0230	0330	2030	3030	4030	T252D477M010(1)S	
560.0	D	10	4.0	10	0031	0131	0231	0331	2031	3031	4031	T252D567K010(1)S	
<b>15 VOLT RATING AT 85°C</b>													
4.7	A	10	.5	4	0032	0132	0232	0332	2032	3032	4032	T252A475K015(1)S	
4.7	A	20	.5	4	0033	0133	0233	0333	2033	3033	4033	T252A475M015(1)S	
5.6	A	10	.5	4	0034	0134	0234	0334	2034	3034	4034	T252A565K015(1)S	
33.0	B	10	1.0	6	0035	0135	0235	0335	2035	3035	4035	T252B336K015(1)S	
33.0	B	20	1.0	6	0036	0136	0236	0336	2036	3036	4036	T252B336M015(1)S	
39.0	B	10	1.0	6	0037	0137	0237	0337	2037	3037	4037	T252B396K015(1)S	
150.0	C	10	1.0	8	0038	0138	0238	0338	2038	3038	4038	T252C157K015(1)S	
150.0	C	20	1.0	8	0039	0139	0239	0339	2039	3039	4039	T252C157M015(1)S	
180.0	C	10	2.0	8	0040	0140	0240	0340	2040	3040	4040	T252C187K015(1)S	
220.0	D	10	2.0	8	0041	0141	0241	0341	2041	3041	4041	T252D227K015(1)S	
220.0	D	20	2.0	8	0042	0142	0242	0342	2042	3042	4042	T252D227M015(1)S	
270.0	D	10	2.0	8	0043	0143	0243	0343	2043	3043	4043	T252D277K015(1)S	
330.0	D	10	2.0	8	0044	0144	0244	0344	2044	3044	4044	T252D337K015(1)S	
330.0	D	20	2.0	8	0045	0145	0245	0345	2045	3045	4045	T252D337M015(1)S	

(1) To complete Part Number, insert Failure Rate Symbol in the 13th Character as shown on Page 31.



RATINGS & PART NUMBER REFERENCE

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T252 SERIES						MIL-PRF-39003 (CSR33) CAPACITORS				KEMET EQUIVALENT MILITARY PART NUMBER
			D.C. LEAKAGE µA@25°C MAX.	MAX. DISSI- PATION FACTOR %@25°C, 120Hz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)								
					MIL-PRF-39003/6C EXPONENTIAL				MIL-PRF-39003/6C GRADED				
					M (1.0)	P (0.1)	R (0.01)	S (0.001)	B (0.1)	C (0.01)	D (0.001)		
<b>20 VOLT RATING AT 85°C</b>													
2.7	A	10	.5	4	0046	0146	0246	0346	2046	3046	4046	T252A275K020(1)S	
3.3	A	10	.5	4	0047	0147	0247	0347	2047	3047	4047	T252A335K020(1)S	
3.3	A	20	.5	4	0048	0148	0248	0348	2048	3048	4048	T252A335M020(1)S	
3.9	A	10	.5	4	0049	0149	0249	0349	2049	3049	4049	T252A395K020(1)S	
18.0	B	10	1.0	6	0050	0150	0250	0350	2050	3050	4050	T252B186K020(1)S	
22.0	B	10	1.0	6	0051	0151	0251	0351	2051	3051	4051	T252B226K020(1)S	
22.0	B	20	1.0	6	0052	0152	0252	0352	2052	3052	4052	T252B226M020(1)S	
27.0	B	10	1.0	6	0053	0153	0253	0353	2053	3053	4053	T252B276K020(1)S	
56.0	C	10	1.0	6	0054	0154	0254	0354	2054	3054	4054	T252C566K020(1)S	
68.0	C	10	1.0	6	0055	0155	0255	0355	2055	3055	4055	T252C686K020(1)S	
68.0	C	20	1.0	6	0056	0156	0256	0356	2056	3056	4056	T252C686M020(1)S	
82.0	C	10	1.0	6	0057	0157	0257	0357	2057	3057	4057	T252C826K020(1)S	
100.0	C	10	1.0	6	0058	0158	0258	0358	2058	3058	4058	T252C107K020(1)S	
100.0	C	20	1.0	6	0059	0159	0259	0359	2059	3059	4059	T252C107M020(1)S	
120.0	C	10	1.0	6	0060	0160	0260	0360	2060	3060	4060	T252C127K020(1)S	
150.0	D	10	2.0	8	0061	0161	0261	0361	2061	3061	4061	T252D157K020(1)S	
150.0	D	20	2.0	8	0062	0162	0262	0362	2062	3062	4062	T252D157M020(1)S	
180.0	D	10	2.0	8	0063	0163	0263	0363	2063	3063	4063	T252D187K020(1)S	
<b>35 VOLT RATING AT 85°C</b>													
1.8	A	10	.5	4	0064	0164	0264	0364	2064	3064	4064	T252A185K035(1)S	
8.2	B	10	1.0	6	0065	0165	0265	0365	2065	3065	4065	T252B825K035(1)S	
10.0	B	10	1.0	6	0066	0166	0266	0366	2066	3066	4066	T252B106K035(1)S	
10.0	B	20	1.0	6	0067	0167	0267	0367	2067	3067	4067	T252B106M035(1)S	
33.0	C	10	1.0	6	0068	0168	0268	0368	2068	3068	4068	T252C336K035(1)S	
33.0	C	20	1.0	6	0069	0169	0269	0369	2069	3069	4069	T252C336M035(1)S	
39.0	C	10	1.0	6	0070	0170	0270	0370	2070	3070	4070	T252C396K035(1)S	
47.0	C	10	1.0	6	0071	0171	0271	0371	2071	3071	4071	T252C476K035(1)S	
47.0	C	20	1.0	6	0072	0172	0272	0372	2072	3072	4072	T252C476M035(1)S	
56.0	D	10	2.0	6	0073	0173	0273	0373	2073	3073	4073	T252D566K035(1)S	
68.0	D	10	2.0	6	0074	0174	0274	0374	2074	3074	4074	T252D686K035(1)S	
68.0	D	20	2.0	6	0075	0175	0275	0375	2075	3075	4075	T252D686M035(1)S	
<b>50 VOLT RATING AT 85°C</b>													
1.2	A	10	.5	4	0076	0176	0276	0376	2076	3076	4076	T252A125K050(1)S	
1.5	A	10	.5	4	0077	0177	0277	0377	2077	3077	4077	T252A155K050(1)S	
1.5	A	20	.5	4	0078	0178	0278	0378	2078	3078	4078	T252A155M050(1)S	
5.6	B	10	1.0	4	0079	0179	0279	0379	2079	3079	4079	T252B565K050(1)S	
6.8	B	10	1.0	6	0080	0180	0280	0380	2080	3080	4080	T252B685K050(1)S	
6.8	B	20	1.0	6	0081	0181	0281	0381	2081	3081	4081	T252B685M050(1)S	
22.0	C	10	1.0	6	0082	0182	0282	0382	2082	3082	4082	T252C226K050(1)S	
22.0	C	20	1.0	6	0083	0183	0283	0383	2083	3083	4083	T252C226M050(1)S	
27.0	C	10	1.0	6	0084	0184	0284	0384	2084	3084	4084	T252C276K050(1)S	
33.0	D	10	1.0	6	0085	0185	0285	0385	2085	*	*	T252D336K050(1)S	
33.0	D	20	1.0	6	0086	0186	0286	0386	2086	*	*	T252D336M050(1)S	
39.0	D	10	1.0	6	0087	0187	0287	0387	2087	*	*	T252D396K050(1)S	

(1) To complete Part Number, insert Failure Rate Symbol in the 13th Character as shown on Page 31.  
\*NOTE: C Failure rate not QPL for -3085 thru 3087.  
D Failure rate not QPL for -4085 thru 4087.

T252 Series Tantalum  
Hermetically Sealed

KEMET's T262 (CSR21) per MIL-C-39003/09 hermetically sealed solid tantalum capacitors are similar to KEMET's popular T212 (CSR13 per MIL-PRF-39003/01) capacitors shown on page 6, but offer higher ripple current handling capability and exhibit exceptionally low Equivalent Series Resistance (ESR).

The T262 Series is ideal for filtering applications and in military power supplies where low ESR is essential. T262s are 100% surge current tested and their dissipation factor is screened at 1kHz. Available in C & D case sizes only, 5.6 to 330  $\mu$ F, 6 to 50 VDC.

## CAPACITOR OUTLINE DRAWINGS



## DIMENSIONS — INCHES & (MILLIMETERS)

CASE SIZE	UNINSULATED		INSULATED		B $\pm 0.002$ ( $\pm .05$ )	C MAX.
	D $\pm 0.005$ ( $\pm .13$ )	L $\pm 0.031$ ( $\pm .79$ )	D $\pm 0.010$ ( $\pm .25$ )	L $\pm 0.031$ ( $\pm .79$ )		
C	0.279 (7.09)	0.650 (16.51)	0.289 (7.34)	0.686 (17.42)	0.025 (.64)	0.822 (20.88)
D	0.341 (8.66)	0.750 (19.05)	0.351 (8.92)	0.786 (19.96)	0.025 (.64)	0.922 (23.42)

## ORDERING INFORMATION



For Military Marking Information, see page 4.



**RATINGS & PART NUMBER REFERENCE**

CAPACITANCE μF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T262 SERIES				MIL-PRF-39003/09 (CSR21) CAPACITORS							KEMET EQUIVALENT MILITARY PART NUMBER
			D.C. LEAKAGE μA@25°C MAX.	MAX. DISSI- PATION FACTOR %@25°C, 1 kHz	MAX. ESR Ω@25°C, 100 kHz	MAX. RIPPLE CURRENT Arms@25°C 40 kHz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS.)							
							MIL-PRF-39003/9D EXPONENTIAL				MIL-PRF-39003/9D GRADED			
							M (1.0)	P (0.1)	R (0.01)	S (0.001)	B (0.1)	C (0.01)	D (0.001)	
<b>35 VOLT RATING AT 85°C — 23 VOLT RATING AT 125°C</b>														
22.0	C	5	4.0	4	.160	2.1	0053	0153	0253	0353	2053	3053	4053	T262C226J035(1)S
22.0	C	10	4.0	4	.160	2.1	0054	0154	0254	0354	2054	3054	4054	T262C226K035(1)S
22.0	C	20	4.0	4	.160	2.1	0055	0155	0255	0355	2055	3055	4055	T262C226M035(1)S
27.0	D	5	4.5	4	.145	2.4	0056	0156	0256	0356	2056	3056	4056	T262D276J035(1)S
27.0	D	10	4.5	4	.145	2.4	0057	0157	0257	0357	2057	3057	4057	T262D276K035(1)S
33.0	D	5	5.5	5	.130	2.5	0058	0158	0258	0358	2058	3058	4058	T262D336J035(1)S
33.0	D	10	5.5	5	.130	2.5	0059	0159	0259	0359	2059	3059	4059	T262D336K035(1)S
33.0	D	20	5.5	5	.130	2.5	0060	0160	0260	0360	2060	3060	4060	T262D336M035(1)S
39.0	D	5	7.0	5	.120	2.6	0061	0161	0261	0361	2061	3061	4061	T262D396J035(1)S
39.0	D	10	7.0	5	.120	2.6	0062	0162	0262	0362	2062	3062	4062	T262D396K035(1)S
47.0	D	5	8.0	5	.110	2.7	0063	0163	0263	0363	2063	3063	4063	T262D476J035(1)S
47.0	D	10	8.0	5	.110	2.7	0064	0164	0264	0364	2064	3064	4064	T262D476K035(1)S
47.0	D	20	8.0	5	.110	2.7	0065	0165	0265	0365	2065	3065	4065	T262D476M035(1)S
<b>50 VOLT RATING AT 85°C — 33 VOLT RATING AT 125°C</b>														
5.6	C	5	2.2	3	.300	1.5	0066	0166	0266	0366	2066	3066	4066	T262C565J050(1)S
5.6	C	10	2.2	3	.300	1.5	0067	0167	0267	0367	2067	3067	4067	T262C565K050(1)S
6.8	C	5	2.2	3	.275	1.6	0068	0168	0268	0368	2068	3068	4068	T262C685J050(1)S
6.8	C	10	2.2	3	.275	1.6	0069	0169	0269	0369	2069	3069	4069	T262C685K050(1)S
6.8	C	20	2.2	3	.275	1.6	0070	0170	0270	0370	2070	3070	4070	T262C685M050(1)S
8.2	C	5	2.5	3	.250	1.6	0071	0171	0271	0371	2071	3071	4071	T262C825J050(1)S
8.2	C	10	2.5	3	.250	1.6	0072	0172	0272	0372	2072	3072	4072	T262C825K050(1)S
10.0	C	5	2.5	3	.230	1.7	0073	0173	0273	0373	2073	3073	4073	T262C106J050(1)S
10.0	C	10	2.5	3	.230	1.7	0074	0174	0274	0374	2074	3074	4074	T262C106K050(1)S
10.0	C	20	2.5	3	.230	1.7	0075	0175	0275	0375	2075	3075	4075	T262C106M050(1)S
12.0	C	5	3.0	3	.210	1.8	0076	0176	0276	0376	2076	3076	4076	T262C126J050(1)S
12.0	C	10	3.0	3	.210	1.8	0077	0177	0277	0377	2077	3077	4077	T262C126K050(1)S
15.0	C	5	4.0	3	.190	1.9	0078	0178	0278	0378	2078	3078	4078	T262C156J050(1)S
15.0	C	10	4.0	3	.190	1.9	0079	0179	0279	0379	2079	3079	4079	T262C156K050(1)S
15.0	C	20	4.0	3	.190	1.9	0080	0180	0280	0380	2080	3080	4080	T262C156M050(1)S
18.0	C	5	4.5	4	.175	2.0	0081	0181	0281	0381	2081	3081	4081	T262C186J050(1)S
18.0	C	10	4.5	4	.175	2.0	0082	0182	0282	0382	2082	3082	4082	T262C186K050(1)S
22.0	D	5	5.5	4	.160	2.3	0083	0183	0283	0383	2083	3083	4083	T262D226J050(1)S
22.0	D	10	5.5	4	.160	2.3	0084	0184	0284	0384	2084	3084	4084	T262D226K050(1)S
22.0	D	20	5.5	4	.160	2.3	0085	0185	0285	0385	2085	3085	4085	T262D226M050(1)S

(1) To complete the T262 Series Part Number, insert Failure Rate Symbol in the 13th Character as shown on Page 34.

T216 and T256 are KEMET's new designation for MIL-Style CSS13 and CSS33 capacitors. The T216/T256 Series is qualified to all failure rates per MIL-PRF-39003/10. Products meeting this specification have passed rigorous test requirements and are used in space applications or other equally demanding environments.

The T216 is available in capacitance ratings from .15 µF to 330 µF; voltage ratings from 6 VDC to 75 VDC. The T256 is available in capacitance ratings from 1.2 µF to 1000 µF with voltage ratings of 6 VDC to 50 VDC.

These capacitors provide circuit designers an excellent choice for blocking, bypass, decoupling, filtering and timing applications.

**CAPACITOR OUTLINE DRAWINGS**



**DIMENSIONS — INCHES & (MILLIMETERS)**

CASE SIZE	UNINSULATED		INSULATED		B ±0.002 (±.05)	C MAX.
	D ±0.005 (±.13)	L ±0.031 (±.79)	D ±0.010 (±.25)	L ±0.031 (±.79)		
A	0.125 (3.18)	0.250 (6.35)	0.135 (3.43)	0.286 (7.26)	0.020 (.51)	0.422 (10.72)
B	0.175 (4.45)	0.438 (11.13)	0.185 (4.70)	0.474 (12.04)	0.020 (.51)	0.610 (15.49)
C	0.279 (7.09)	0.650 (16.51)	0.289 (7.34)	0.686 (17.42)	0.025 (.64)	0.822 (20.88)
D	0.341 (8.66)	0.750 (19.05)	0.351 (8.92)	0.786 (19.96)	0.025 (.64)	0.922 (23.42)

**ORDERING INFORMATION**



\*Part Number Example: T216A105K050CS (14 digits – no spaces)

T216/T256 Series Tantalum  
Hermetically Sealed

**MIL-PRF-39003/10 ORDERING INFORMATION**

**M39003/10 — 3078S**



**MARKING INFORMATION**

**A CASE**

39003	Military specification number
10 - K	Specification sheet number and trademark
3078S	Military dash number and "S" for sleeved
+J310	Polarity, "J" for JAN date code (1st digit indicates year and the next two digits indicate the week)
XYA	Lot, unique lot code

**C & D CASE**

M39003	Military specification number
10-2049SJ	Specification sheet number, military dash number and "J" for Jan.
+6.8 μF	Positive terminal identifier and capacitance value
10% 35V	Capacitance tolerance and voltage rating
31433	Source code
0310 NAB K	Date code, lot code, unique lot code, and trademark

**B CASE**

M39003	Military specification number
10 -	Specification sheet number
3082SJ	Military dash number and "J" for JAN
31433	Source code
+310	Polarity, date code (1st digit indicates year and the next two digits indicate the week)
NABK	Lot code, unique lot code and trademark.

NOTE: Marking will include S or U after the MIL dash number, a third letter following lot symbol or lot code designates a unique lot identifier, and a black band on negative end of case.

■ Black band on negative end.

**T216/(CSS13)  
RATINGS & PART NUMBER REFERENCE**

CAPACITANCE μF	CASE SIZE	KEMET EQUIVALENT PART NUMBER FOR CSS13 CAPACITORS	KEMET T216						MIL-PRF-39003 (CSS13) CAPACITORS	
			DC LEAKAGE			MAX. DISSIPATION FACTOR		MAX. ESR Ω @ 25°C 100kHz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS) MIL-PRF-39003/10 GRADED	
			μA @ +25° MAX.	μA @ +85° MAX.	μA @ +125° MAX.	% @ -55°C +25°C MAX.	% @ -85°C +125°C MAX.		B (0.1)	C (0.01)
<b>6 VOLT RATING AT 85°C</b>										
5.6 6.8	A A	T216A565K006CS T216A685K006CS	.3 .3	6.0 6.0	7.5 7.5	4 6	4 6	.90 .80		3001(1) 3002(1)
47.0 56.0	B B	T216B476K006CS T216B566K006CS	1.5 1.5	24.0 24.0	30.0 30.0	6 6	6 6	.24 .24		3003(1) 3004(1)
150.0 180.0	C C	T216C157K006CS T216C187K006CS	4.5 5.5	90.0 110.0	113.0 138.0	8 8	8 8	.09 .08		3005(1) 3006(1)
270.0 330.0	D D	T216D277K006CS T216D337K006CS	6.5 7.5	130.0 150.0	163.0 188.0	8 8	8 8	.07 .06		3007(1) 3008(1)
<b>10 VOLT RATING AT 85°C</b>										
3.9 4.7	A A	T216A395K010CS T216A475K010CS	.3 .4	6.0 7.0	7.5 8.8	4 4	4 4	1.00 .90		3009(1) 3010(1)
27.0 33.0 39.0	B B B	T216B276K010CS T216B336K010CS T216B396K010CS	2.0 2.5 2.5	40.0 50.0 50.0	50.0 63.0 63.0	6 6 6	6 6 6	.25 .24 .24		3011(1) 3012(1) 3013(1)
82.0 100.0 120.0	C C C	T216C826K010CS T216C107K010CS T216C127K010CS	4.0 5.0 6.0	80.0 100.0 120.0	100.0 125.0 150.0	6 8 8	6 8 8	.12 .11 .10		3014(1) 3015(1) 3016(1)
180.0 220.0	D D	T216D187K010CS T216D227K010CS	9.0 10.0	180.0 200.0	226.0 250.0	8 8	8 8	.08 .07		3017(1) 3018(1)

(1) To complete, insert S for sleeved or U for unsleeved, if "U" ordered also use C-0100.

**RATINGS & PART NUMBER REFERENCE T216/(CSS13) (Cont'd)**

CAPACITANCE µF	CASE SIZE	KEMET EQUIVALENT PART NUMBER FOR CSS13 CAPACITORS	KEMET T216						MIL-PRF-39003 (CSS13) CAPACITORS	
			DC LEAKAGE			MAX. DISSIPATION FACTOR		MAX. ESR Ω @ 25°C 100kHz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS) MIL-PRF-39003/10 GRADED	
			µA @ +25° MAX.	µA @ +85° MAX.	µA @ +125° MAX.	% @ -55°C +25°C MAX.	% @ -85°C +125°C MAX.		B (0.1)	C (0.01)
<b>15 VOLT RATING AT 85°C</b>										
2.7	A	T216A275K015CS	.3	6.0	7.5	4	4	1.20		3019(1)
3.3	A	T216A335K015CS	.4	8.0	10.0	4	4	1.00		3020(1)
18.0	B	T216B186K015CS	2.0	35.0	44.0	6	6	.27		3021(1)
22.0	B	T216B226K015CS	2.0	40.0	50.0	6	6	.26		3022(1)
56.0	C	T216C566K015CS	4.0	80.0	100.0	6	6	.15		3023(1)
68.0	C	T216C686K015CS	5.0	100.0	125.0	6	6	.13		3024(1)
120.0	D	T216D127K015CS	9.0	180.0	226.0	8	8	.09		3025(1)
150.0	D	T216D157K015CS	10.0	220.0	250.0	8	8	.09		3026(1)
<b>20 VOLT RATING AT 85°C</b>										
1.2	A	T216A125K020CS	.3	6.0	7.5	4	4	1.40		3027(1)
1.5	A	T216A155K020CS	.3	6.0	7.5	4	4	1.30		3028(1)
1.8	A	T216A185K020CS	.3	6.0	7.5	4	4	1.25		3029(1)
2.2	A	T216A225K020CS	.4	8.0	10.0	4	4	1.20		3030(1)
8.2	B	T216B825K020CS	1.0	20.0	25.0	6	6	.39		3031(1)
10.0	B	T216B106K020CS	1.5	30.0	38.0	6	6	.35		3032(1)
12.0	B	T216B126K020CS	1.8	35.0	44.0	6	6	.32		3033(1)
15.0	B	T216B156K020CS	2.0	40.0	50.0	6	6	.29		3034(1)
27.0	C	T216C276K020CS	2.5	50.0	63.0	6	6	.21		3035(1)
33.0	C	T216C336K020CS	3.5	70.0	88.0	6	6	.19		3036(1)
39.0	C	T216C396K020CS	4.0	80.0	100.0	6	6	.17		3037(1)
47.0	C	T216C476K020CS	4.5	90.0	113.0	6	6	.16		3038(1)
56.0	D	T216D566K020BS	5.5	110.0	138.0	6	6	.13	2039(1)	
68.0	D	T216D686K020BS	7.0	140.0	175.0	6	6	.12	2040(1)	
82.0	D	T216D826K020BS	8.0	160.0	200.0	6	6	.11	2041(1)	
100.0	D	T216D107K020BS	10.0	200.0	250.0	8	8	.10	2042(1)	
<b>35 VOLT RATING AT 85°C</b>										
5.6	B	T216B565K035BS	1.3	25.0	32.0	4	4	.47	2043(1)	
6.8	B	T216B685K035BS	1.5	30.0	38.0	6	6	.43	2044(1)	
22.0	C	T216C226K035BS	4.0	40.0	100.0	6	6	.25	2045(1)	
27.0	D	T216D276K035BS	4.5	90.0	113.0	6	6	.18	2046(1)	
33.0	D	T216D336K035BS	5.5	110.0	138.0	6	6	.17	2047(1)	
39.0	D	T216D396K035BS	7.0	140.0	175.0	6	6	.15	2048(1)	
47.0	D	T216D476K035BS	8.0	160.0	200.0	6	6	.14	2049(1)	
<b>50 VOLT RATING AT 85°C</b>										
.12	A	T216A124K050CS	.3	5.0	6.3	2	4	6.50		3067(1)
.15	A	T216A154K050CS	.3	5.0	6.3	2	4	5.50		3068(1)
.18	A	T216A184K050CS	.3	5.0	6.3	2	4	5.00		3069(1)
.22	A	T216A224K050CS	.3	5.0	6.3	2	4	4.00		3070(1)
.27	A	T216A274K050CS	.3	5.0	6.3	2	4	3.50		3071(1)
.33	A	T216A334K050CS	.3	5.0	6.3	2	4	3.30		3072(1)
.39	A	T216A394K050CS	.3	5.0	6.3	2	4	3.20		3073(1)
.47	A	T216A474K050CS	.3	5.0	6.3	2	4	3.00		3074(1)
.56	A	T216A564K050CS	.3	5.0	6.3	2	4	2.50		3075(1)
.68	A	T216A684K050CS	.3	5.0	6.3	2	4	1.80		3076(1)
.82	A	T216A824K050CS	.3	5.0	6.3	2	4	1.60		3077(1)
1.0	A	T216A105K050CS	.4	8.0	10.0	2	4	1.40		3078(1)
1.2	B	T216B125K050CS	.4	9.0	11.0	4	4	1.20		3079(1)
1.5	B	T216B155K050CS	.6	12.0	15.0	4	4	1.10		3080(1)
1.8	B	T216B185K050CS	.7	14.0	18.0	4	4	.92		3081(1)
2.2	B	T216B225K050CS	.8	17.0	22.0	4	4	.80		3082(1)
2.7	B	T216B275K050CS	1.0	20.0	25.0	4	4	.68		3083(1)
3.3	B	T216B335K050CS	1.2	25.0	32.0	4	4	.62		3084(1)
3.9	B	T216B395K050CS	1.5	30.0	38.0	4	4	.56		3085(1)
4.7	B	T216B475K050BS	1.7	35.0	44.0	4	4	.51	2086(1)	
5.6	C	T216C565K050CS	2.2	45.0	56.0	4	4	.44		3087(1)
6.8	C	T216C685K050CS	2.2	45.0	56.0	6	6	.40		3088(1)
8.2	C	T216C825K050CS	2.5	50.0	63.0	6	6	.36		3089(1)
10.0	C	T216C106K050CS	2.5	50.0	63.0	6	6	.33		3090(1)
12.0	C	T216C126K050BS	3.0	60.0	75.0	6	6	.30	2091(1)	
15.0	C	T216C156K020BS	4.0	80.0	100.0	6	6	.27	2092(1)	
18.0	C	T216C186K050BS	4.5	90.0	113.0	6	6	.25	2093(1)	
22.0	D	T216D226K050BS	5.5	100.0	138.0	6	6	.20	2094(1)	

(1) To complete, insert S for sleeved or U for unsleeved, if "U" ordered also use C-0100.

T216/T256 Series Tantalum  
Hermetically Sealed



# TANTALUM HERMETICALLY SEALED / AXIAL — MIL-PRF-39003 T216 (CSS13) & T256 (CSS33) SERIES

## RATINGS & PART NUMBER REFERENCE T216/(CSS13) (Cont'd)

CAPACITANCE μF	CASE SIZE	KEMET EQUIVALENT PART NUMBER FOR CSS13 CAPACITORS	KEMET T216 SERIES					MIL-PRF-39003 (CSS13) CAPACITORS		
			DC LEAKAGE			MAX. DISSIPATION FACTOR		MAX. ESR Ω @ 25°C 100kHz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS) MIL-PRF-39003/10 GRADED	
			μA @ +25° MAX.	μA @ +85° MAX.	μA @ +125° MAX.	% @ -55°C +25°C MAX.	% @ -85°C +125°C MAX.		B (0.1)	C (0.01)
<b>75 VOLT RATING AT 85°C</b>										
.15	A	T216A154K075CS	.3	5.0	6.3	2	4	4.4		3097(1)
.18	A	T216A184K075CS	.3	5.0	6.3	2	4	4.0		3098(1)
.22	A	T216A224K075CS	.3	5.0	6.3	2	4	3.5		3099(1)
.27	A	T216A274K075CS	.3	5.0	6.3	2	4	3.1		3100(1)
.33	A	T216A334K075CS	.3	5.0	6.3	2	4	2.8		3101(1)
.39	A	T216A394K075CS	.3	5.0	6.3	2	4	2.6		3102(1)
.47	A	T216A474K075CS	.3	5.0	6.3	2	4	2.4		3103(1)
.56	A	T216A564K075CS	.3	5.0	6.3	2	4	2.25		3104(1)
.68	A	T216A684K075CS	.3	5.0	6.3	2	4	2.10		3105(1)
.82	B	T216B824K075CS	.3	5.0	6.3	2	4	1.47		3106(1)
1.0	B	T216B105K075CS	.4	5.0	6.3	2	4	1.40		3107(1)
1.2	B	T216B125K075CS	.4	5.0	6.3	4	4	1.33		3108(1)
1.5	B	T216B155K075CS	.6	10.0	13.0	4	4	1.06		3109(1)
1.8	B	T216B185K075CS	.7	10.0	13.0	4	4	.92		3110(1)
2.2	B	T216B225K075CS	.8	15.0	19.0	4	4	.80		3111(1)
2.7	B	T216B275K075BS	1.0	15.0	19.0	4	4	.68	2112(1)	
3.3	B	T216B335K075BS	1.2	20.0	25.0	4	4	.62	2113(1)	
3.9	B	T216B395K075BS	1.5	20.0	25.0	4	4	.56	2114(1)	
4.7	C	T216C475K075BS	3.0	60.0	75.0	4	4	.47	2115(1)	
5.6	C	T216C565K075BS	3.0	60.0	75.0	4	4	.44	2116(1)	
6.8	C	T216C685K075BS	5.0	100.0	125.0	6	6	.44	2117(1)	
8.2	C	T216C825K075BS	5.0	100.0	125.0	6	6	.36	2118(1)	
10.0	C	T216C106K075BS	5.0	100.0	125.0	6	6	.33	2119(1)	
12.0	D	T216D126K075BS	5.0	100.0	125.0	6	6	.26	2120(1)	
15.0	D	T216D156K075BS	7.0	140.0	175.0	6	6	.23	2121(1)	

## T256/(CSS33) RATINGS AND PART NUMBER REFERENCE

CAPACITANCE μF	CASE SIZE	KEMET EQUIVALENT PART NUMBER FOR CSS33 CAPACITORS	KEMET T256 SERIES					MIL-PRF-39003 (CSS33) CAPACITORS		
			DC LEAKAGE			MAX. DISSIPATION FACTOR		MAX. ESR Ω @ 25°C 100kHz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS) MIL-PRF-39003/10 GRADED	
			μA @ +25° MAX.	μA @ +85° MAX.	μA @ +125° MAX.	% @ -55°C +25°C MAX.	% @ -85°C +125°C MAX.		B (0.1)	C (0.01)
<b>6 VOLT RATING AT 85°C</b>										
10.0	A	T256A106K006CS	.5	2.0	2.0	6	6	.70		3500(1)
12.0	A	T256A126K006CS	.5	2.0	2.0	6	6	.60		3501(1)
100.0	B	T256B107K006CS	1.0	3.0	3.0	8	8	.20		3502(1)
330.0	C	T256C337K006BS	2.0	8.0	8.0	8	8	.065	2503(1)	
390.0	C	T256C397K006BS	2.0	8.0	8.0	10	10	.065	2504(1)	
470.0	C	T256C477K006BS	2.0	8.0	8.0	10	10	.060	2505(1)	
680.0	D	T256D687K006CS	5.0	10.0	10.0	10	10	.060		3506(1)
820.0	D	T256D827K006CS	5.0	10.0	10.0	10	10	.055		3507(1)
1000.0	D	T256D108K006CS	5.0	10.0	10.0	10	10	.050		3508(1)
<b>10 VOLT RATING AT 85°C</b>										
6.8	A	T256A685K010CS	.5	2.0	2.0	6	6	.80		3509(1)
8.2	A	T256A825K010CS	.5	2.0	2.0	6	6	.70		3510(1)
47.0	B	T256B476K010CS	1.0	2.0	2.0	6	6	.22		3511(1)
56.0	B	T256B566K010CS	1.0	4.0	4.0	6	6	.20		3512(1)
68.0	B	T256B686K010CS	1.0	4.0	4.0	6	6	.18		3513(1)
82.0	B	T256B826K010CS	1.0	4.0	4.0	6	6	.15		3514(1)
220.0	C	T256C227K010BS	1.0	7.0	7.0	8	8	.090	2515(1)	
270.0	C	T256C277K010BS	2.0	10.0	10.0	8	8	.075	2516(1)	
390.0	D	T256D397K010CS	2.0	16.0	16.0	10	10	.070		3517(1)
470.0	D	T256D477K010CS	4.0	16.0	16.0	10	10	.065		3518(1)
560.0	D	T256D567K010CS	4.0	16.0	16.0	10	10	.060		3519(1)

(1) To complete, insert S for sleeved or U for unsleeved, if "U" ordered also use C-0100.



**RATINGS AND PART NUMBER REFERENCE T256/(CSS33) (Cont'd)**

CAPACITANCE μF	CASE SIZE	KEMET EQUIVALENT PART NUMBER FOR CSS33 CAPACITORS	KEMET T256 SERIES						MIL-PRF-39003 (CSS33) CAPACITORS	
			DC LEAKAGE			MAX. DISSIPATION FACTOR		MAX. ESR Ω @ 25°C 100kHz	DASH NUMBER REFERENCE FAILURE RATE LEVEL (%/1000 HRS) MIL-PRF-39003/10 GRADED	
			μA @ +25° MAX.	μA @ +85° MAX.	μA @ +125° MAX.	% @ -55°C +25°C MAX.	% @ -85°C +125°C MAX.		B (0.1)	C (0.01)
<b>15 VOLT RATING AT 85°C</b>										
4.7	A	T256A475K015CS	.5	2.0	2.0	4	4	.90		3520(1)
5.6	A	T256A565K015CS	.5	2.0	2.0	4	4	.80		3521(1)
33.0	B	T256B336K015CS	1.0	2.0	2.0	6	6	.24		3522(1)
39.0	B	T256B396K015CS	1.0	2.0	2.0	6	6	.22		3523(1)
150.0	C	T256C157K015BS	1.0	7.0	7.0	8	8	.10	2524(1)	
180.0	C	T256C187K015BS	2.0	10.0	10.0	8	8	.09	2525(1)	
220.0	D	T256D227K015BS	2.0	10.0	10.0	8	8	.07	2526(1)	
270.0	D	T256D277K015BS	2.0	16.0	16.0	8	8	.065	2527(1)	
330.0	D	T256D337K015BS	2.0	16.0	16.0	8	8	.060	2528(1)	
<b>20 VOLT RATING AT 85°C</b>										
2.7	A	T256A275K020CS	.5	2.0	2.0	4	4	1.15		3529(1)
3.3	A	T256A335K020CS	.5	2.0	2.0	4	4	.95		3530(1)
3.9	A	T256A395K020CS	.5	2.0	2.0	4	4	.90		3531(1)
18.0	B	T256B186K020CS	1.0	2.0	2.0	6	6	.27		3532(1)
22.0	B	T256B226K020BS	1.0	2.0	2.0	6	6	.26	2533(1)	
27.0	B	T256B276K020BS	1.0	2.0	2.0	6	6	.24	2534(1)	
56.0	C	T256C566K020CS	1.0	10.0	10.0	6	6	.15		3535(1)
68.0	C	T256C686K020CS	1.0	10.0	10.0	6	6	.14		3536(1)
82.0	C	T256C826K020BS	1.0	10.0	10.0	6	6	.12	2537(1)	
100.0	C	T256C107K020BS	1.0	10.0	10.0	6	6	.10	2538(1)	
120.0	C	T256C127K020BS	1.0	10.0	10.0	6	6	.09	2539(1)	
150.0	D	T256D157K020BS	2.0	10.0	10.0	8	8	.08	2540(1)	
180.0	D	T256D187K020BS	2.0	10.0	10.0	8	8	.07	2541(1)	
<b>35 VOLT RATING AT 85°C</b>										
1.8	A	T256A185K035BS	.5	2.0	2.0	4	4	.20	2542(1)	
8.2	B	T256B825K035BS	1.0	2.0	2.0	6	6	.40	2543(1)	
10.0	B	T256B106K035BS	1.0	2.0	2.0	6	6	.35	2544(1)	
33.0	C	T256C336K035BS	1.0	5.0	5.0	6	6	.19	2545(1)	
39.0	C	T256C396K035BS	1.0	5.0	5.0	6	6	.17	2546(1)	
47.0	C	T256C476K035BS	1.0	5.0	5.0	6	6	.15	2547(1)	
56.0	D	T256D566K035BS	2.0	10.0	10.0	6	6	.13	2548(1)	
68.0	D	T256D686K035BS	2.0	10.0	10.0	6	6	.12	2549(1)	
<b>50 VOLT RATING AT 85°C</b>										
1.2	A	T256A125K050BS	.5	2.0	2.0	4	4	1.30	2550(1)	
1.5	A	T256A155K050BS	.5	2.0	2.0	4	4	1.20	2551(1)	
5.6	B	T256B565K050BS	1.0	2.0	2.0	4	4	.47	2552(1)	
6.8	B	T256B685K050BS	1.0	2.0	2.0	6	6	.43	2553(1)	
22.0	C	T256C226K050BS	1.0	5.0	5.0	6	6	.22	2554(1)	
27.0	C	T256C276K050BS	1.0	5.0	5.0	6	6	.20	2555(1)	
33.0	D	T256D336K050BS	1.0	9.0	9.0	6	6	.18	2556(1)	
39.0	D	T256D396K050BS	1.0	9.0	9.0	6	6	.16	2557(1)	

(1) To complete, insert S for sleeved or U for unsleeved, if "U" ordered also use C-0100.

T216/T256 Series Tantalum  
Hermetically Sealed

The KEMET T322 AND T323 (CX01 & CX05) Series offers a complete line of extended range molded solid tantalum capacitors designed specifically for high speed automatic insertion applications. These capacitors offer an extremely high capacitance-to-volume ratio while still maintaining excellent performance characteristics.

Supplied in six axial lead tubular case sizes, these capacitors are ideally suited for use in printed wiring boards and all applications requiring a high degree of packaging density and can be supplied in bulk packaging or lead-taped on reels.

The T322/T323 Series dimensions and tight lead wire-to-body concentricity permit installation by the same automatic insertion equipment used for diodes and resistors. Available in working voltages of

2, 4, 6, 10, 15, 20, 25, 35, and 50 volts. Operating temperature range -55°C to +85°C at full rated voltage and with  $\frac{2}{3}$  85°C rated voltage at 125°C.

The gold color epoxy utilized permits laser marking with outstanding permanency and legibility.

T323 Series capacitors are qualified under MIL-PRF-49137/1 & 5 as Military Style CX01 & CX05.

Typical applications include decoupling, blocking, bypassing and filtering in commercial computers, data processing, communications, and other electronic equipment. The low ESR/impedance at high frequencies offered by this capacitor is especially suitable for decoupling required by high speed computers.

### PERFORMANCE CHARACTERISTICS

- **CAPACITANCE/VOLTAGE RANGE:**  
0.1-330µF, 2-50 Volts.
- **CAPACITANCE TOLERANCE:** Available in standard EIA nominal values with ±20%, ±10% and ±5% tolerance.
- **DISSIPATION FACTOR:** Maximum DF limits are shown in corresponding series part number listings on pages 44-48. See Application Notes Section, page 76 for additional description.
- **DC LEAKAGE CURRENT:** Each corresponding part number table lists maximum leakage current for each capacitor on pages 44 through 48. See Application Notes Section, page 76 for additional description.
- **RATED VOLTAGE; WORKING VOLTAGE; SURGE VOLTAGE; REVERSE VOLTAGE:** See Application Notes Section, page 76 & 77 for description.
- **AC RIPPLE VOLTAGE:** Permissible AC ripple voltage is related to equivalent series resistance (ESR) and power dissipation capability. Maximum power dissipation for each case size is listed in Table below. For additional description see page 79.

Case Size	Power Dissipation (max.) @ 25°C (watts)
A	.060
B	.070
C	.080
D	.090
E	.100
F	.110

Maximum Power Dissipation Capability @ 25°C

- **IMPEDANCE and ESR:** See Application Notes Section, pages 77 & 78 for description. Reference ESR values are shown in adjoining column, this page.
- **ENVIRONMENTAL CONSIDERATIONS:**
  - Shock Test: MIL-STD-202, Method 213.
  - Thermal Shock, MIL-STD-202, Method 107.
  - Moisture Resistance: MIL-STD-202, Method 106.
  - Solderability: MIL-STD-202, Method 208.

**T322 ESR (OHMS) at 100 kHz @ +25°C**  
(The ESR values provided below are for reference only. No warranty, as stated on page 3 and reincorporated here, is made as to the accuracy of these values for any particular T322 Series product.)

Cap. µF	6 Volt	10 Volt	15 Volt	20 Volt	25 Volt	35 Volt	50 Volt
0.10						26.0	26.0
0.12						26.0	26.0
0.15						21.0	21.0
0.18						21.0	21.0
0.22						17.0	17.0
0.27						17.0	17.0
0.33						15.0	15.0
0.39						15.0	15.0
0.47					16.0	13.0	13.0
0.56					14.0	13.0	13.0
0.68					12.0	10.0	10.0
0.82					12.0	10.0	10.0
1.00				10.0	10.0	8.0	8.0
1.20				10.0	10.0	8.0	8.0
1.50			10.0	9.0	8.0	6.0	5.0
1.80			10.0	9.0	8.0	6.0	5.0
2.20		13.0	8.0	7.0	6.0	5.0	3.5
2.70		13.0	8.0	7.0	6.0	5.0	3.5
3.30	13.0	10.0	6.0	5.5	5.0	4.0	3.0
3.90	13.0	10.0	6.0	5.5	5.0	4.0	3.0
4.70	10.0	8.0	5.0	4.5	4.0	3.0	2.5
5.60	10.0	8.0	5.0	4.5	4.0	3.0	2.5
6.80	8.0	6.0	4.0	3.6	3.1	2.5	2.0
8.20	8.0	6.0	4.0	3.6	3.1	2.5	2.0
10.0	6.0	5.0	3.2	2.9	2.5	2.0	1.6
12.0	6.0	5.0	3.2	2.9	2.5	2.0	1.6
15.0	5.0	3.7	2.5	2.3	2.0	1.6	1.2
18.0	5.0	3.7	2.5	2.3	2.0	1.6	1.2
22.0	3.7	2.7	2.0	1.8	1.5	1.3	1.0
27.0	3.7	2.7	2.0	1.8	1.5	1.3	1.0
33.0	3.0	2.1	1.6	1.4	1.2	1.0	
39.0	3.0	2.1	1.6	1.4	1.2	1.0	
47.0	2.0	1.7	1.3	1.2	1.0	0.8	
56.0	2.0	1.7	1.3	1.2	1.0		
68.0	1.8	1.3	1.0	0.9	0.8		
82.0	1.8	1.3	1.0	0.9			
100.0	1.6	1.0	0.8	0.6			
120.0	1.6	1.0	0.8				
150.0	0.9	0.8	0.6				
180.0	0.9	0.8					
220.0	0.9	0.6					
270.0	0.9						
330.0	0.7						

For additional Environmental Test Information see pages 80, 81 and 82.

- **LEAD MATERIAL:** Solder coated steel core with copper plating per MIL-STD-1276.
- **LEAD TAPE and REEL:** Reeling per specification RS-296. See pages 71 and 73 for additional information.

# TANTALUM MOLDED / AXIAL — MIL-PRF-49137/1 & 5

## T322 & T323 (CX01 & CX05) SERIES



Effective September 30, 2005, the KEMET T322 Series is RoHS compliant.

### CAPACITOR OUTLINE DRAWINGS



### DIMENSIONS — INCHES & (MILLIMETERS)

CASE SIZE	D (MAX)	L (MAX)	W
A	.095 (2.41)	.260 (6.6)	.020 (.51)
B	.110 (2.79)	.290 (7.37)	.020 (.51)
C	.180 (4.57)	.345 (8.76)	.020 (.51)
D	.180 (4.57)	.420 (10.67)	.020 (.51)
E	.280 (7.11)	.530 (13.46)	.025 (.64)
F	.300 (7.62)	.710 (18.03)	.025 (.64)

### T322 & T323 ORDERING INFORMATION

**TANTALUM** — T

**SERIES** — 32X  
Sub-Miniature, Molded, Polar, Solid Tantalum, Insert appropriate number to replace letter "X" — 322 or 323 (CX01, CX05).

**CASE SIZE** — A  
A, B, C, D, E, or F

**CAPACITANCE IN PICOFARADS** — 474  
First two digits are significant figures. Third digit is number of zeros following.

**VOLTAGE RATING** — M  
M — ±20%  
K — ±10%  
J — ±5%

**CAPACITANCE TOLERANCE** — 035  
M — ±20%  
K — ±10%  
J — ±5%

**LEAD MATERIAL** — A  
S — Standard  
T — 100% Tin

**FAILURE RATE LEVEL** — A  
A — Not Applicable

**SPECIFICATION (when necessary)** — S — C\*  
— Reeling Per EIA Specification RS-296

\*Part Number Example: T322A474M035AS (14 digits – no spaces)

\* M & K only tolerances available for T323 Series.

### MIL-PRF-49137/5 MILITARY ORDERING INFORMATION

**TYPE** — CX  
Capacitor, Fixed, Solid Tantalum, Molded, Non-hermetically Sealed

**STYLE** — 05  
01, 05 (T323) A, B, C, and D

**VOLTAGE** — D  
D — 6V, F — 10V, H — 15V, J — 20V, K — 25V, M — 35V, N — 50V

**CAPACITANCE TOLERANCE** — 225  
K — 10%  
M — 20%

Symbol	Rated (85°C) Volts, DC	Surge (85°C) Volts, DC
D	6	8.0
F	10	13.0
H	15	20.0
J	20	26.0
K	25	32.0
M	35	46.0
N	50	65.0

**CAPACITANCE TOLERANCE**  
The nominal capacitance value, expressed in picofarads (pF), is identified by a three-digit number; the first two digits represent significant figures and the last digit specifies the number of zeros to follow.

### CAPACITOR MARKING



T322/T323 Tantalum Molded / Axial



# TANTALUM MOLDED / AXIAL — MIL-PRF-49137/1 & 5

## T322 & T323 (CX01 & CX05) SERIES

### RATINGS & PART NUMBER REFERENCE

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T322 SERIES			CX01 & CX05 CAPACITORS PER MIL-PRF-49137/1 & 5	
			KEMET PART NUMBER	D. C. LEAKAGE µA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120 HZ	MILITARY PART NUMBER	KEMET PART NUMBER
<b>2 VOLT RATING AT 85°C — 1.3 VOLT RATING AT 125°C</b>							
<b>6.8</b>	<b>A</b>	<b>5,10,20</b>	<b>T322A685(1)002AS</b>	<b>0.5</b>	<b>10</b>		
8.2	A	5,10,20	T322A825(1)002AS	0.5	10		
10.0	A	5,10,20	T322A106(1)002AS	0.5	10		
12.0	B	5,10,20	T322B126(1)002AS	0.5	10		
<b>15.0</b>	<b>B</b>	<b>5,10,20</b>	<b>T322B156(1)002AS</b>	<b>0.5</b>	<b>10</b>		
18.0	B	5,10,20	T322B186(1)002AS	0.5	10		
<b>22.0</b>	<b>B</b>	<b>5,10,20</b>	<b>T322B226(1)002AS</b>	<b>0.5</b>	<b>10</b>		
27.0	B	5,10,20	T322B276(1)002AS	0.5	10		
<b>33.0</b>	<b>B</b>	<b>5,10,20</b>	<b>T322B336(1)002AS</b>	<b>0.5</b>	<b>10</b>		
39.0	C	5,10,20	T322C396(1)002AS	0.6	10		
<b>47.0</b>	<b>C</b>	<b>5,10,20</b>	<b>T322C476(1)002AS</b>	<b>0.8</b>	<b>10</b>		
56.0	C	5,10,20	T322C566(1)002AS	0.9	10		
<b>68.0</b>	<b>C</b>	<b>5,10,20</b>	<b>T322C686(1)002AS</b>	<b>1.1</b>	<b>10</b>		
<b>4 VOLT RATING AT 85°C — 2.7 VOLT RATING AT 125°C</b>							
<b>4.7</b>	<b>A</b>	<b>5,10,20</b>	<b>T322A475(1)004AS</b>	<b>0.5</b>	<b>8</b>		
5.6	A	5,10,20	T322A565(1)004AS	0.5	8		
<b>6.8</b>	<b>A</b>	<b>5,10,20</b>	<b>T322A685(1)004AS</b>	<b>0.5</b>	<b>8</b>		
8.2	B	5,10,20	T322B825(1)004AS	0.5	8		
<b>10.0</b>	<b>B</b>	<b>5,10,20</b>	<b>T322B106(1)004AS</b>	<b>0.5</b>	<b>8</b>		
12.0	B	5,10,20	T322B126(1)004AS	0.5	8		
<b>15.0</b>	<b>B</b>	<b>5,10,20</b>	<b>T322B156(1)004AS</b>	<b>0.5</b>	<b>8</b>		
18.0	B	5,10,20	T322B186(1)004AS	0.6	8		
<b>22.0</b>	<b>B</b>	<b>5,10,20</b>	<b>T322B226(1)004AS</b>	<b>0.7</b>	<b>8</b>		
27.0	C	5,10,20	T322C276(1)004AS	0.9	8		
<b>33.0</b>	<b>C</b>	<b>5,10,20</b>	<b>T322C336(1)004AS</b>	<b>1.1</b>	<b>8</b>		
39.0	C	5,10,20	T322C396(1)004AS	1.2	8		
<b>47.0</b>	<b>C</b>	<b>5,10,20</b>	<b>T322C476(1)004AS</b>	<b>1.5</b>	<b>8</b>		
56.0	D	5,10,20	T322D566(1)004AS	1.8	8		
<b>68.0</b>	<b>D</b>	<b>5,10,20</b>	<b>T322D686(1)004AS</b>	<b>2.2</b>	<b>8</b>		
<b>6 VOLT RATING AT 85°C — 4 VOLT RATING AT 125°C</b>							
<b>3.3</b>	<b>A</b>	<b>5,10,20</b>	<b>T322A335(1)006AS</b>	<b>0.5</b>	<b>4</b>		
3.9	A	5,10,20	T322A395(1)006AS	0.5	4		
<b>4.7</b>	<b>A</b>	<b>5</b>	<b>T322A475J006AS</b>	<b>0.5</b>	<b>4</b>		
<b>4.7</b>	<b>A</b>	<b>10</b>	<b>T322A475K006AS</b>	<b>0.5</b>	<b>4</b>	<b>CX05D475K</b>	<b>T323A475K006AS</b>
<b>4.7</b>	<b>A</b>	<b>20</b>	<b>T322A475M006AS</b>	<b>0.5</b>	<b>4</b>	<b>CX05D475M</b>	<b>T323A475M006AS</b>
5.6	B	5	T322B565J006AS	0.5	4		
5.6	B	10	T322B565K006AS	0.5	4	CX01D565K	T323B565K 006AS
5.6	B	20	T322B565M006AS	0.5	4	CX01D565M	T323B565M006AS
<b>6.8</b>	<b>B</b>	<b>5</b>	<b>T322B685J006AS</b>	<b>0.5</b>	<b>6</b>		
<b>6.8</b>	<b>B</b>	<b>10</b>	<b>T322B685K006AS</b>	<b>0.5</b>	<b>6</b>	<b>CX01D685K</b>	<b>T323B685K006AS</b>
<b>6.8</b>	<b>B</b>	<b>20</b>	<b>T322B685M006AS</b>	<b>0.5</b>	<b>6</b>	<b>CX01D685M</b>	<b>T323B685M006AS</b>
8.2	B	5	T322B825J006AS	0.5	6		
8.2	B	10	T322B825K006AS	0.5	6	CX01D825K	T323B825K 006AS
8.2	B	20	T322B825M006AS	0.5	6	CX01D825M	T323B825M006AS
<b>10.0</b>	<b>B</b>	<b>5</b>	<b>T322B106J006AS</b>	<b>0.5</b>	<b>6</b>		
<b>10.0</b>	<b>B</b>	<b>10</b>	<b>T322B106K006AS</b>	<b>0.5</b>	<b>6</b>	<b>CX01D106K</b>	<b>T323B106K006AS</b>
<b>10.0</b>	<b>B</b>	<b>20</b>	<b>T322B106M006AS</b>	<b>0.5</b>	<b>6</b>	<b>CX01D106M</b>	<b>T323B106M006AS</b>
12.0	B	5	T322B126J006AS	0.6	6		
12.0	B	10	T322B126K006AS	0.6	6	CX01D126K	T323B126K 006AS
12.0	B	20	T322B126M006AS	0.6	6	CX01D126M	T323B126M006AS
<b>15.0</b>	<b>B</b>	<b>5</b>	<b>T322B156J006AS</b>	<b>0.7</b>	<b>6</b>		
<b>15.0</b>	<b>B</b>	<b>10</b>	<b>T322B156K006AS</b>	<b>0.7</b>	<b>6</b>	<b>CX05D156K</b>	<b>T323B156K006AS</b>
<b>15.0</b>	<b>B</b>	<b>20</b>	<b>T322B156M006AS</b>	<b>0.7</b>	<b>6</b>	<b>CX05D156M</b>	<b>T323B156M006AS</b>
18.0	C	5,10,20	T322C186(1)006AS	0.9	6		
<b>22.0</b>	<b>C</b>	<b>5,10,20</b>	<b>T322C226(1)006AS</b>	<b>1.1</b>	<b>6</b>		
27.0	C	5,10,20	T322C276(1)006AS	1.3	6		
<b>33.0</b>	<b>C</b>	<b>5</b>	<b>T322C336J006AS</b>	<b>1.5</b>	<b>6</b>		
<b>33.0</b>	<b>C</b>	<b>10</b>	<b>T322C336K006AS</b>	<b>1.5</b>	<b>6</b>	<b>CX05D336K</b>	<b>T323C336K006AS</b>
<b>33.0</b>	<b>C</b>	<b>20</b>	<b>T322C336M006AS</b>	<b>1.5</b>	<b>6</b>	<b>CX05D336M</b>	<b>T323C336M006AS</b>
39.0	D	5,10,20	T322D396(1)006AS	1.9	6		
<b>47.0</b>	<b>D</b>	<b>5</b>	<b>T322D476J006AS</b>	<b>2.3</b>	<b>6</b>		
<b>47.0</b>	<b>D</b>	<b>10</b>	<b>T322D476K006AS</b>	<b>2.3</b>	<b>6</b>	<b>CX05D476K</b>	<b>T323D476K006AS</b>
<b>47.0</b>	<b>D</b>	<b>20</b>	<b>T322D476M006AS</b>	<b>2.3</b>	<b>6</b>	<b>CX05D476M</b>	<b>T323D476M006AS</b>
56.0	D	5,10,20	T322D566(1)006AS	2.7	6		
<b>68.0</b>	<b>D</b>	<b>5,10,20</b>	<b>T322D686(1)006AS</b>	<b>3.3</b>	<b>6</b>		

(1) To complete KEMET Part Number, insert Capacitance Tolerance Symbol as follows: M — ±20%, K — ±10%, J — ±5%  
**Bold Face** lines indicate preferred part types and values.

RATINGS & PART NUMBER REFERENCE

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T322 SERIES			CX01 & CX05 CAPACITORS PER MIL-PRF-49137/1 & 5	
			KEMET PART NUMBER	D.C. LEAKAGE µA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120 HZ	MILITARY PART NUMBER	KEMET PART NUMBER
<b>6 VOLT RATING AT 85°C — 4 VOLT RATING AT 125°C (Cont'd)</b>							
82.0	E	5,10,20	T322E826(1)006AS	3.9	8		
<b>100.0</b>	<b>E</b>	<b>5,10,20</b>	<b>T322E107(1)006AS</b>	<b>4.8</b>	<b>8</b>		
120.0	E	5,10,20	T322E127(1)006AS	5.0	8		
<b>150.0</b>	<b>E</b>	<b>5,10,20</b>	<b>T322E157(1)006AS</b>	<b>5.0</b>	<b>8</b>		
180.0	E	5,10,20	T322E187(1)006AS	8.6	8		
<b>220.0</b>	<b>E</b>	<b>5,10,20</b>	<b>T322E227(1)006AS</b>	<b>10.0</b>	<b>8</b>		
270.0	F	5,10,20	T322F277(1)006AS	10.0	8		
<b>330.0</b>	<b>F</b>	<b>5,10,20</b>	<b>T322F337(1)006AS</b>	<b>10.0</b>	<b>8</b>		
<b>10 VOLT RATING AT 85°C — 7 VOLT RATING AT 125°C</b>							
<b>2.2</b>	<b>A</b>	<b>5,10,20</b>	<b>T322A225(1)010AS</b>	<b>0.5</b>	<b>4</b>		
2.7	A	5,10,20	T322A275(1)010AS	0.5	4		
<b>3.3</b>	<b>A</b>	<b>5</b>	<b>T322A335J010AS</b>	<b>0.5</b>	<b>4</b>		
<b>3.3</b>	<b>A</b>	<b>10</b>	<b>T322A335K010AS</b>	<b>0.5</b>	<b>4</b>	CX05F335K	T323A335K010AS
<b>3.3</b>	<b>A</b>	<b>20</b>	<b>T322A335M010AS</b>	<b>0.5</b>	<b>4</b>	CX05F335M	T323A335M010AS
3.9	B	5,10,20	T322B395(1)010AS	0.5	4		
<b>4.7</b>	<b>B</b>	<b>5,10,20</b>	<b>T322B475(1)010AS</b>	<b>0.5</b>	<b>4</b>		
5.6	B	5,10,20	T322B565(1)010AS	0.5	4		
<b>6.8</b>	<b>B</b>	<b>5,10,20</b>	<b>T322B685(1)010AS</b>	<b>0.5</b>	<b>6</b>		
8.2	B	5,10,20	T322B825(1)010AS	0.7	6		
<b>10.0</b>	<b>B</b>	<b>5</b>	<b>T322B106J010AS</b>	<b>0.8</b>	<b>6</b>		
<b>10.0</b>	<b>B</b>	<b>10</b>	<b>T322B106K010AS</b>	<b>0.8</b>	<b>6</b>	CX05F106K	T323B106K010AS
<b>10.0</b>	<b>B</b>	<b>20</b>	<b>T322B106M010AS</b>	<b>0.8</b>	<b>6</b>	CX05F106M	T323B106M010AS
12.0	C	5,10,20	T322C126(1)010AS	1.0	6		
<b>15.0</b>	<b>C</b>	<b>5,10,20</b>	<b>T322C156(1)010AS</b>	<b>1.2</b>	<b>6</b>		
18.0	C	5,10,20	T322C186(1)010AS	1.4	6		
<b>22.0</b>	<b>C</b>	<b>5</b>	<b>T322C226J010AS</b>	<b>1.5</b>	<b>6</b>		
<b>22.0</b>	<b>C</b>	<b>10</b>	<b>T322C226K010AS</b>	<b>1.5</b>	<b>6</b>	CX05F226K	T323C226K010AS
<b>22.0</b>	<b>C</b>	<b>20</b>	<b>T322C226M010AS</b>	<b>1.5</b>	<b>6</b>	CX05F226M	T323C226M010AS
27.0	D	5	T322D276J010AS	2.2	6		
27.0	D	10	T322D276K010AS	2.2	6	CX05F276K	T323D276K010AS
27.0	D	20	T322D276M010AS	2.2	6	CX05F276M	T323D276M010AS
<b>33.0</b>	<b>D</b>	<b>5</b>	<b>T322D336J010AS</b>	<b>2.6</b>	<b>6</b>		
<b>33.0</b>	<b>D</b>	<b>10</b>	<b>T322D336K010AS</b>	<b>2.6</b>	<b>6</b>	CX05F336K	T323D336K010AS
<b>33.0</b>	<b>D</b>	<b>20</b>	<b>T322D336M010AS</b>	<b>2.6</b>	<b>6</b>	CX05F336M	T323D336M010AS
39.0	D	5	T322D396J010AS	3.1	6		
39.0	D	10	T322D396K010AS	3.1	6	CX05F396K	T323D396K010AS
39.0	D	20	T322D396M010AS	3.1	6	CX05F396M	T323D396M010AS
<b>47.0</b>	<b>D</b>	<b>5</b>	<b>T322D476J010AS</b>	<b>3.8</b>	<b>6</b>		
<b>47.0</b>	<b>D</b>	<b>10</b>	<b>T322D476K010AS</b>	<b>3.8</b>	<b>6</b>	CX05F476K	T323D476K010AS
<b>47.0</b>	<b>D</b>	<b>20</b>	<b>T322D476M010AS</b>	<b>3.8</b>	<b>6</b>	CX05F476M	T323D476M010AS
56.0	E	5,10,20	T322E566(1)010AS	4.4	6		
<b>68.0</b>	<b>E</b>	<b>5,10,20</b>	<b>T322E686(1)010AS</b>	<b>5.0</b>	<b>6</b>		
82.0	E	5,10,20	T322E826(1)010AS	5.0	8		
<b>100.0</b>	<b>E</b>	<b>5,10,20</b>	<b>T322E107(1)010AS</b>	<b>8.0</b>	<b>8</b>		
120.0	E	5,10,20	T322E127(1)010AS	9.6	8		
<b>150.0</b>	<b>E</b>	<b>5,10,20</b>	<b>T322E157(1)010AS</b>	<b>10.0</b>	<b>8</b>		
180.0	F	5,10,20	T322F187(1)010AS	10.0	8		
<b>220.0</b>	<b>F</b>	<b>5,10,20</b>	<b>T322F227(1)010AS</b>	<b>10.0</b>	<b>8</b>		
<b>15 VOLT RATING AT 85°C — 10 VOLT RATING AT 125°C</b>							
<b>1.5</b>	<b>A</b>	<b>5,10,20</b>	<b>T322A155(1)015AS</b>	<b>0.5</b>	<b>4</b>		
1.8	A	5,10,20	T322A185(1)015AS	0.5	4		
<b>2.2</b>	<b>A</b>	<b>5</b>	<b>T322A225J015AS</b>	<b>0.5</b>	<b>4</b>		
<b>2.2</b>	<b>A</b>	<b>10</b>	<b>T322A225K015AS</b>	<b>0.5</b>	<b>4</b>	CX05H225K	T323A225K015AS
<b>2.2</b>	<b>A</b>	<b>20</b>	<b>T322A225M015AS</b>	<b>0.5</b>	<b>4</b>	CX05H225M	T323A225M015AS
2.7	B	5,10,20	T322B275(1)015AS	0.5	4		
<b>3.3</b>	<b>B</b>	<b>5,10,20</b>	<b>T322B335(1)015AS</b>	<b>0.5</b>	<b>4</b>		
3.9	B	5,10,20	T322B395(1)015AS	0.5	4		
<b>4.7</b>	<b>B</b>	<b>5,10,20</b>	<b>T322B475(1)015AS</b>	<b>0.6</b>	<b>4</b>		
5.6	B	5,10,20	T322B565(1)015AS	0.7	4		
<b>6.8</b>	<b>B</b>	<b>5</b>	<b>T322B685J015AS</b>	<b>0.8</b>	<b>6</b>		
<b>6.8</b>	<b>B</b>	<b>10</b>	<b>T322B685K015AS</b>	<b>0.8</b>	<b>6</b>	CX05H685K	T323B685K015AS
<b>6.8</b>	<b>B</b>	<b>20</b>	<b>T322B685M015AS</b>	<b>0.8</b>	<b>6</b>	CX05H685M	T323B685M015AS
8.2	C	5,10,20	T322C825(1)015AS	1.0	6		
<b>10.0</b>	<b>C</b>	<b>5,10,20</b>	<b>T322C106(1)015AS</b>	<b>1.2</b>	<b>6</b>		
12.0	C	5,10,20	T322C126(1)015AS	1.4	6		
<b>15.0</b>	<b>C</b>	<b>5</b>	<b>T322C156J015AS</b>	<b>1.5</b>	<b>6</b>		
<b>15.0</b>	<b>C</b>	<b>10</b>	<b>T322C156K015AS</b>	<b>1.5</b>	<b>6</b>	CX05H156K	T323C156K015AS
<b>15.0</b>	<b>C</b>	<b>20</b>	<b>T322C156M015AS</b>	<b>1.5</b>	<b>6</b>	CX05H156M	T323C156M015AS

(1) To complete KEMET Part Number, insert Capacitance Tolerance Symbol as follows: M — ±20%, K — ±10%, J — ±5%  
Bold Face lines indicate preferred part types and values.

T322/T323 Series Tantalum  
Molded / Axial



# TANTALUM MOLDED / AXIAL — MIL-PRF-49137/1 & 5

## T322 & T323 (CX01 & CX05) SERIES

### RATINGS & PART NUMBER REFERENCE

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T322 SERIES			CX01 & CX05 CAPACITORS PER MIL-PRF-49137/1 & 5	
			KEMET PART NUMBER	D. C. LEAKAGE µA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120 HZ	MILITARY PART NUMBER	KEMET PART NUMBER
<b>15 VOLT RATING AT 85°C — 10 VOLT RATING AT 125°C (Cont'd)</b>							
18.0	D	5,10,20	T322D186(1)015AS	2.2	6		
<b>22.0</b>	<b>D</b>	<b>5</b>	<b>T322D226J015AS</b>	<b>2.6</b>	<b>6</b>		
22.0	D	10	T322D226K015AS	2.6	6	CX05H226K CX05H226M	T323D226K015AS T323D226M015AS
22.0	D	20	T322D226M015AS	2.6	6		
27.0	D	5,10,20	T322D276(1)015AS	3.2	6		
33.0	D	5	T322D336J015AS	4.0	6		
33.0	D	10	T322D336K015AS	4.0	6	CX05H336K CX05H336M	T323D336K015AS T323E336M015AS
33.0	D	20	T322D336M015AS	4.0	6		
39.0	E	5,10,20	T322E396(1)015AS	4.7	6		
47.0	E	5,10,20	T322E476(1)015AS	5.0	6		
56.0	E	5,10,20	T322E566(1)015AS	6.7	6		
68.0	E	5,10,20	T322E686(1)015AS	8.2	6		
82.0	E	5,10,20	T322E826(1)015AS	9.8	8		
100.0	E	5,10,20	T322E107(1)015AS	10.0	8		
120.0	F	5,10,20	T322F127(1)015AS	10.0	8		
150.0	F	5,10,20	T322F157(1)015AS	10.0	8		
<b>20 VOLT RATING AT 85°C — 13 VOLT RATING AT 125°C</b>							
1.0	A	5,10,20	T322A105(1)020AS	0.5	4		
1.2	A	5,10,20	T322A125(1)020AS	0.5	4		
1.5	A	5	T322A155J020AS	0.5	4		
1.5	A	10	T322A155K020AS	0.5	4	CX05J155K CX05J155M	T323A155K020AS T323A155M020AS
1.5	A	20	T322A155M020AS	0.5	4		
1.8	B	5,10,20	T322B185(1)020AS	0.5	4		
2.2	B	5,10,20	T322B225(1)020AS	0.5	4		
2.7	B	5,10,20	T322B275(1)020AS	0.5	4		
3.3	B	5,10,20	T322B335(1)020AS	0.5	4		
3.9	B	5,10,20	T322B395(1)020AS	0.6	4		
4.7	B	5	T322B475J020AS	0.8	4		
4.7	B	10	T322B475K020AS	0.8	4	CX05J475K CX05J475M	T323B475K020AS T323B475M020AS
4.7	B	20	T322B475M020AS	0.8	4		
5.6	C	5,10,20	T322C565(1)020AS	0.9	4		
6.8	C	5,10,20	T322C685(1)020AS	1.1	6		
8.2	C	5,10,20	T322C825(1)020AS	1.3	6		
10.0	C	5,10,20	T322C106(1)020AS	1.6	6		
12.0	D	5	T322D126J020AS	1.9	6		
12.0	D	10	T322D126K020AS	1.9	6	CX05J126K CX05J126M	T323D126K020AS T323D126M020AS
12.0	D	20	T322D126M020AS	1.9	6		
15.0	D	5	T322D156J020AS	2.4	6		
15.0	D	10	T322D156K020AS	2.4	6	CX05J156K CX05J156M	T323D156K020AS T323D156M020AS
15.0	D	20	T322D156M020AS	2.4	6		
18.0	D	5,10,20	T322D186(1)020AS	2.9	6		
22.0	D	5,10,20	T322D226(1)020AS	3.5	6		
27.0	E	5,10,20	T322E276(1)020AS	4.3	6		
33.0	E	5,10,20	T322E336(1)020AS	5.0	6		
39.0	E	5,10,20	T322E396(1)020AS	6.2	6		
47.0	E	5,10,20	T322E476(1)020AS	7.5	6		
56.0	E	5,10,20	T322E566(1)020AS	8.9	6		
68.0	E	5,10,20	T322E686(1)020AS	10.0	6		
82.0	F	5,10,20	T322F826(1)020AS	10.0	8		
100.0	F	5,10,20	T322F107(1)020AS	10.0	8		
<b>25 VOLT RATING AT 85°C — 17 VOLT RATING AT 125°C</b>							
0.47	A	5,10,20	T322A474(1)025AS	0.5	3		
0.56	A	5,10,20	T322A564(1)025AS	0.5	3		
0.68	A	5,10,20	T322A684(1)025AS	0.5	3		
0.82	A	5,10,20	T322A824(1)025AS	0.5	3		
1.0	A	5	T322A105J025AS	0.5	3		
1.0	A	10	T322A105K025AS	0.5	3	CX05K105K CX05K105M	T323A105K025AS T323A105M025AS
1.0	A	20	T322A105M025AS	0.5	3		
1.2	B	5,10,20	T322B125(1)025AS	0.5	3		
1.5	B	5	T322B155J025AS	0.5	3		
1.5	B	10	T322B155K025AS	0.5	3	CX01K155K CX01K155M	T323B155K025AS T323B155M020AS
1.5	B	20	T322B155M025AS	0.5	3		
1.8	B	5	T322B185J025AS	0.5	3		
1.8	B	10	T322B185K025AS	0.5	3	CX01K185K CX01K185M	T323B185K025AS T323B185M025AS
1.8	B	20	T322B185M025AS	0.5	3		
2.2	B	5	T322B225J025AS	0.5	3		
2.2	B	10	T322B225K025AS	0.5	3	CX05K225K	T323B225K025AS

(1) To complete KEMET Part Number, insert Capacitance Tolerance Symbol as follows: M — ±20%, K — ±10%, J — ±5%  
**Bold Face** lines indicate preferred part types and values.

TANTALUM MOLDED / AXIAL — MIL-PRF-49137/1 & 5  
T322 & T323 (CX01 & CX05) SERIES



RATINGS & PART NUMBER REFERENCE

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	KEMET T322 SERIES			CX01 & CX05 CAPACITORS PER MIL-PRF-49137/1 & 5			
			KEMET PART NUMBER	D. C. LEAKAGE µA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120 HZ	MILITARY PART NUMBER	KEMET PART NUMBER		
<b>25 VOLT RATING AT 85°C — 17 VOLT RATING AT 125°C (Cont'd)</b>									
<b>2.2</b>	<b>B</b>	<b>20</b>	<b>T322B225M025AS</b>	<b>0.5</b>	<b>3</b>	<b>CX01/5K225M</b>	<b>T323B225M025AS</b>		
2.7	B	5,10,20	T322B275(1)025AS	0.5	3				
<b>3.3</b>	<b>B</b>	<b>5</b>	<b>T322B335J025AS</b>	<b>0.7</b>	<b>3</b>				
<b>3.3</b>	<b>B</b>	<b>10</b>	<b>T322B335K025AS</b>	<b>0.7</b>	<b>3</b>				
<b>3.3</b>	<b>B</b>	<b>20</b>	<b>T322B335M025AS</b>	<b>0.7</b>	<b>3</b>				
3.9	C	5,10,20	T322C395(1)025AS	0.8	3	<b>CX05K685K</b> <b>CX05K685M</b>	<b>T323C685K025AS</b> <b>T323C685M025AS</b>		
<b>4.7</b>	<b>C</b>	<b>5,10,20</b>	<b>T322C475(1)025AS</b>	<b>0.9</b>	<b>4</b>				
5.6	C	5,10,20	T322C565(1)025AS	1.1	4				
<b>6.8</b>	<b>C</b>	<b>5</b>	<b>T322C685J025AS</b>	<b>1.4</b>	<b>4</b>				
<b>6.8</b>	<b>C</b>	<b>10</b>	<b>T322C685K025AS</b>	<b>1.4</b>	<b>4</b>				
<b>6.8</b>	<b>C</b>	<b>20</b>	<b>T322C685M025AS</b>	<b>1.4</b>	<b>4</b>				
8.2	C	5,10,20	T322C825(1)025AS	1.5	4				
10.0	C	5	T322C106J025AS	1.5	4				
10.0	C	10	T322C106K025AS	1.5	4				
10.0	C	20	T322C106M025AS	1.5	4				
12.0	D	5,10,20	T322D126(1)025AS	2.4	4				
<b>15.0</b>	<b>D</b>	<b>5,10,20</b>	<b>T322D156(1)025AS</b>	<b>3.0</b>	<b>4</b>				
18.0	E	5,10,20	T322E186(1)025AS	3.6	6				
<b>22.0</b>	<b>E</b>	<b>5,10,20</b>	<b>T322E226(1)025AS</b>	<b>4.4</b>	<b>6</b>				
27.0	E	5,10,20	T322E276(1)025AS	5.4	6				
<b>33.0</b>	<b>E</b>	<b>5,10,20</b>	<b>T322E336(1)025AS</b>	<b>6.6</b>	<b>6</b>				
39.0	E	5,10,20	T322E396(1)025AS	7.8	6				
<b>47.0</b>	<b>E</b>	<b>5,10,20</b>	<b>T322E476(1)025AS</b>	<b>9.4</b>	<b>6</b>				
56.0	F	5,10,20	T322F566(1)025AS	10.0	6				
<b>68.0</b>	<b>F</b>	<b>5,10,20</b>	<b>T322F686(1)025AS</b>	<b>10.0</b>	<b>6</b>				
<b>35 VOLT RATING AT 85°C — 23 VOLT RATING AT 125°C</b>									
<b>0.1</b>	<b>A</b>	<b>5,10,20</b>	<b>T322A104(1)035AS</b>	<b>0.5</b>	<b>3</b>	<b>CX05M334K</b> <b>CX05M334M</b>	<b>T323A334K035AS</b> <b>T323A334M035AS</b>		
0.12	A	5,10,20	T322A124(1)035AS	0.5	3				
<b>0.15</b>	<b>A</b>	<b>5,10,20</b>	<b>T322A154(1)035AS</b>	<b>0.5</b>	<b>3</b>				
0.18	A	5,10,20	T322A184(1)035AS	0.5	3				
<b>0.22</b>	<b>A</b>	<b>5,10,20</b>	<b>T322A224(1)035AS</b>	<b>0.5</b>	<b>3</b>				
0.27	A	5,10,20	T322A274(1)035AS	0.5	3				
<b>0.33</b>	<b>A</b>	<b>5</b>	<b>T322A334J035AS</b>	<b>0.5</b>	<b>3</b>				
<b>0.33</b>	<b>A</b>	<b>10</b>	<b>T322A334K035AS</b>	<b>0.5</b>	<b>3</b>				
<b>0.33</b>	<b>A</b>	<b>20</b>	<b>T322A334M035AS</b>	<b>0.5</b>	<b>3</b>				
0.39	A	5,10,20	T322A394(1)035AS	0.5	3				
<b>0.47</b>	<b>A</b>	<b>5</b>	<b>T322A474J035AS</b>	<b>0.5</b>	<b>3</b>				
<b>0.47</b>	<b>A</b>	<b>10</b>	<b>T322A474K035AS</b>	<b>0.5</b>	<b>3</b>				
<b>0.47</b>	<b>A</b>	<b>20</b>	<b>T322A474M035AS</b>	<b>0.5</b>	<b>3</b>				
0.56	B	5	T322B564J035AS	0.5	3			<b>CX01M564K</b> <b>CX01M564M</b>	<b>T323B564K035AS</b> <b>T323B564M035AS</b>
0.56	B	10	T322B564K035AS	0.5	3				
0.56	B	20	T322B564M035AS	0.5	3	<b>CX01M684K</b> <b>CX01M684M</b>	<b>T323B684K035AS</b> <b>T323B684M035AS</b>		
<b>0.68</b>	<b>B</b>	<b>5</b>	<b>T322B684J035AS</b>	<b>0.5</b>	<b>3</b>				
<b>0.68</b>	<b>B</b>	<b>10</b>	<b>T322B684K035AS</b>	<b>0.5</b>	<b>3</b>				
<b>0.68</b>	<b>B</b>	<b>20</b>	<b>T322B684M035AS</b>	<b>0.5</b>	<b>3</b>	<b>CX01M824K</b> <b>CX01M824M</b>	<b>T323B824K035AS</b> <b>T323B824M035AS</b>		
0.82	B	5	T322B824J035AS	0.5	3				
0.82	B	10	T322B824K035AS	0.5	3				
0.82	B	20	T322B824M035AS	0.5	3				
<b>1.0</b>	<b>B</b>	<b>5</b>	<b>T322B105J035AS</b>	<b>0.5</b>	<b>3</b>				
<b>1.0</b>	<b>B</b>	<b>10</b>	<b>T322B105K035AS</b>	<b>0.5</b>	<b>3</b>				
<b>1.0</b>	<b>B</b>	<b>20</b>	<b>T322B105M035AS</b>	<b>0.5</b>	<b>3</b>				
1.2	B	5	T322B125J035AS	0.5	3				
1.2	B	10	T322B125K035AS	0.5	3				
1.2	B	20	T322B125M035AS	0.5	3				
<b>1.5</b>	<b>B</b>	<b>5</b>	<b>T322B155J035AS</b>	<b>0.5</b>	<b>3</b>				
<b>1.5</b>	<b>B</b>	<b>10</b>	<b>T322B155K035AS</b>	<b>0.5</b>	<b>3</b>				
<b>1.5</b>	<b>B</b>	<b>20</b>	<b>T322B155M035AS</b>	<b>0.5</b>	<b>3</b>				
1.8	C	5,10,20	T322C185(1)035AS	0.5	3	<b>CX05M335K</b> <b>CX05M335M</b>	<b>T323C335K035AS</b> <b>T323C335M035AS</b>		
<b>2.2</b>	<b>C</b>	<b>5,10,20</b>	<b>T322C225(1)035AS</b>	<b>0.6</b>	<b>3</b>				
2.7	C	5,10,20	T322C275(1)035AS	0.8	3				
<b>3.3</b>	<b>C</b>	<b>5</b>	<b>T322C335J035AS</b>	<b>0.9</b>	<b>4</b>				
<b>3.3</b>	<b>C</b>	<b>10</b>	<b>T322C335K035AS</b>	<b>0.9</b>	<b>4</b>				
<b>3.3</b>	<b>C</b>	<b>20</b>	<b>T322C335M035AS</b>	<b>0.9</b>	<b>4</b>				
3.9	C	5	T322C395J035AS	1.1	4				
3.9	C	10	T322C395K035AS	1.1	4				
3.9	C	20	T322C395M035AS	1.1	4				
<b>4.7</b>	<b>C</b>	<b>5</b>	<b>T322C475J035AS</b>	<b>1.3</b>	<b>4</b>				
<b>4.7</b>	<b>C</b>	<b>10</b>	<b>T322C475K035AS</b>	<b>1.3</b>	<b>4</b>				
<b>4.7</b>	<b>C</b>	<b>20</b>	<b>T322C475M035AS</b>	<b>1.3</b>	<b>4</b>				

(1) To complete KEMET Part Number, insert Capacitance Tolerance Symbol as follows: M — ±20%, K — ±10%, J — ±5%  
Bold Face lines indicate preferred part types and values.





**T330 Series**

KEMET T330 Series, polar-type, radial lead rectangular Precision Molded Tantalum (PMT) capacitors are primarily designed for applications that demand full use of the premium space available in printed circuitry and high density packaging. Compact, space saving T330 Series capacitors provide superior packing factor and space utilization compared with tubular units of the same microcoulomb (CV) rating.

T330 Series capacitors employ a rectangular sintered, dry tantalum anode, transfer molded in precision dies with a high impact resistant plastic having excellent electrical, physical, and moisture resistant properties. All cases utilize gold color plastic which permits laser marking with outstanding permanency and legibility. The polarity is indicated by a + sign permanently marked on the case. The radius on the two vertical edges at the positive end of B, C, and D Cases can be used as a sensing dimension for automatic insertion processes.

**T340 Series**

The compact space saving T340 Series is transfer molded in precision dies with a high impact resistant plastic having excellent electrical, physical, and moisture resistant properties. The gold color plastic case utilized permits laser marking with outstanding permanency and legibility.

Marking is provided on the top of the case to allow visual inspection for proper polarity and placement after insertion. In addition, positive polarity identification is achieved by an easily recognized molded radius on the positive end of the case. This physical polarity identification is readily observed after capacitor placement as a further aid to the top marking in prevention of possible reverse insertion.

The location of the standoffs may serve a similar sensing function for the A Case. These standoffs, located in the base of all case sizes, provide vents for air circulation and also allow easy removal of flux residues from leadwire and circuit board solder joints.

T330 Series capacitors are highly reliable and exhibit performance characteristics typical of military test standards. They are available in capacitance values ranging from 0.1 to 220 microfarads in  $\pm 20$ ,  $\pm 10$ ,  $\pm 5\%$  tolerance levels, and in working voltages from 6 to 50 volts. At 85°C the capacitors will operate continuously at full rated voltage. They are rated to 125°C when operated at 2/3 of nameplate voltage. In addition, they feature exceptionally low DC leakage and Dissipation Factor characteristics.

They are ideal for bypass, coupling, and timing applications in computers, military ordinance, industrial, entertainment, and consumer electronic equipment.

Standoffs, located in the base of all case sizes, provide vents for air circulation and also allow easy removal of flux residues from leadwire and circuit board solder joints. With very low impedance and ESR values, the T340 Series features exceptionally low DC leakage and DF characteristics. The T340 Series is available in standard  $\pm 20\%$ ;  $\pm 10\%$ ;  $\pm 5\%$  (special order) capacitance tolerance.

T340 Series capacitors are highly reliable and exhibit performance characteristics typical of military test standards.

**PERFORMANCE CHARACTERISTICS**

- **CAPACITANCE/VOLTAGE RANGE:**  
 T330: 0.1-220 $\mu$ F, 6-50 Volts.  
 T340: 0.1-330 $\mu$ F, 6-50 Volts.
- **CAPACITANCE TOLERANCE:** Available in standard EIA nominal values with  $\pm 20\%$  tolerance standard,  $\pm 10\%$  and  $\pm 5\%$  available on special order.
- **DISSIPATION FACTOR:** Maximum DF limits are shown in corresponding series part number listing. See Application Notes Section, page 78.
- **DC LEAKAGE CURRENT:** Maximum leakage values at 25°C are shown in part number listings, pages 51, 52, 55, 56 and 57. See Application Notes Section, page 76.
- **RATED VOLTAGE; WORKING VOLTAGE; SURGE VOLTAGE; REVERSE VOLTAGE:** See Application Notes Section, pages 76 & 77 for description.
- **IMPEDANCE and ESR:** See Application Notes Section, page 77 & 78 for additional information. Reference ESR values are shown in table below.
- **AC RIPPLE VOLTAGE:** Permissible AC ripple voltage is related to ESR of the capacitor and the power dissipation capabilities of a particular case size. Thermal capacities for the various case sizes have been determined and are listed in Table below. For additional description see page 78.

**T330/T340 ESR (OHMS) at 100 kHz @ +25°C**

(The ESR values provided below are for reference only.  
 No warranty, as stated on page 3 and reincorporated here, is made as to the accuracy of these values for any particular T330/T340 Series product.)

Cap. $\mu$ F	6 Volt	10 Volt	15 Volt	20 Volt	25 Volt	35 Volt	50 Volt
0.10						26.0	26.0
0.15						21.0	21.0
0.22						17.0	17.0
0.33						15.0	15.0
0.47						13.0	13.0
0.68						10.0	10.0
1.00						8.0	8.0
1.50					8.0	6.0	5.0
2.20				7.0	6.0	5.0	3.5
3.30			6.0	5.5	5.0	4.0	3.0
4.70		8.0	5.0	4.5	4.0	3.0	2.5
6.80	8.0	6.0	4.0	3.6	3.1	2.5	2.0
10.0	6.0	5.0	3.2	2.9	2.5	2.0	1.6
15.0	5.0	3.7	2.5	2.3	2.0	1.6	1.2
22.0	3.7	2.7	2.0	1.8	1.5	1.3	1.0
33.0	3.0	2.1	1.6	1.4	1.2	1.0	
47.0	2.0	1.7	1.3	1.2	1.0	0.8	
68.0	1.8	1.3	1.0	0.9	0.8		
100.0	1.6	1.0	0.8	0.6			
150.0	0.9	0.8	0.6				
220.0	0.9	0.6					
330.0	0.7						

Series	Case Size	Watts
T330/T340	A	.09
	B	.09
	C	.100
T330	D	.125
T340 only	D/F	.125
	E	.180

**Maximum Power Dissipation: 25°C Ambient**

- **ENVIRONMENTAL CONSIDERATIONS:**
  - A. Shock Test: MIL-STD-202, Method 213.
  - B. Thermal Shock, MIL-STD-202, Method 107.
  - C. Moisture Resistance: MIL-STD-202, Method 106.
  - D. Solderability: MIL-STD-202, Method 208.
 For additional Environmental Test Information see pages 80, 81 and 82.
- **LEAD MATERIAL:** Solder coated steel core with copper ply per MIL-STD-1276.
- **LEAD TAPE and REEL:** Reeling per specification RS-468. See pages 71 and 73 for additional information.

### CAPACITOR OUTLINE DRAWINGS



### DIMENSIONS — INCHES & (MILLIMETERS)

CASE SIZE	H CASE HEIGHT	W CASE WIDTH	T CASE THICKNESS	E CASE TO WIRE	S LEAD SPACING
A	.345 ± .008 (8.76 ± .203)	.230 ± .005 (5.84 ± .127)	.105 ± .005 (2.67 ± .127)	.050 ± .010 (1.27 ± .25)	.125 ± .005 (3.18 ± .127)
B	.225 ± .015 (5.71 ± 0.38)	.285 ± .015 (7.24 ± 0.38)	.170 ± .015 (4.32 ± 0.38)	.042 ± .010 (1.07 ± .25)	.200 ± .005 (5.08 ± .127)
C	.325 ± .015 (8.26 ± 0.38)	.325 ± .015 (8.26 ± 0.38)	.170 ± .015 (4.32 ± 0.38)	.062 ± .010 (1.57 ± 0.25)	.200 ± .005 (5.08 ± .127)
D	.375 ± .015 (9.53 ± 0.38)	.600 ± .015 (15.24 ± 0.38)	.195 ± .015 (4.95 ± 0.38)	.200 ± .010 (5.08 ± 0.25)	.200 ± .005 (5.08 ± .127)

### ORDERING INFORMATION



**\*Part Number Example: T330B104M035AS (14 digits – no spaces)**

### MARKING INFORMATION





### B, C & D CASES (Cont'd)

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz
<b>25 VOLT RATING AT 85°C — 17 VOLT RATING AT 125°C</b>				
2.7	B	T330B275(1)025AS	1	6
3.3	B	T330B335(1)025AS	1	6
3.9	B	T330B395(1)025AS	1	6
4.7	B	T330B475(1)025AS	1	6
5.6	C	T330C565(1)025AS	1	6
6.8	C	T330C685(1)025AS	1	6
8.2	C	T330C825(1)025AS	1	6
10.0	C	T330C106(1)025AS	1	6
12.0	C	T330C126(1)025AS	1	6
15.0	C	T330C156(1)025AS	2	6
18.0	D	T330D186(1)025AS	5	6
22.0	D	T330D226(1)025AS	5	6
27.0	D	T330D276(1)025AS	5	6
33.0	D	T330D336(1)025AS	5	6
39.0	D	T330D396(1)025AS	10	6
<b>47.0</b>	<b>D</b>	<b>T330D476(1)025AS</b>	<b>10</b>	<b>6</b>
<b>35 VOLT RATING AT 85°C—23 VOLT RATING AT 125°C</b>				
0.10	B	T330B104(1)035AS	1	6
0.12	B	T330B124(1)035AS	1	6
0.15	B	T330B154(1)035AS	1	6
0.18	B	T330B184(1)035AS	1	6
0.22	B	T330B224(1)035AS	1	6
0.27	B	T330B274(1)035AS	1	6
0.33	B	T330B334(1)035AS	1	6
0.39	B	T330B394(1)035AS	1	6
0.47	B	T330B474(1)035AS	1	6
0.56	B	T330B564(1)035AS	1	6
0.68	B	T330B684(1)035AS	1	6
0.82	B	T330B824(1)035AS	1	6
1.0	B	T330B105(1)035AS	1	6
1.2	B	T330B125(1)035AS	1	6
1.5	B	T330B155(1)035AS	1	6
1.8	B	T330B185(1)035AS	1	6
2.2	B	T330B225(1)035AS	1	6
2.7	B	T330B275(1)035AS	1	6
3.3	B	T330B335(1)035AS	1	6
3.9	C	T330C395(1)035AS	1	6
4.7	C	T330C475(1)035AS	1	6
5.6	C	T330C565(1)035AS	1	6

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz
<b>35 VOLT RATING AT 85°C — 23 VOLT RATING AT 125°C</b>				
6.8	C	T330C685(1)035AS	2	6
8.2	C	T330C825(1)035AS	5	6
<b>10.0</b>	<b>C</b>	<b>T330C106(1)035AS</b>	<b>5</b>	<b>6</b>
12.0	D	T330D126(1)035AS	5	6
15.0	D	T330D156(1)035AS	5	6
18.0	D	T330D186(1)035AS	10	6
22.0	D	T330D226(1)035AS	10	6
27.0	D	T330D276(1)035AS	10	6
33.0	D	T330D336(1)035AS	10	6
<b>50 VOLT RATING AT 85°C—33 VOLT RATING AT 125°C</b>				
0.10	B	T330B104(1)050AS	1	6
0.12	B	T330B124(1)050AS	1	6
0.15	B	T330B154(1)050AS	1	6
0.18	B	T330B184(1)050AS	1	6
0.22	B	T330B224(1)050AS	1	6
0.27	B	T330B274(1)050AS	1	6
0.33	B	T330B334(1)050AS	1	6
0.39	B	T330B394(1)050AS	1	6
0.47	B	T330B474(1)050AS	1	6
0.56	B	T330B564(1)050AS	1	6
0.68	B	T330B684(1)050AS	1	6
0.82	B	T330B824(1)050AS	1	6
1.0	B	T330B105(1)050AS	1	6
1.2	B	T330B125(1)050AS	1	6
1.5	B	T330B155(1)050AS	1	6
1.8	B	T330B185(1)050AS	1	6
2.2	B	T330B225(1)050AS	1	6
2.7	C	T330C275(1)050AS	1	6
3.3	C	T330C335(1)050AS	2	6
3.9	C	T330C395(1)050AS	5	6
4.7	C	T330C475(1)050AS	5	6
5.6	C	T330C565(1)050AS	5	6
6.8	D	T330D685(1)050AS	5	6
8.2	D	T330D825(1)050AS	5	6
10.0	D	T330D106(1)050AS	5	6
12.0	D	T330D126(1)050AS	5	6
15.0	D	T330D156(1)050AS	10	6
18.0	D	T330D186(1)050AS	10	6

(1) To complete Part Number insert Capacitance Tolerance Symbol in the 9th character, M — ±20%, K — ±10%, J — ±5%.

**Bold face** lines indicate popular part types and values.

Higher voltage and better capacitance tolerance product may be substituted for an order within the same case size at KEMET'S option.

Effective September 30, 2005, the KEMET T340 Series is RoHS compliant.

**CAPACITOR OUTLINE DRAWINGS**



T340 Series Tantalum Molded / Radial

**DIMENSIONS — INCHES & MILLIMETERS**

CASE SIZE	H** (MAX)		W (MAX)		T (MAX)		LEAD SPACING S		LEAD LENGTH L		LEAD DIAMETER D	
	H		W		T		Inches ±.020	mm ±.5	Inches ±.078	mm ±2.0	Inches ±.001	mm ±.03
	Inches	mm	Inches	mm	inches	mm						
A	.287	7.3	.185	4.7	.165	4.2	.100	2.5	.600	15.0	.020	0.50
B	.327	8.3	.283	7.2	.157	4.0	.200	5.0	.600	15.0	.020	0.50
C	.413	10.5	.287	7.3	.169	4.3	.200	5.0	.600	15.0	.020	0.50
D	.413	10.5	.484	12.3	.287	7.3	.400	10.0	.600	15.0	.025	0.64
E	.413	10.5	.484	12.3	.484	12.3	.400	10.0	.600	15.0	.025	0.64
F	.413	10.5	.484	12.3	.287	7.3	.200	5.0	.600	15.0	.025	0.64

\*\*Includes Standoff Height of .015 ± .005" (.38 ± .13 mm) for All Case Sizes.

**ORDERING INFORMATION**



\*Part Number Example: T340A105M035AS (14 digits – no spaces)

### MARKING INFORMATION

#### American



#### European



□ □ = DIN. Specification Date Code

Insert Date Code as follows:

- |                               |                                |
|-------------------------------|--------------------------------|
| □ 1st digit - represents year | □ 2nd digit - represents month |
| L - 2000                      | Q - 2005                       |
| M - 2001                      | R - 2006                       |
| N - 2002                      | S - 2007                       |
| O - 2003                      | T - 2008                       |
| P - 2004                      | U - 2009                       |
|                               | 1 - 9 for January - September  |
|                               | O for October                  |
|                               | N for November                 |
|                               | D for December                 |

RATINGS & PART NUMBER REFERENCE

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	MAX. DC LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120 HZ	MAX. IMPEDANCE Ω@ 10 kHz
<b>3 VOLT RATING AT 85°C — 2 VOLT AT 125°C</b>					
10.0	A	T340A106(1)003AS	1.0	6	6.0
15.0	A	T340A156(1)003AS	1.0	6	3.2
33.0	B	T340B336(1)003AS	1.5	6	2.1
47.0	B	T340B476(1)003AS	3.0	6	1.8
68.0	C	T340C686(1)003AS	4.0	6	1.5
100.0	C	T340C107(1)003AS	5.0	6	1.2
<b>6/6.3 VOLT RATING AT 85°C — 4 VOLT AT 125°C</b>					
6.8	A	T340A685(1)006AS	1.0	6	6.0
10.0	B	T340B106(1)006AS	1.0	6	
12.0	B	T340B126(1)006AS	1.0	6	
15.0	B	T340B156(1)006AS	1.0	6	
18.0	B	T340B186(1)006AS	1.0	6	
22.0	B	T340B226(1)006AS	2.5	6	2.1
27.0	C	T340C276(1)006AS	2.5	6	
33.0	C	T340C336(1)006AS	2.5	6	
39.0	C	T340C396(1)006AS	2.5	6	
<b>47.0</b>	<b>C</b>	<b>T340C476(1)006AS</b>	<b>3.0</b>	<b>6</b>	<b>1.5</b>
56.0	C	T340C566(1)006AS	5.0	6	
68.0	C	T340C686(1)006AS	5.0	6	
82.0	D/F	T340(2)826(1)006AS	5.0	6	
100.0	D/F	T340(2)107(1)006AS	5.0	6	
120.0	D/F	T340(2)127(1)006AS	5.0	6	
150.0	D/F	T340(2)157(1)006AS	8.0	6	0.8
180.0	D/F	T340(2)187(1)006AS	10.0	6	
220.0	D/F	T340(2)227(1)006AS	10.0	6	
330.0	E	T340E337(1)006AS	10.0	8	0.5
<b>10 VOLT RATING AT 85°C — 6 VOLT AT 125°C</b>					
<b>4.7</b>	<b>A</b>	<b>T340A475(1)010AS</b>	<b>1.0</b>	<b>6</b>	<b>7.5</b>
5.6	B	T340B565(1)010AS	1.0	6	
6.8	B	T340B685(1)010AS	1.0	6	
8.2	B	T340B825(1)010AS	1.0	6	
10.0	B	T340B106(1)010AS	1.0	6	
12.0	B	T340B126(1)010AS	1.0	6	
15.0	B	T340B156(1)010AS	3.0	6	2.5
18.0	C	T340C186(1)010AS	3.0	6	
22.0	C	T340C226(1)010AS	3.0	6	
27.0	C	T340C276(1)010AS	3.0	6	
<b>33.0</b>	<b>C</b>	<b>T340C336(1)010AS</b>	<b>5.0</b>	<b>6</b>	<b>1.7</b>
39.0	C	T340C396(1)010AS	5.0	6	
47.0	D/F	T340(2)476(1)010AS	5.0	6	
56.0	D/F	T340(2)566(1)010AS	5.0	6	
68.0	D/F	T340(2)686(1)010AS	5.0	6	
82.0	D/F	T340(2)826(1)010AS	8.0	6	
<b>100.0</b>	<b>D/F</b>	<b>T340(2)107(1)010AS</b>	<b>10.0</b>	<b>6</b>	<b>1.0</b>
120.0	D/F	T340(2)127(1)010AS	10.0	6	
150.0	D/F	T340(2)157(1)010AS	10.0	6	
220.0	E	T340E227(1)010AS	10.0	6	0.5
<b>15/16 VOLT RATING AT 85°C — 10 VOLT AT 125°C</b>					
<b>3.3</b>	<b>A</b>	<b>T340A335(1)015AS</b>	<b>1.0</b>	<b>6</b>	<b>9.0</b>
3.9	B	T340B395(1)015AS	1.0	6	
4.7	B	T340B475(1)015AS	1.0	6	
5.6	B	T340B565(1)015AS	1.0	6	
6.8	B	T340B685(1)015AS	1.0	6	
8.2	B	T340B825(1)015AS	1.0	6	
<b>10.0</b>	<b>B</b>	<b>T340B106(1)015AS</b>	<b>3.0</b>	<b>6</b>	<b>3.2</b>

(1) To complete KEMET Part Number, insert M — ±20%, K — ±10%, or J — ±5% for capacitance tolerance as shown in T340 ordering information.  
 (2) To complete KEMET Part Number, insert letter "D" for 10.0 mm (.394) lead spacing or letter "F" for 5.0 mm (.197) lead spacing. See page 53 for outline drawings.  
**Bold face** lines indicate popular part types and values.  
 Higher voltage and better capacitance tolerance product may be substituted for an order within the same case size at KEMET'S option.

T340 Series Tantalum  
Molded / Radial

### RATINGS & PART NUMBER REFERENCE

CAPACITANCE µF	CASE SIZE	KEMET PART NUMBER	MAX. DC LEAKAGE µA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120 HZ	MAX IMPEDANCE Ω@ 10 kHz
<b>15/16 VOLT RATING AT 85°C — 10 VOLT AT 125°C (Cont'd)</b>					
12.0	C	T340C126(1)015AS	3.0	6	2.5
15.0	C	T340C156(1)015AS	3.5	6	
18.0	C	T340C186(1)015AS	4.0	6	
<b>22.0</b>	<b>C</b>	<b>T340C226(1)015AS</b>	<b>4.0</b>	<b>6</b>	
27.0	C	T340C276(1)015AS	5.0	6	
33.0	C	T340C336(1)015AS	5.0	6	
39.0	D/F	T340(2)396(1)015AS	7.0	6	1.3
<b>47.0</b>	<b>D/F</b>	<b>T340(2)476(1)015AS</b>	<b>7.0</b>	<b>6</b>	
56.0	D/F	T340(2)566(1)015AS	8.0	6	
<b>68.0</b>	<b>D/F</b>	<b>T340(2)686(1)015AS</b>	<b>9.0</b>	<b>6</b>	
82.0	D/F	T340(2)826(1)015AS	10.0	6	1.1
100.0	E	T340E107(1)015AS	10.0	6	0.8
<b>150.0</b>	<b>E</b>	<b>T340E157(1)015AS</b>	<b>10.0</b>	<b>6</b>	
<b>20 VOLT RATING AT 85°C — 13 VOLT AT 125°C</b>					
2.2	A	T340A225(1)020AS	1.0	6	12.0
3.3	B	T340B335(1)020AS	1.0	6	8.0
4.7	B	T340B475(1)020AS	1.5	6	5.5
6.8	B	T340B685(1)020AS	2.5	6	4.2
15.0	C	T340C156(1)020AS	5.0	6	2.5
47.0	D	T340D476(1)020AS	9.0	6	1.3
100.0	E	T340E107(1)020AS	10.0	6	0.8
<b>25 VOLT RATING AT 85°C — 16 VOLT AT 125°C</b>					
<b>1.5</b>	<b>A</b>	<b>T340A155(1)025AS</b>	<b>1.0</b>	<b>6</b>	<b>17.0</b>
2.7	B	T340B275(1)025AS	1.0	6	5.5
3.3	B	T340B335(1)025AS	1.0	6	
3.9	B	T340B395(1)025AS	1.0	6	
4.7	B	T340B475(1)025AS	2.0	6	
5.6	C	T340C565(1)025AS	2.0	6	
6.8	C	T340C685(1)025AS	3.0	6	4.2
8.2	C	T340C825(1)025AS	3.0	6	
<b>10.0</b>	<b>C</b>	<b>T340C106(1)025AS</b>	<b>3.5</b>	<b>6</b>	
12.0	C	T340C126(1)025AS	3.5	6	
15.0	C	T340C156(1)025AS	4.0	6	
18.0	D/F	T340(2)186(1)025AS	5.0	6	2.0
22.0	D/F	T340(2)226(1)025AS	5.5	6	
27.0	D/F	T340(2)276(1)025AS	7.0	6	
<b>33.0</b>	<b>D/F</b>	<b>T340(2)336(1)025AS</b>	<b>8.0</b>	<b>6</b>	
39.0	D/F	T340(2)396(1)025AS	10.0	6	
47.0	D/E/F	T340(2)476(1)025AS	10.0	6	
68.0	E	T340E686(1)025AS	10.0	6	0.9
<b>35 VOLT RATING AT 85°C — 23 VOLT AT 125°C</b>					
0.1	A	T340A104(1)035AS	1.0	6	220.0
0.15	A	T340A154(1)035AS	1.0	6	150.0
0.22	A	T340A224(1)035AS	1.0	6	100.0
0.33	A	T340A334(1)035AS	1.0	6	75.0
0.47	A	T340A474(1)035AS	1.0	6	50.0
0.68	A	T340A684(1)035AS	1.0	6	36.0
<b>1.0</b>	<b>A</b>	<b>T340A105(1)035AS</b>	<b>1.0</b>	<b>6</b>	<b>25.0</b>
1.2	B	T340B125(1)035AS	1.0	6	15.0
1.5	B	T340B155(1)035AS	1.0	6	
1.8	B	T340B185(1)035AS	1.0	6	
<b>2.2</b>	<b>B</b>	<b>T340B225(1)035AS</b>	<b>1.0</b>	<b>6</b>	
2.7	B	T340B275(1)035AS	1.0	6	
3.3	B/C	T340(2)335(1)035AS	1.0	6	

(1) To complete KEMET Part Number, insert M — ±20%, K — ±10%, or J — ±5% for capacitance tolerance as shown in T340 ordering information.  
 (2) To complete KEMET Part Number, insert letter "C" for 5.0 mm (.197") lead spacing, "D" for 10.0 mm (.394") lead spacing, "E" for 10.0 mm (.394") lead spacing or "F" for 5.0 mm (.197") lead spacing. See page 53 for outline drawings.  
**Bold face** lines indicate popular part types and values.  
 Higher voltage and better capacitance tolerance product may be substituted for an order within the same case size at KEMET'S option.



RATINGS & PART NUMBER REFERENCE

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	MAX. DC LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120 HZ	MAX IMPEDANCE Ω@ 10 kHz
<b>35 VOLT RATING AT 85°C — 23 VOLT AT 125°C (Cont'd)</b>					
3.9	C	T340C395(1)035AS	1.0	6	
<b>4.7</b>	<b>C</b>	<b>T340C475(1)035AS</b>	<b>2.5</b>	<b>6</b>	<b>5.5</b>
5.6	C	T340C565(1)035AS	2.5	6	
<b>6.8</b>	<b>C</b>	<b>T340C685(1)035AS</b>	<b>3.0</b>	<b>6</b>	<b>4.2</b>
8.2	C	T340C825(1)035AS	4.0	6	
<b>10.0</b>	<b>C</b>	<b>T340(2)106(1)035AS</b>	<b>4.0</b>	<b>6</b>	<b>2.8</b>
12.0	D/F	T340(2)126(1)035AS	5.0	6	
15.0	D/F	T340(2)156(1)035AS	5.0	6	2.2
18.0	D/F	T340(2)186(1)035AS	8.0	6	
<b>22.0</b>	<b>D/F</b>	<b>T340(2)226(1)035AS</b>	<b>8.0</b>	<b>6</b>	<b>1.9</b>
27.0	D/F	T340(2)276(1)035AS	10.0	6	
33.0	D/E/F	T340(2)336(1)035AS	10.0	6	1.4
<b>47.0</b>	<b>E</b>	<b>T340E476(1)035AS</b>	<b>10.0</b>	<b>6</b>	<b>1.1</b>
<b>40 VOLT RATING AT 85°C — 32 VOLT AT 100°C</b>					
0.1	A	T340A104(1)040AS	1.0	6	200.0
0.15	A	T340A154(1)040AS	1.0	6	140.0
0.22	A	T340A224(1)040AS	1.0	6	95.0
0.33	A	T340A334(1)040AS	1.0	6	70.0
0.47	A	T340A474(1)040AS	1.0	6	46.0
0.68	A	T340A684(1)040AS	1.0	6	34.0
1.0	A	T340A105(1)040AS	1.0	6	23.0
1.5	B	T340B155(1)040AS	1.0	6	14.0
2.2	B	T340B225(1)040AS	1.7	6	10.0
3.3	C	T340C335(1)040AS	2.3	6	7.0
4.7	C	T340C475(1)040AS	3.0	6	5.0
6.8	C	T340C685(1)040AS	3.5	6	3.9
10.0	D	T340D106(1)040AS	4.5	6	2.6
15.0	D	T340D156(1)040AS	6.0	6	2.0
22.0	D	T340D226(1)040AS	9.0	6	1.7
33.0	E	T340E336(1)040AS	10.0	6	1.3
47.0	E	T340E476(1)040AS	10.0	6	1.0
<b>50 VOLT RATING AT 85°C — 33 VOLT AT 125°C</b>					
0.1	A	T340A104(1)050AS	1.0	6	220.0
0.15	A	T340A154(1)050AS	1.0	6	150.0
0.22	A	T340A224(1)050AS	1.0	6	100.0
0.33	A	T340A334(1)050AS	1.0	6	75.0
0.39	B	T340B394(1)050AS	1.0	6	
0.47	B	T340B474(1)050AS	1.0	6	50.0
0.56	B	T340B564(1)050AS	1.0	6	
0.68	B	T340B684(1)050AS	1.0	6	36.0
0.82	B	T340B824(1)050AS	1.0	6	
1.0	B	T340B105(1)050AS	1.0	6	25.0
1.2	B	T340B125(1)050AS	1.0	6	
1.5	B/C	T340(2)155(1)050AS	1.1	6	15.0
1.8	B	T340B185(1)050AS	1.1	6	
2.2	B/C	T340(2)225(1)050AS	1.5	6	11.0
2.7	C	T340C275(1)050AS	1.5	6	
3.3	C/D	T340(2)335(1)050AS	2.5	6	7.5
3.9	C	T340C395(1)050AS	3.0	6	
4.7	C/D	T340(2)475(1)050AS	3.5	6	5.5
5.6	C	T340C565(1)050AS	4.0	6	
6.8	D/F	T340(2)685(1)050AS	5.0	6	4.0
8.2	D/F	T340(2)825(1)050AS	6.0	6	
10.0	D/F	T340(2)106(1)050AS	7.0	6	2.8
12.0	D/F	T340(2)126(1)050AS	8.0	6	
15.0	D/F	T340(2)156(1)050AS	9.0	6	2.2
18.0	D/F	T340(2)186(1)050AS	10.0	6	
22.0	E	T340E226(1)050AS	10.0	6	1.7

T340 Series Tantalum  
Molded / Radial

(1) To complete KEMET Part Number, insert M — ±20%, K — ±10%, or J — ±5% for capacitance tolerance as shown in T340 ordering information.  
 (2) To complete KEMET Part Number, insert letter "C" for 5.0 mm (.197") lead spacing, "D" for 10.0 mm (.394") lead spacing, "E" for 10.0 mm (.394") lead spacing or letter "F" for 5.0 mm (.197") lead spacing. See page 53 for outline drawings.

**Bold face** lines indicate popular part types and values.

Higher voltage and better capacitance tolerance product may be substituted for an order within the same case size at KEMET'S option.

The KEMET Micron Series is available in a variety of case styles and sizes. They are designed to operate from -55°C to +85°C at full voltage and to +125°C with derating. Typical applications include use in bypass coupling, filtering, and timing circuits.

The KEMET Micron Series is qualified under MIL-PRF-49137/6 as military styles CX06 (T378 Series).

The KEMET T370 Series is encapsulated in a molded gold color epoxy. This encasement technique allows maximum utilization of circuit board real estate with precisely centered leads in a microminature case.

These molded packages also provide significant improvements in overall dimensional consistency as well as lead wires precisely spaced to within .010 inches (.25mm).

With our new molded packaging design, these capacitors can now be marked using our laser printing technique. The KEMET laser marking system ensures legibility and permanency while offering a complete alphanumeric print format. Laser print meets all requirements of the Resistance to Solvents Test, method 215 of MIL-STD-202.

### PERFORMANCE CHARACTERISTICS

- **CAPACITANCE/VOLTAGE RANGE:**  
 T370 Series: 0.68-220µF, 3-35 Volts.  
 T378 Series: 2.2-220µF, 3-35 Volts.
- **CAPACITANCE TOLERANCE:** Available in standard EIA nominal values with ±20% tolerance standard, +40% -20%, ±10% and ±5% are also available.
- **DISSIPATION FACTOR:** Maximum DF limits are shown in corresponding series part number listings on page 60. See Application Notes Section, page 76 for additional information.
- **DC LEAKAGE CURRENT:** Maximum leakage values at 25° are shown in part number listings, page 60. See Application Notes Section, page 76 for additional information.
- **RATED VOLTAGE; WORKING VOLTAGE; SURGE VOLTAGE; REVERSE VOLTAGE:** See Application Notes Section, pages 76 & 77 for description.
- **IMPEDANCE and ESR:** See Application Notes Section, pages 78 for description. Reference ESR values are listed in table below.
- **AC RIPPLE VOLTAGE:** Permissible AC ripple volt-

age is related to the ESR of the capacitor and the power dissipation capabilities of a particular case size. Thermal capacities for the various case sizes have been determined and are listed in Table below. For additional description see page 78.

• **ENVIRONMENTAL CONSIDERATIONS:**

Case Size	Watts
C	.070
D	.080
E	.090
F	.100

Maximum Power Dissipation Capability @ 25°C

- A. Shock Test: MIL-STD-202, Method 213 Condition 1.
- B. Thermal Shock, MIL-STD-202, Method 107.
- C. Moisture Resistance: MIL-STD-202, Method 106.
- D. Solderability: MIL-STD-202, Method 208.

For additional Environmental Test Information see pages 80, 81 and 82.

- **LEAD MATERIAL:** Solder coated nickel per MIL-STD1266, type N32.
- **LEAD TAPE and REEL:** Reeling per specification RS-468. See pages 72 and 74 for additional information.

**T370 ESR (OHMS) at 100 kHz @ +25°C**  
 (The ESR values provided below are for reference only. No warranty, as stated on page 3 and reincorporated here, is made as to the accuracy of these values for any particular T370 Series product.)

Cap. µF	6 Volt	10 Volt	15 Volt	20 Volt	25 Volt	35 Volt
0.68						10.0
1.00						8.0
1.50						6.0
2.20					6.0	5.0
3.30				5.5	5.0	4.0
4.70				4.5	4.0	3.0
6.80		6.0		3.6	3.1	2.5
10.0	6.0	5.0		2.9	2.5	2.0
15.0	5.0	3.7	2.5	2.3	2.0	1.6
22.0	3.7	2.7	2.0	1.8	1.5	1.3
33.0	3.0	2.1	1.6	1.4	1.2	
47.0	2.0	1.7	1.3	1.2		
68.0	1.8	1.3	1.0			
100.0	1.6	1.0				
150.0	0.9					

CAPACITOR OUTLINE DRAWING

DIMENSIONS - INCHES (MILLIMETER)



CASE SIZE	H MAX.	W MAX.	T MAX.	S LEAD SPACING	LEAD DIAMETER ± .001 (.03)
*C	.225 (5.72)	.185 (4.70)	.075 (1.91)	.150 ± .010 (3.81 ± .25)	.016 (.41)
D	.290 (7.37)	.220 (5.59)	.110 (2.79)	.180 ± .010 (4.57 ± .25)	.016 (.41)
E	.310 (7.87)	.230 (5.84)	.130 (3.30)	.200 ± .010 (5.08 ± .25)	.016 (.41)
F	.475 (12.07)	.375 (9.53)	.150 (3.81)	.300 ± .010 (7.62 ± .25)	.016 (.41)

\*C case size T370 style only.

CAPACITOR MARKING

INDUSTRIAL PRODUCT

MILITARY PRODUCT



ORDERING INFORMATION  
KEMET PART NUMBER



\*Part Number Example: T370D475M035AS (14 digits – no spaces)

MIL-PRF-49137/6 PART NUMBER  
CX06(T378) STYLE



Symbol	Rated (85°C) Volts, dc	Surge (85°C) Volts, dc
A	2	2.6
B	3	4
C	4	5
D	6	8
F	10	13
H	15	20
J	20	26
K	25	32
M	35	46

**CAPACITANCE**  
The nominal capacitance value, expressed in picofarads (pF), is identified by a three digit number. The first two digits represent significant figures and the last digit specifies the number of zeros to follow.

T370/T378 Series Tantalum Molded / Radial



# TANTALUM MOLDED / RADIAL — MIL-PRF-49137/6

## T370/T378 (CX06) SERIES

### RATINGS & PART NUMBER REFERENCE

CAPACITANCE µF	CASE SIZE	INDUSTRIAL PRODUCT T370 PART NO.	MILITARY PRODUCT		DC LEAKAGE µA@25°C MAXIMUM	DISSIPATION FACTOR %@25°C 120HZ MAXIMUM
			CX06 PART NO.	T378 PART NO.		
<b>3 VOLT RATING AT 85°C—2.0 VOLT RATING AT 125°C</b>						
220.0	F	T370F227(1)003AS	CX06B227(2)	T378F227(3)003AS	9.0	15
<b>4 VOLT RATING AT 85°C—2.7 VOLT RATING AT 125°C</b>						
15.0	C	T370C156(1)004AS			1.0	8
47.0	D	T370D476(1)004AS	CX06C476(2)	T378D476(3)004AS	2.0	8
68.0	E	T370E686(1)004AS	CX06C686(2)	T378E686(3)004AS	3.0	8
<b>6 VOLT RATING AT 85°C—4.0 VOLT RATING AT 125°C</b>						
10.0	C	T370C106(1)006AS			1.0	6
33.0	D	T370D336(1)006AS	CX06D336(2)	T378D336(3)006AS	2.0	6
47.0	E	T370E476(1)006AS	CX06D476(2)	T378E476(3)006AS	3.0	6
150.0	F	T370F157(1)006AS	CX06D157(2)	T378F157(3)006AS	9.0	10
<b>10 VOLT RATING AT 85°C—7.0 VOLT RATING AT 125°C</b>						
6.8	C	T370C685(1)010AS			1.0	6
22.0	D	T370D226(1)010AS	CX06F226(2)	T378D226(3)010AS	2.0	6
33.0	E	T370E336(1)010AS	CX06F336(2)	T378E336(3)010AS	3.0	6
100.0	F	T370F107(1)010AS	CX06F107(2)	T378F107(3)010AS	9.0	8
<b>15 VOLT RATING AT 85°C—10 VOLT RATING AT 125°C</b>						
15.0	D	T370D156(1)015AS	CX06H156(2)	T378D156(3)015AS	2.0	6
22.0	E	T370E226(1)015AS	CX06H226(2)	T378E226(3)015AS	3.0	6
68.0	F	T370F686(1)015AS	CX06H686(2)	T378F686(3)015AS	9.0	8
<b>20 VOLT RATING AT 85°C—13 VOLT RATING AT 125°C</b>						
3.3	C	T370C335(1)020AS			1.0	6
4.7	C	T370C475(1)020AS			1.0	6
10.0	D	T370D106(1)020AS	CX06J106(2)	T378D106(3)020AS	2.0	6
15.0	E	T370E156(1)020AS	CX06J156(2)	T378E156(3)020AS	3.0	6
47.0	F	T370F476(1)020AS	CX06J476(2)	T378F476(3)020AS	9.0	8
<b>25 VOLT RATING AT 85°C—17 VOLT RATING AT 125°C</b>						
2.2	C	T370C225(1)025AS			1.0	6
6.8	D	T370D685(1)025AS	CX06K685(2)	T378D685(3)025AS	2.0	6
10.0	E	T370E106(1)025AS	CX06K106(2)	T378E106(3)025AS	3.0	6
33.0	F	T370F336(1)025AS	CX06K336(2)	T378F336(3)025AS	9.0	6
<b>35 VOLT RATING AT 85°C—23 VOLT RATING AT 125°C</b>						
0.68	C	T370C684(1)035AS			1.0	6
1.0	C	T370C105(1)035AS			1.0	6
1.5	C	T370C155(1)035AS			1.0	6
2.2	D	T370D225(1)035AS	CX06M225(2)	T378D225(3)035AS	2.0	6
3.3	D	T370D335(1)035AS	CX06M335(2)	T378D335(3)035AS	2.0	6
4.7	D	T370D475(1)035AS	CX06M475(2)	T378D475(3)035AS	2.0	6
6.8	E	T370E685(1)035AS	CX06M685(2)	T378E685(3)035AS	3.0	6
10.0	F	T370F106(1)035AS	CX06M106(2)	T378F106(3)035AS	9.0	6
15.0	F	T370F156(1)035AS	CX06M156(2)	T378F156(3)035AS	9.0	6
22.0	F	T370F226(1)035AS	CX06M226(2)	T378F226(3)035AS	9.0	6

- (1) To complete KEMET part number, insert capacitance tolerance symbol as follows: L = +40%, -20%; M = ±20%; K = ±10%; J = ±5%.  
 (2) To complete military part number, insert capacitance tolerance symbol as follows: M = ±20%; K = ±10%.  
 (3) To complete KEMET part number, insert capacitance tolerance symbol as follows: M = ±20%; K = ±10%.

**PERFORMANCE CHARACTERISTICS**

- **CAPACITANCE/VOLTAGE RANGE:**  
T35X/T39X: 0.1-680µF, 3-50 Volts.  
T36X: 0.1-330µF, 6-50 Volts.
- **CAPACITANCE TOLERANCE:** Available in standard EIA nominal values with ±20% and ±10% standard.
- **DISSIPATION FACTOR:** Maximum DF limits are shown in corresponding series part number listings. See Application Notes Section, page 76 for additional information.
- **DC LEAKAGE CURRENT:** Maximum leakage values at 25° are shown in part number listings, pages 63-65, 67, 68 and 70. See Application Notes Section, pages 76 & 77 for additional information.
- **RATED VOLTAGE; WORKING VOLTAGE; SURGE VOLTAGE; REVERSE VOLTAGE:** See Application Notes Section, pages 76 & 77 for description.
- **IMPEDANCE and ESR:** See Application Notes Section, page 77 & 78 for description. Reference ESR values are shown in table below.

- **AC RIPPLE VOLTAGE:** Permissible AC ripple voltage is related to equivalent series resistance (ESR) and power dissipation capability. Maximum power dissipation for each case size is listed in Table below. For additional description see page 78.

Case Size	Power Dissipation (max.) @ 25°C (watts)
T35X, A	.040
T39X B	.050
C	.060
D	.065
E	.070
F	.080
G	.090
H	.100
J	.110
K	.120
L	.130
M	.140
T36X A	.050
B	.075
C	.090
D	.135

Maximum Power Dissipation Capability @ 25°C

**Commercial T35X/T36X/T39X ESR (OHMS) at 100 kHz @ +25°C**  
(The ESR values provided below are for reference only. No warranty, as stated on page 3 and reincorporated here, is made as to the accuracy of these values for any particular T35X, T36X, T39X Series product.)

Cap. µF	6 Volt	10 Volt	16 Volt	20 Volt	25 Volt	35 Volt	50 Volt
0.10						26.0	26.0
0.15						21.0	21.0
0.22						17.0	17.0
0.33						15.0	15.0
0.47						13.0	13.0
0.68						10.0	10.0
1.00				10.0	10.0	8.0	8.0
1.50			10.0	9.0	8.0	6.0	5.0
2.20		13.0	8.0	7.0	6.0	5.0	3.5
3.30	13.0	10.0	6.0	5.5	5.0	4.0	3.0
4.70	10.0	8.0	5.0	4.5	4.0	3.0	2.5
6.80	8.0	6.0	4.0	3.6	3.1	2.5	2.0
10.0	6.0	5.0	3.2	2.9	2.5	2.0	1.6
15.0	5.0	3.7	2.5	2.3	2.0	1.6	1.2
22.0	3.7	2.7	2.0	1.8	1.5	1.3	1.0
33.0	3.0	2.1	1.6	1.4	1.2	1.0	
47.0	2.0	1.7	1.3	1.2	1.0	0.8	
68.0	1.8	1.3	1.0	0.9	0.8		
100.0	1.6	1.0	0.8	0.6			
150.0	0.9	0.8	0.6				
220.0	0.9	0.6					
330.0	0.7						

- **ENVIRONMENTAL CONSIDERATIONS:**
  - A. Shock Test: MIL-STD-202, Method 213.
  - B. Thermal Shock, MIL-STD-202, Method 107, Condition A.
  - C. Moisture Resistance: MIL-STD-202, Method 106.
  - D. Solderability: MIL-STD-202, Method 208.
 For additional Environmental Test Information see pages 80, 81 and 82.
- **LEAD MATERIAL:** Effective June 30, 2005 the T35x, T368 and T39x Series will be available, as an option, with 100% Matte Tin (RoHS compliant) lead wire or Sn/Pb lead wire. Please see page 63 for part number ordering information. The T363 and T369 lead material will remain Sn/Pb solder coated steel core with a copper ply per MIL-STD-127 and at this time will not be available with a 100% Sn option.
- **LEAD TAPE AND REEL:** Reeling per specification RS-468. See pages 72 - 74 for additional information.

The KEMET 'UltraDip II' Capacitors offer the designer of quality instruments and entertainment systems the widely recognized advantages inherent in solid tantalum capacitors at competitive prices.

The 'UltraDip II' Series, miniature dipped solid tantalum capacitors, provide the designer with the advantage of compactness plus low leakage and low DF performance characteristics for filtering, bypassing, coupling, blocking and RC timing circuits. This series features a capacitance range from 0.1 to 680 microfarads at voltages from 3 to 50 VDC. 'UltraDip II' capacitors utilize the same sophisticated materials and processes which have advanced KEMET Electronics Corporation to the leadership position in solid tantalum capacitors.

The plastic case provides a tough barrier coating and maintains precision of lead wire spacing within  $\pm 0.015$  inch. The gold color epoxy utilized permits Laser marking with outstanding permanency and legibility. All case sizes are printed with capacitance, voltage, polarity and vendor identification.

Solid tantalum devices exhibit no degradation failure mode during shelf storage and show a constantly decreasing failure rate (i.e., absence of wearout mechanism) during life tests.

The 'UltraDip II' Series provides self-insulating cases which are resistant to shock and vibration. These capacitors exhibit low DCL, ESR and Impedance and have excellent temperature stability.

**Effective June 30, 2005 the T35x Series is RoHS compliant.**

### CAPACITOR OUTLINE DRAWINGS



### DIMENSIONS — INCHES (MILLIMETERS)

Case Size	All	T350	T351	T352	T353	T354	T355	T356
	D Max Diameter	H <sup>(1)</sup> Max Height	H <sup>(1)</sup> Max Height	H <sup>(1)</sup> Max Height	H <sup>(1)</sup> Max Height	H <sup>(1)</sup> Max Height	H <sup>(1)</sup> Max Height	H <sup>(1)</sup> Max Height
A	.175 (4.5)	.280 (7.1)	.380 (9.6)	.400 (10.2)	.400 (10.2)	.340 (8.6)	.340 (8.6)	.340 (8.6)
B	.175 (4.5)	.300 (7.6)	.390 (9.9)	.410 (10.4)	.410 (10.4)	.350 (8.9)	.350 (8.9)	.350 (8.9)
C	.196 (5.0)	.330 (8.4)	.420 (10.7)	.440 (11.2)	.440 (11.2)	.380 (9.6)	.380 (9.6)	.380 (9.6)
D	.196 (5.0)	.340 (8.6)	.430 (10.9)	.450 (11.4)	.450 (11.4)	.390 (9.9)	.390 (9.9)	.390 (9.9)
E	.216 (5.5)	.350 (8.9)	.440 (11.2)	.460 (11.7)	.460 (11.7)	.400 (10.2)	.400 (10.2)	.400 (10.2)
F	.236 (6.0)	.390 (9.9)	.480 (12.2)	.500 (12.7)	.500 (12.7)	.440 (11.2)	.440 (11.2)	.440 (11.2)
G	.250 (6.3)	.400 (10.2)	.490 (12.4)	.510 (13.0)	.510 (13.0)	.450 (11.4)	.450 (11.4)	.450 (11.4)
H	.300 (7.6)	.400 (10.2)	.500 (12.7)	.520 (13.2)	.520 (13.2)	.470 (11.9)	.470 (11.9)	.470 (11.9)
J <sup>(2)</sup>	.330 (8.4)	.500 (12.7)	Note 3	Note 3	.580 (14.7)	.550 (14.0)	Note 3	.550 (14.0)
K <sup>(2)</sup>	.350 (8.9)	.530 (13.5)			.630 (16.0)	.610 (15.5)		.610 (15.5)
L <sup>(2)</sup>	.350 (8.9)	.630 (16.0)			.730 (18.5)	.710 (18.1)		.710 (18.1)
M <sup>(2)</sup>	.400 (10.2)	.670 (17.0)			.760 (19.3)	.740 (18.8)		.740 (18.8)

NOTES: (1) All "H" Dimensions are from Capacitor seating plane to top of Capacitor.  
 (2) On T350 Series, case sizes A-H are supplied with .100"(2.54) lead spacing—case sizes J-M are supplied with .200"(5.08) lead spacing.  
 (3) These case sizes are not available for T351, T352 & T355 capacitors.

### LEAD CONFIGURATION & SPACING CHART

CASE	LEAD CONFIGURATION	SERIES						
		T350	T351	T352	T353	T354	T355	T356
A-H	.100	X	X					
	.125						X	
	.200			X	X			X
	.250					X		
	STRAIGHT LEAD	X						
	STAND OFF		X	X		X	X	X
SNAP-IN				X				
J-M	.100		"NOT AVAILABLE"	"NOT AVAILABLE"			"NOT AVAILABLE"	
	.125							
	.200	X			X			X
	.250					X		
	STRAIGHT LEAD	X						
	STAND OFF					X		X
SNAP-IN				X				



# TANTALUM DIPPED / RADIAL - POLAR

## T350, T351, T352, T353, T354, T355 & T356 SERIES "ULTRADIP II"



### T35X & T36X ORDERING INFORMATION



### T35X & T36X MARKING INFORMATION



### T35X RATINGS AND PART NUMBER REFERENCE

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz
<b>3 VOLT RATING AT 85°C — 2 VOLT RATING AT 125°C</b>				
4.7	A	T35(1)A475(3)003A(4)	0.5	5
5.6	A	T35(1)A565(3)003A(4)	0.5	5
6.8	A	T35(1)A685(3)003A(4)	0.5	5
8.2	A	T35(1)A825(3)003A(4)	0.5	6
10.0	A	T35(1)A106(3)003A(4)	0.5	6
12.0	B	T35(1)B126(3)003A(4)	0.5	6
15.0	B	T35(1)B156(3)003A(4)	0.5	6
18.0	C	T35(1)C186(3)003A(4)	0.5	6
22.0	C	T35(1)C226(3)003A(4)	0.5	6
27.0	D	T35(1)D276(3)003A(4)	0.6	6
33.0	D	T35(1)D336(3)003A(4)	0.8	6
39.0	E	T35(1)E396(3)003A(4)	0.9	6
47.0	E	T35(1)E476(3)003A(4)	1.1	6
56.0	F	T35(1)F566(3)003A(4)	1.3	6
68.0	F	T35(1)F686(3)003A(4)	1.6	6
82.0	G	T35(1)G826(3)003A(4)	2.0	8
100.0	G	T35(1)G107(3)003A(4)	2.4	8
120.0	H	T35(1)H127(3)003A(4)	2.9	8
150.0	H	T35(1)H157(3)003A(4)	3.6	8
180.0	J	T35(2)J187(3)003A(4)	4.3	8
220.0	J	T35(2)J227(3)003A(4)	5.3	8
270.0	K	T35(2)K277(3)003A(4)	6.5	8
330.0	K	T35(2)K337(3)003A(4)	7.9	8
390.0	L	T35(2)L397(3)003A(4)	9.4	9
470.0	L	T35(2)L477(3)003A(4)	10.0	9
560.0	M	T35(2)M567(3)003A(4)	10.0	9
680.0	M	T35(2)M687(3)003A(4)	10.0	9

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz
<b>6.3 VOLT RATING AT 85°C — 4 VOLT RATING AT 125°C</b>				
3.3	A	T35(1)A335(3)006A(4)	0.5	5
3.9	A	T35(1)A395(3)006A(4)	0.5	5
4.7	A	T35(1)A475(3)006A(4)	0.5	5
5.6	A	T35(1)A565(3)006A(4)	0.5	5
6.8	A	T35(1)A685(3)006A(4)	0.5	5
8.2	B	T35(1)B825(3)006A(4)	0.5	6
10.0	B	T35(1)B106(3)006A(4)	0.5	6
12.0	C	T35(1)C126(3)006A(4)	0.6	6
15.0	C	T35(1)C156(3)006A(4)	0.7	6
18.0	D	T35(1)D186(3)006A(4)	0.9	6
22.0	D	T35(1)D226(3)006A(4)	1.1	6
27.0	E	T35(1)E276(3)006A(4)	1.3	6
33.0	E	T35(1)E336(3)006A(4)	1.6	6
39.0	F	T35(1)F396(3)006A(4)	1.9	6
47.0	F	T35(1)F476(3)006A(4)	2.3	6
56.0	G	T35(1)G566(3)006A(4)	2.7	6
68.0	G	T35(1)G686(3)006A(4)	3.3	6
82.0	H	T35(1)H826(3)006A(4)	3.9	8
100.0	H	T35(1)H107(3)006A(4)	4.8	8
120.0	J	T35(2)J127(3)006A(4)	5.8	8
150.0	J	T35(2)J157(3)006A(4)	7.2	8
180.0	K	T35(2)K187(3)006A(4)	8.6	8
220.0	K	T35(2)K227(3)006A(4)	10.0	8
270.0	L	T35(2)L277(3)006A(4)	10.0	8
330.0	L	T35(2)L337(3)006A(4)	10.0	8

(1) To complete KEMET Part Number, insert Series Designation as follows: "0" = T350, "1" = T351, "2" = T352, "3" = T353, "4" = T354, "5" = T355, "6" = T356.

(2) To complete KEMET Part Number, insert only Series Designation as follows: "0" = T350, "3" = T353, "4" = T354, "6" = T356.

(3) To complete KEMET Part Number, insert Capacitance Tolerance Symbol: "M" = ±20%, "K" = ±10%.

(4) To complete KEMET Part Number, insert Lead Material designation: S = Sn/Pb (tin/lead) and T = 100% Sn (tin).

NOTE: Higher voltage and better capacitance tolerance product may be substituted for an order within the same case size at KEMET's option.

T35X Series  
Tantalum Dipped / Radial

# TANTALUM DIPPED / RADIAL — POLAR

T350, T351, T352, T353, T354, T355 & T356 SERIES "ULTRADIP II"

## T35X

### RATINGS AND PART NUMBER REFERENCE

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz
<b>10 VOLT RATING AT 85°C — 7 VOLT RATING AT 125°C</b>				
2.2	A	T35(1)A225(3)010A(4)	0.5	5
2.7	A	T35(1)A275(3)010A(4)	0.5	5
3.3	A	T35(1)A335(3)010A(4)	0.5	5
3.9	A	T35(1)A395(3)010A(4)	0.5	5
<b>4.7</b>	<b>A</b>	<b>T35(1)A475(3)010A(4)</b>	<b>0.5</b>	<b>5</b>
5.6	B	T35(1)B565(3)010A(4)	0.5	5
6.8	B	T35(1)B685(3)010A(4)	0.5	5
8.2	C	T35(1)C825(3)010A(4)	0.7	6
10.0	C	T35(1)C106(3)010A(4)	0.8	6
12.0	E	T35(1)E126(3)010A(4)	1.0	6
15.0	E	T35(1)E156(3)010A(4)	1.2	6
18.0	E	T35(1)E186(3)010A(4)	1.4	6
22.0	E	T35(1)E226(3)010A(4)	1.8	6
27.0	F	T35(1)F276(3)010A(4)	2.2	6
<b>33.0</b>	<b>F</b>	<b>T35(1)F336(3)010A(4)</b>	<b>2.6</b>	<b>6</b>
39.0	G	T35(1)G396(3)010A(4)	3.1	6
47.0	H	T35(1)H476(3)010A(4)	3.8	6
56.0	H	T35(1)H566(3)010A(4)	4.5	6
68.0	H	T35(1)H686(3)010A(4)	5.4	6
82.0	J	T35(2)J826(3)010A(4)	6.6	8
<b>100.0</b>	<b>J</b>	<b>T35(2)J107(3)010A(4)</b>	<b>8.0</b>	<b>8</b>
120.0	K	T35(2)K127(3)010A(4)	9.6	8
150.0	K	T35(2)K157(3)010A(4)	10.0	8
180.0	L	T35(2)L187(3)010A(4)	10.0	8
220.0	L	T35(2)L227(3)010A(4)	10.0	8
<b>16 VOLT RATING AT 85°C — 10 VOLT RATING AT 125°C</b>				
1.5	A	T35(1)A155(3)016A(4)	0.5	5
1.8	A	T35(1)A185(3)016A(4)	0.5	5
<b>2.2</b>	<b>A</b>	<b>T35(1)A225(3)016A(4)</b>	<b>0.5</b>	<b>5</b>
2.7	A	T35(1)A275(3)016A(4)	0.5	5
3.3	A	T35(1)A335(3)016A(4)	0.5	5
3.9	B	T35(1)B395(3)016A(4)	0.5	5
<b>4.7</b>	<b>B</b>	<b>T35(1)B475(3)016A(4)</b>	<b>0.6</b>	<b>5</b>
5.6	C	T35(1)C565(3)016A(4)	0.7	5
6.8	C	T35(1)C685(3)016A(4)	0.9	5
8.2	E	T35(1)E825(3)016A(4)	1.0	6
<b>10.0</b>	<b>E</b>	<b>T35(1)E106(3)016A(4)</b>	<b>1.3</b>	<b>6</b>
12.0	E	T35(1)E126(3)016A(4)	1.5	6
15.0	E	T35(1)E156(3)016A(4)	1.8	6
18.0	F	T35(1)F186(3)016A(4)	2.2	6
<b>22.0</b>	<b>F</b>	<b>T35(1)F226(3)016A(4)</b>	<b>2.6</b>	<b>6</b>
27.0	H	T35(1)H276(3)016A(4)	3.2	6
33.0	H	T35(1)H336(3)016A(4)	4.0	6
39.0	J	T35(2)J396(3)016A(4)	4.7	6
<b>47.0</b>	<b>J</b>	<b>T35(2)J476(3)016A(4)</b>	<b>5.6</b>	<b>6</b>
56.0	K	T35(2)K566(3)016A(4)	6.8	6
<b>68.0</b>	<b>K</b>	<b>T35(2)K686(3)016A(4)</b>	<b>8.2</b>	<b>6</b>
82.0	L	T35(2)L826(3)016A(4)	9.8	8
<b>100.0</b>	<b>L</b>	<b>T35(2)L107(3)016A(4)</b>	<b>10.0</b>	<b>8</b>
120.0	M	T35(2)M127(3)016A(4)	10.0	8
150.0	M	T35(2)M157(3)016A(4)	10.0	8

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz
<b>20 VOLT RATING AT 85°C — 13 VOLT RATING AT 125°C</b>				
1.0	A	T35(1)A105(3)020A(4)	0.5	5
1.2	A	T35(1)A125(3)020A(4)	0.5	5
1.5	A	T35(1)A155(3)020A(4)	0.5	5
1.8	A	T35(1)A185(3)020A(4)	0.5	5
2.2	A	T35(1)A225(3)020A(4)	0.5	5
2.7	B	T35(1)B275(3)020A(4)	0.5	5
3.3	B	T35(1)B335(3)020A(4)	0.5	5
3.9	C	T35(1)C395(3)020A(4)	0.6	5
4.7	C	T35(1)C475(3)020A(4)	0.8	5
5.6	D	T35(1)D565(3)020A(4)	0.9	5
6.8	D	T35(1)D685(3)020A(4)	1.1	5
8.2	E	T35(1)E825(3)020A(4)	1.3	6
10.0	E	T35(1)E106(3)020A(4)	1.6	6
12.0	F	T35(1)F126(3)020A(4)	1.9	6
15.0	F	T35(1)F156(3)020A(4)	2.4	6
18.0	G	T35(1)G186(3)020A(4)	2.9	6
22.0	G	T35(1)G226(3)020A(4)	3.5	6
27.0	J	T35(2)J276(3)020A(4)	4.3	6
33.0	J	T35(2)J336(3)020A(4)	5.3	6
39.0	K	T35(2)K396(3)020A(4)	6.2	6
47.0	K	T35(2)K476(3)020A(4)	7.5	6
56.0	L	T35(2)L566(3)020A(4)	9.0	6
68.0	L	T35(2)L686(3)020A(4)	10.0	6
82.0	M	T35(2)M826(3)020A(4)	10.0	8
<b>100.0</b>	<b>M</b>	<b>T35(2)M107(3)020A(4)</b>	<b>10.0</b>	<b>8</b>
<b>25 VOLT RATING AT 85°C — 16.5 VOLT RATING AT 125°C</b>				
<b>1.0</b>	<b>A</b>	<b>T35(1)A105(3)025A(4)</b>	<b>0.5</b>	<b>5</b>
1.2	A	T35(1)A125(3)025A(4)	0.5	5
1.5	A	T35(1)A155(3)025A(4)	0.5	5
1.8	A	T35(1)A185(3)025A(4)	0.5	5
<b>2.2</b>	<b>B</b>	<b>T35(1)B225(3)025A(4)</b>	<b>0.5</b>	<b>5</b>
2.7	B	T35(1)B275(3)025A(4)	0.5	5
3.3	B	T35(1)B335(3)025A(4)	0.7	5
3.9	C	T35(1)C395(3)025A(4)	0.8	5
4.7	C	T35(1)C475(3)025A(4)	0.9	5
5.6	E	T35(1)E565(3)025A(4)	1.1	5
6.8	E	T35(1)E685(3)025A(4)	1.4	5
8.2	E	T35(1)E825(3)025A(4)	1.6	6
<b>10.0</b>	<b>E</b>	<b>T35(1)E106(3)025A(4)</b>	<b>2.0</b>	<b>6</b>
12.0	G	T35(1)G126(3)025A(4)	2.4	6
<b>15.0</b>	<b>G</b>	<b>T35(1)G156(3)025A(4)</b>	<b>3.0</b>	<b>6</b>
18.0	H	T35(1)H186(3)025A(4)	3.6	6
<b>22.0</b>	<b>H</b>	<b>T35(1)H226(3)025A(4)</b>	<b>4.4</b>	<b>6</b>
27.0	J	T35(2)J276(3)025A(4)	5.4	6
33.0	J	T35(2)J336(3)025A(4)	6.6	6
39.0	K	T35(2)K396(3)025A(4)	7.8	6
<b>47.0</b>	<b>K</b>	<b>T35(2)K476(3)025A(4)</b>	<b>9.4</b>	<b>6</b>
56.0	L	T35(2)L566(3)025A(4)	10.0	6
68.0	L	T35(2)L686(3)025A(4)	10.0	6

(1) To complete KEMET Part Number, insert Series Designation as follows: "0" = T350, "1" = T351, "2" = T352, "3" = T353, "4" = T354, "5" = T355, "6" = T356.  
 (2) To complete KEMET Part Number, insert only Series Designation as follows: "0" = T350, "3" = T353, "4" = T354, "6" = T356.  
 (3) To complete KEMET Part Number, insert Capacitance Tolerance Symbol: "M" = ±20%, "K" = ±10%.  
 (4) To complete KEMET Part Number, insert Lead Material Designation as follows: S = Sn/Pb (tin/lead) and T = 100% Sn (tin).  
 NOTE: Higher voltage and better capacitance tolerance product may be substituted for an order within the same case size at KEMET's option.



T35X

RATINGS AND PART NUMBER REFERENCE

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSI- PATION FACTOR %@25°C, 120Hz
<b>35 VOLT RATING AT 85°C — 23 VOLT RATING AT 125°C</b>				
0.10	A	T35(1)A104(3)035A(4)	0.5	3
0.12	A	T35(1)A124(3)035A(4)	0.5	3
0.15	A	T35(1)A154(3)035A(4)	0.5	3
0.18	A	T35(1)A184(3)035A(4)	0.5	3
0.22	A	T35(1)A224(3)035A(4)	0.5	3
0.27	A	T35(1)A274(3)035A(4)	0.5	3
0.33	A	T35(1)A334(3)035A(4)	0.5	3
0.39	A	T35(1)A394(3)035A(4)	0.5	3
0.47	A	T35(1)A474(3)035A(4)	0.5	3
0.56	A	T35(1)A564(3)035A(4)	0.5	3
0.68	A	T35(1)A684(3)035A(4)	0.5	3
0.82	A	T35(1)A824(3)035A(4)	0.5	3
<b>1.0</b>	<b>A</b>	<b>T35(1)A105(3)035A(4)</b>	<b>0.5</b>	<b>3</b>
1.2	B	T35(1)B125(3)035A(4)	0.5	5
1.5	B	T35(1)B155(3)035A(4)	0.5	5
1.8	C	T35(1)C185(3)035A(4)	0.5	5
<b>2.2</b>	<b>C</b>	<b>T35(1)C225(3)035A(4)</b>	<b>0.6</b>	<b>5</b>
2.7	D	T35(1)D275(3)035A(4)	0.7	5
3.3	D	T35(1)D335(3)035A(4)	0.9	5
3.9	E	T35(1)E395(3)035A(4)	1.0	5
<b>4.7</b>	<b>E</b>	<b>T35(1)E475(3)035A(4)</b>	<b>1.3</b>	<b>5</b>
5.6	F	T35(1)F565(3)035A(4)	1.6	5
<b>6.8</b>	<b>F</b>	<b>T35(1)F685(3)035A(4)</b>	<b>1.9</b>	<b>5</b>
8.2	G	T35(1)G825(3)035A(4)	2.3	6
<b>10.0</b>	<b>G</b>	<b>T35(1)G106(3)035A(4)</b>	<b>2.8</b>	<b>6</b>
12.0	J	T35(2)J126(3)035A(4)	3.4	6
15.0	J	T35(2)J156(3)035A(4)	4.2	6
18.0	K	T35(2)K186(3)035A(4)	5.0	6
<b>22.0</b>	<b>K</b>	<b>T35(2)K226(3)035A(4)</b>	<b>6.2</b>	<b>6</b>
27.0	L	T35(2)L276(3)035A(4)	7.6	6
33.0	L	T35(2)L336(3)035A(4)	9.2	6
39.0	M	T35(2)M396(3)035A(4)	10.0	6
<b>47.0</b>	<b>M</b>	<b>T35(2)M476(3)035A(4)</b>	<b>10.0</b>	<b>6</b>

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSI- PATION FACTOR %@25°C, 120Hz
<b>50 VOLT RATING AT 85°C — 33 VOLT RATING AT 125°C</b>				
0.10	A	T35(1)A104(3)050A(4)	0.5	3
0.12	A	T35(1)A124(3)050A(4)	0.5	3
0.15	A	T35(1)A154(3)050A(4)	0.5	3
0.18	A	T35(1)A184(3)050A(4)	0.5	3
0.22	A	T35(1)A224(3)050A(4)	0.5	3
0.27	A	T35(1)A274(3)050A(4)	0.5	3
0.33	A	T35(1)A334(3)050A(4)	0.5	3
0.39	B	T35(1)B394(3)050A(4)	0.5	3
0.47	B	T35(1)B474(3)050A(4)	0.5	3
0.56	B	T35(1)B564(3)050A(4)	0.5	3
0.68	B	T35(1)B684(3)050A(4)	0.5	3
0.82	B	T35(1)B824(3)050A(4)	0.5	3
<b>1.0</b>	<b>B</b>	<b>T35(1)B105(3)050A(4)</b>	<b>0.5</b>	<b>3</b>
1.2	D	T35(1)D125(3)050A(4)	0.5	5
1.5	E	T35(1)E155(3)050A(4)	0.6	5
1.8	E	T35(1)E185(3)050A(4)	0.7	5
2.2	E	T35(1)E225(3)050A(4)	0.9	5
2.7	F	T35(1)F275(3)050A(4)	1.1	5
3.3	F	T35(1)F335(3)050A(4)	1.3	5
3.9	G	T35(1)G395(3)050A(4)	1.6	5
4.7	G	T35(1)G475(3)050A(4)	1.9	5
5.6	H	T35(1)H565(3)050A(4)	2.2	5
<b>6.8</b>	<b>J</b>	<b>T35(2)J685(3)050A(4)</b>	<b>2.7</b>	<b>5</b>
8.2	J	T35(2)J825(3)050A(4)	3.3	6
<b>10.0</b>	<b>K</b>	<b>T35(2)K106(3)050A(4)</b>	<b>4.0</b>	<b>6</b>
12.0	K	T35(2)K126(3)050A(4)	4.8	6
15.0	L	T35(2)L156(3)050A(4)	6.0	6
18.0	L	T35(2)L186(3)050A(4)	7.2	6
22.0	M	T35(2)M226(3)050A(4)	8.8	6

(1) To complete KEMET Part Number, insert Series Designation as follows: "0" = T350, "1" = T351, "2" = T352, "3" = T353, "4" = T354, "5" = T355, "6" = T356.  
 (2) To complete KEMET Part Number, insert only Series Designation as follows: "0" = T350, "3" = T353, "4" = T354, "6" = T356.  
 (3) To complete KEMET Part Number, insert Capacitance Tolerance Symbol: "M" = ±20%, "K" = ±10%.  
 (4) To complete KEMET Part Number, insert Lead Material Designation as follows: S = Sn/Pb (tin/lead) and T = 100% Tin.  
 Note: Higher voltage and better capacitance tolerance product may be substituted for an order within the same case size at KEMET's option.

Product manufactured to the requirements of MIL-PRF-49137 satisfy all the performance characteristics of the UltraDip II. The performance characteristics meet or exceed the requirements of MIL-PRF-49137.

In addition to the standard process testing done on the UltraDip II, all product supplied to MIL-PRF-49137 is sampled on a lot by lot

basis for Group A and Group B inspection to insure compliance. Product supplied per MIL-PRF-49137 also receives an additional post process burn-in for at least two (2) 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.

### CAPACITOR OUTLINE DRAWINGS



### DIMENSIONS — INCHES & (MILLIMETERS)

T363 A-D CASE  
T369 A&B CASE ONLY

CASE SIZE	D MAX	H MAX
A	0.175 (4.45)	0.350 (8.89)
B	0.250 (6.35)	0.450 (11.43)
C	0.350 (8.89)	0.610 (15.49)
D	0.400 (10.16)	0.740 (18.80)

### MIL-PRF-49137 MARKING INFORMATION



### MIL-PRF-49137/2 ORDERING INFORMATION



Symbol	Rated (857C) Volts, dc	Surge (857C) Volts, dc
D	6	8
F	10	13
H	15	20
J	20	26
K	25	32
M	35	46
N	50	65

#### CAPACITANCE TOLERANCE

Symbol	Capacitance Tolerance
	Percent (±)
K	10
M	20

#### CAPACITANCE IN PICOFARAD CODE

The nominal capacitance value, expressed in picofarads (pF), is identified by a three-digit number; the first two digits represent significant figures and the last digit specifies the number of zeros to follow.

\*For KEMET Ordering Information, see page 63.

**RATINGS & PART NUMBER REFERENCE**

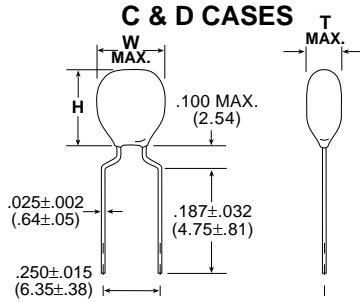
T363/T369 & T368 Series  
Tantalum Dipped / Radial

CAPACITANCE µF	CASE SIZE	CAPACITANCE TOLERANCE ±%	T363, T369 KEMET PART NUMBER	D.C. LEAKAGE µA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz	CX02 (T363) MILITARY PART NUMBER	CX12 (T369) MILITARY PART NUMBER
<b>6 VOLT RATING AT 85°C</b>							
6.8	A	10, 20	T36(1)A685(2)006AS	0.5	6	CX02D685(2)	CX12D685(2)
47.0	B	10, 20	T36(1)B476(2)006AS	2.3	6	CX02D476(2)	CX12D476(2)
68.0	B	10, 20	T36(1)B686(2)006AS	3.3	6	CX02D686(2)	CX12D686(2)
150.0	C	10, 20	T363C157(2)006AS	7.2	8	CX02D157(2)	
330.0	D	10, 20	T363D337(2)006AS	10.0	8	CX02D337(2)	
<b>10 VOLT RATING AT 85°C</b>							
4.7	A	10, 20	T36(1)A475(2)010AS	0.5	5	CX02F475(2)	CX12F475(2)
33.0	B	10, 20	T36(1)B336(2)010AS	2.6	6	CX02F336(2)	CX12F336(2)
100.0	C	10, 20	T363C107(2)010AS	8.0	8	CX02F107(2)	
220.0	D	10, 20	T363D227(2)010AS	10.0	8	CX02F227(2)	
<b>15 VOLT RATING AT 85°C</b>							
3.3	A	10, 20	T36(1)A335(2)015AS	0.5	5	CX02H335(2)	CX12H335(2)
22.0	B	10, 20	T36(1)B226(2)015AS	2.6	6	CX02H226(2)	CX12H226(2)
68.0	C	10, 20	T363C686(2)015AS	8.2	6	CX02H686(2)	
150.0	D	10, 20	T363D157(2)015AS	10.0	8	CX02H157(2)	
<b>20 VOLT RATING AT 85°C</b>							
2.2	A	10, 20	T36(1)A225(2)020AS	0.5	5	CX02J225(2)	CX12J225(2)
15.0	B	10, 20	T36(1)B156(2)020AS	2.4	6	CX02J156(2)	CX12J156(2)
47.0	C	10, 20	T363C476(2)020AS	7.5	6	CX02J476(2)	
100.0	D	10, 20	T363D107(2)020AS	10.0	8	CX02J107(2)	
<b>25 VOLT RATING AT 85°C</b>							
1.5	A	10, 20	T36(1)A155(2)025AS	0.5	5	CX02K155(2)	CX12K155(2)
10.0	B	10, 20	T36(1)B106(2)025AS	2.0	6	CX02K106(2)	CX12K106(2)
33.0	C	10, 20	T363C336(2)025AS	6.6	6	CX02K336(2)	
68.0	D	10, 20	T363D686(2)025AS	10.0	6	CX02K686(2)	
<b>35 VOLT RATING AT 85°C</b>							
6.8	B	10, 20	T36(1)B685(2)035AS	1.9	5	CX02M685(2)	CX12M685(2)
22.0	C	10, 20	T363C226(2)035AS	6.2	6	CX02M226(2)	
33.0	D	10, 20	T363D336(2)035AS	9.2	6	CX02M336(2)	
47.0	D	10, 20	T363D476(2)035AS	10.0	6	CX02M476(2)	
<b>50 VOLT RATING AT 85°C</b>							
0.1	A	10, 20	T36(1)A104(2)050AS	0.5	3	CX02N104(2)	CX12N104(2)
0.15	A	10, 20	T36(1)A154(2)050AS	0.5	3	CX02N154(2)	CX12N154(2)
0.22	A	10, 20	T36(1)A224(2)050AS	0.5	3	CX02N224(2)	CX12N224(2)
0.33	A	10, 20	T36(1)A334(2)050AS	0.5	3	CX02N334(2)	CX12N334(2)
0.47	A	10, 20	T36(1)A474(2)050AS	0.5	3	CX02N474(2)	CX12N474(2)
0.68	A	10, 20	T36(1)A684(2)050AS	0.5	3	CX02N684(2)	CX12N684(2)
1.0	A	10, 20	T36(1)A105(2)050AS	0.5	3	CX02N105(2)	CX12N105(2)
1.5	B	10, 20	T36(1)B155(2)050AS	0.6	5	CX02N155(2)	CX12N155(2)
2.2	B	10, 20	T36(1)B225(2)050AS	0.9	5	CX02N225(2)	CX12N225(2)
3.3	B	10, 20	T36(1)B335(2)050AS	1.3	5	CX02N335(2)	CX12N335(2)
4.7	B	10, 20	T36(1)B475(2)050AS	1.9	5	CX02N475(2)	CX12N475(2)
6.8	C	10, 20	T363C685(2)050AS	2.7	5	CX02N685(2)	
10.0	C	10, 20	T363C106(2)050AS	4.0	6	CX02N106(2)	
15.0	C	10, 20	T363C156(2)050AS	6.0	6	CX02N156(2)	
22.0	D	10, 20	T363D226(2)050AS	8.8	6	CX02N226(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 Capacitance Tolerance Symbol as follows:  
M - ±20%, K - ±10%

### T368 CAPACITOR OUTLINE DRAWING



### T368 DIMENSIONS — INCHES + (MILLIMETERS)

CASE SIZE	TMAX	WMAX	HMAX
C	0.250 (6.35)	0.40 (10.16)	0.42 (10.67)
D	0.250 (6.35)	0.460 (11.68)	0.52 (13.20)

### T368 RATINGS AND PART NUMBER REFERENCE

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz
<b>6 VOLT RATING AT 85°C</b>				
82.0	C	T368C826(1)006A(2)	3.9	8
100.0	C	T368C107(1)006A(2)	4.8	8
120.0	C	T368C127(1)006A(2)	5.8	8
150.0	C	T368C157(1)006A(2)	7.2	8
180.0	D	T368D187(1)006A(2)	8.6	8
220.0	D	T368D227(1)006A(2)	10.0	8
270.0	D	T368D277(1)006A(2)	10.0	8
330.0	D	T368D337(1)006A(2)	10.0	8
<b>10 VOLT RATING AT 85°C</b>				
47.0	C	T368C476(1)010A(2)	3.8	6
56.0	C	T368C566(1)010A(2)	4.4	6
68.0	C	T368C686(1)010A(2)	5.4	6
82.0	C	T368C826(1)010A(2)	6.5	8
100.0	C	T368C107(1)010A(2)	8.0	8
120.0	D	T368D127(1)010A(2)	9.6	8
150.0	D	T368D157(1)010A(2)	10.0	8
180.0	D	T368D187(1)010A(2)	10.0	8
220.0	D	T368D227(1)010A(2)	10.0	8
<b>15 VOLT RATING AT 85°C</b>				
27.0	C	T368C276(1)015A(2)	3.2	6
33.0	C	T368C336(1)015A(2)	4.0	6
39.0	C	T368C396(1)015A(2)	4.7	6
47.0	C	T368C476(1)015A(2)	5.6	6
56.0	C	T368C566(1)015A(2)	6.8	6
68.0	C	T368C686(1)015A(2)	8.2	6
82.0	D	T368D826(1)015A(2)	9.8	8
100.0	D	T368D107(1)015A(2)	10.0	8
120.0	D	T368D127(1)015A(2)	10.0	8
150.0	D	T368D157(1)015A(2)	10.0	8
<b>20 VOLT RATING AT 85°C</b>				
18.0	C	T368C186(1)020A(2)	2.8	6
22.0	C	T368C226(1)020A(2)	3.5	6
27.0	C	T368C276(1)020A(2)	4.3	6
33.0	C	T368C336(1)020A(2)	5.3	6
39.0	C	T368C396(1)020A(2)	6.2	6
47.0	C	T368C476(1)020A(2)	7.5	6
56.0	D	T368D566(1)020A(2)	8.9	6
68.0	D	T368D686(1)020A(2)	10.0	6
82.0	D	T368D826(1)020A(2)	10.0	8
100.0	D	T368D107(1)020A(2)	10.0	8

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz
<b>25 VOLT RATING AT 85°C</b>				
12.0	C	T368C126(1)025A(2)	2.4	6
15.0	C	T368C156(1)025A(2)	3.0	6
18.0	C	T368C186(1)025A(2)	3.6	6
22.0	C	T368C226(1)025A(2)	4.4	6
27.0	C	T368C276(1)025A(2)	5.4	6
33.0	C	T368C336(1)025A(2)	6.6	6
39.0	D	T368D396(1)025A(2)	7.8	6
47.0	D	T368D476(1)025A(2)	9.4	6
56.0	D	T368D566(1)025A(2)	10.0	6
68.0	D	T368D686(1)025A(2)	10.0	6
<b>35 VOLT RATING AT 85°C</b>				
8.2	C	T368C825(1)035A(2)	2.3	6
10.0	C	T368C106(1)035A(2)	2.8	6
12.0	C	T368C126(1)035A(2)	3.3	6
15.0	C	T368C156(1)035A(2)	4.2	6
18.0	C	T368C186(1)035A(2)	5.0	6
22.0	C	T368C226(1)035A(2)	6.2	6
27.0	D	T368D276(1)035A(2)	7.5	6
33.0	D	T368D336(1)035A(2)	9.2	6
39.0	D	T368D396(1)035A(2)	10.0	6
47.0	D	T368D476(1)035A(2)	10.0	6
<b>50 VOLT RATING AT 85°C</b>				
5.6	C	T368C565(1)050A(2)	2.2	5
6.8	C	T368C685(1)050A(2)	2.7	5
8.2	C	T368C825(1)050A(2)	3.2	6
10.0	C	T368C106(1)050A(2)	4.0	6
12.0	C	T368C126(1)050A(2)	4.8	6
15.0	C	T368C156(1)050A(2)	6.0	6
18.0	D	T368D186(1)050A(2)	7.2	6
22.0	D	T368D226(1)050A(2)	8.8	6

- (1) To complete KEMET part number, insert capacitance tolerance K- ±10%, M- ±20%, or J- ±5% (Available on special order).
- (2) To complete KEMET part number, insert lead material designation: S = SnPb (tin/lead) and T = 100% Sn (tin).

**\* For Ordering and Marking Information refer to page 63.**

**Effective June 30, 2005 T368 Series is RoHS Compliant.**

# TANTALUM DIPPED / 3 LEADED

## T396 & T398 SERIES "ULTRADIP III"



KEMET UltraDip III Capacitors offer the advantages of solid tantalum construction and a "fail-safe" insertion mechanism. The three-leaded design (the anode is in the center) enables operators to insert the capacitors into printed circuit boards correctly without having to visually determine polarity. This timesaving device also eliminates board damage that may result from incorrect insertion.

The UltraDip III Series features a capacitance range of 0.1 to 680  $\mu$ F at 3 to 50 VDC. These miniature dipped solid tantalum capacitors are encased in a tough plastic barrier coating that maintains the pre-

cise lead wire spacing within  $\pm 0.015$  inch. The gold color epoxy permits laser markings with outstanding permanency and legibility. All case sizes are printed with capacitance, voltage and vendor I.D.

The UltraDip III Series from KEMET Capacitors exhibit low DCL, ESR and Impedance and have excellent temperature stability. These capacitors may be ordered with precut leads (see drawing for lengths) or in KEMET Capacitor ARIS packaging (leads taped and on reels) for high speed automatic insertion equipment.

Effective June 30, 2005 the T396 and T398 Series are RoHS Compliant.

### CAPACITOR OUTLINE DRAWING



### DIMENSIONS—INCHES & (MILLIMETERS)

Series	Case Size	Both		T396	T398
		W Width	T Thickness	H* Height	H* Height
T396/T398	A	.280 (7.1)	.190 (4.8)	.310 (7.9)	.355 (9.0)
T396/T398	B	.280 (7.1)	.190 (4.8)	.320 (8.1)	.365 (9.3)
T396/T398	C	.280 (7.1)	.200 (5.1)	.360 (9.1)	.390 (9.9)
T396/T398	D	.280 (7.1)	.200 (5.1)	.370 (9.4)	.390 (9.9)
T396/T398	E	.280 (7.1)	.230 (5.8)	.380 (9.7)	.415 (10.5)
T396/T398	F	.280 (7.1)	.240 (6.1)	.410 (10.4)	.430 (10.9)
T396/T398	G	.280 (7.1)	.250 (6.3)	.420 (10.7)	.440 (11.2)
T396/T398	H	.280 (7.1)	.270 (6.9)	.420 (10.7)	.440 (11.2)
T396/T398	J	.300 (7.6)	.300 (7.6)	.460 (11.7)	.480 (12.2)
T396/T398	K	.340 (8.6)	.340 (8.6)	.500 (12.7)	.500 (12.7)
T396/T398	L	.340 (8.6)	.340 (8.6)	.560 (14.2)	.580 (14.7)
T396/T398	M	.360 (9.1)	.360 (9.1)	.620 (15.7)	.620 (15.7)

\*NOTE: "H" dimensions are from seating plane to top of capacitor.

### CAPACITOR MARKING



### ORDERING INFORMATION



T396/T398 Series  
Tantalum Dipped / 3 Leaded



# TANTALUM DIPPED / 3 LEADED —POLAR

## T396 & T398 SERIES “ULTRADIP III”

### RATINGS & PART NUMBER REFERENCE

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz
<b>3 VOLT RATING AT 85°C — 2 VOLT RATING AT 125°C</b>				
4.7	A	T39(1)A475(2)003A(3)	0.5	5
6.8	A	T39(1)A685(2)003A(3)	0.5	5
10.0	A	T39(1)A106(2)003A(3)	0.5	6
15.0	B	T39(1)B156(2)003A(3)	0.5	6
22.0	C	T39(1)C226(2)003A(3)	0.5	6
33.0	D	T39(1)D336(2)003A(3)	0.8	6
47.0	E	T39(1)E476(2)003A(3)	1.1	6
68.0	F	T39(1)F686(2)003A(3)	1.6	6
100.0	G	T39(1)G107(2)003A(3)	2.4	8
150.0	H	T39(1)H157(2)003A(3)	3.6	8
220.0	J	T39(1)J227(2)003A(3)	5.3	8
330.0	K	T39(1)K337(2)003A(3)	7.9	8
470.0	L	T39(1)L477(2)003A(3)	10.0	9
680.0	M	T39(1)M687(2)003A(3)	10.0	9
<b>10 VOLT RATING AT 85°C — 7 VOLT RATING AT 125°C</b>				
2.2	A	T39(1)A225(2)010A(3)	0.5	5
3.3	A	T39(1)A335(2)010A(3)	0.5	5
4.7	A	T39(1)A475(2)010A(3)	0.5	5
6.8	B	T39(1)B685(2)010A(3)	0.5	5
10.0	C	T39(1)C106(2)010A(3)	0.8	6
15.0	E	T39(1)E156(2)010A(3)	1.2	6
22.0	E	T39(1)E226(2)010A(3)	1.8	6
33.0	F	T39(1)F336(2)010A(3)	2.6	6
47.0	H	T39(1)H476(2)010A(3)	3.8	6
68.0	H	T39(1)H686(2)010A(3)	5.4	6
100.0	J	T39(1)J107(2)010A(3)	8.0	8
150.0	K	T39(1)K157(2)010A(3)	10.0	8
220.0	I	T39(1)L227(2)010A(3)	10.0	8
<b>20 VOLT RATING AT 85°C — 13 VOLT RATING AT 125°C</b>				
1.0	A	T39(1)A105(2)020A(3)	0.5	3
1.5	A	T39(1)A155(2)020A(3)	0.5	5
2.2	A	T39(1)A225(2)020A(3)	0.5	5
3.3	B	T39(1)B335(2)020A(3)	0.5	5
4.7	C	T39(1)C475(2)020A(3)	0.8	5
6.8	D	T39(1)D685(2)020A(3)	1.1	5
10.0	E	T39(1)E106(2)020A(3)	1.6	6
15.0	F	T39(1)F156(2)020A(3)	2.4	6
22.0	G	T39(1)G226(2)020A(3)	3.5	6
33.0	J	T39(1)J336(2)020A(3)	5.3	6
47.0	K	T39(1)K476(2)020A(3)	7.5	6
68.0	L	T39(1)L686(2)020A(3)	10.0	6
100.0	M	T39(1)M107(2)020A(3)	10.0	8
<b>35 VOLT RATING AT 85°C — 23 VOLT RATING AT 125°C</b>				
0.10	A	T39(1)A104(2)035A(3)	0.5	3
0.15	A	T39(1)A154(2)035A(3)	0.5	3
0.22	A	T39(1)A224(2)035A(3)	0.5	3
0.33	A	T39(1)A334(2)035A(3)	0.5	3
0.47	A	T39(1)A474(2)035A(3)	0.5	3
0.68	A	T39(1)A684(2)035A(3)	0.5	3
1.0	A	T39(1)A105(2)035A(3)	0.5	3
1.5	B	T39(1)B155(2)035A(3)	0.5	5
2.2	C	T39(1)C225(2)035A(3)	0.6	5
3.3	D	T39(1)D335(2)035A(3)	0.9	5
4.7	E	T39(1)E475(2)035A(3)	1.3	5
6.8	F	T39(1)F685(2)035A(3)	1.9	5
10.0	G	T39(1)G106(2)035A(3)	2.8	6
15.0	J	T39(1)J156(2)035A(3)	4.2	6
22.0	K	T39(1)K226(2)035A(3)	6.2	6
33.0	L	T39(1)L336(2)035A(3)	9.2	6
47.0	M	T39(1)M476(2)035A(3)	10.0	6

CAPACITANCE μF	CASE SIZE	KEMET PART NUMBER	D.C. LEAKAGE μA@25°C	MAX. DISSIPATION FACTOR %@25°C, 120Hz
<b>6.3 VOLT RATING AT 85°C — 4 VOLT RATING AT 125°C</b>				
3.3	A	T39(1)A335(2)006A(3)	0.5	5
4.7	A	T39(1)A475(2)006A(3)	0.5	5
6.8	A	T39(1)A685(2)006A(3)	0.5	5
10.0	B	T39(1)B106(2)006A(3)	0.5	6
15.0	C	T39(1)C156(2)006A(3)	0.7	6
22.0	D	T39(1)D226(2)006A(3)	1.1	6
33.0	E	T39(1)E336(2)006A(3)	1.6	6
47.0	F	T39(1)F476(2)006A(3)	2.3	6
68.0	G	T39(1)G686(2)006A(3)	3.3	6
100.0	H	T39(1)H107(2)006A(3)	4.8	8
150.0	J	T39(1)J157(2)006A(3)	7.2	8
220.0	K	T39(1)K227(2)006A(3)	10.0	8
330.0	L	T39(1)L337(2)006A(3)	10.0	8
<b>16 VOLT RATING AT 85°C — 10 VOLT RATING AT 125°C</b>				
1.5	A	T39(1)A155(2)016A(3)	0.5	5
2.2	A	T39(1)A225(2)016A(3)	0.5	5
3.3	A	T39(1)A335(2)016A(3)	0.5	5
4.7	B	T39(1)B475(2)016A(3)	0.6	5
6.8	C	T39(1)C685(2)016A(3)	0.9	5
10.0	E	T39(1)E106(2)016A(3)	1.3	6
15.0	E	T39(1)E156(2)016A(3)	1.8	6
22.0	F	T39(1)F226(2)016A(3)	2.6	6
33.0	H	T39(1)H336(2)016A(3)	4.0	6
47.0	J	T39(1)J476(2)016A(3)	5.6	6
68.0	K	T39(1)K686(2)016A(3)	8.2	6
100.0	L	T39(1)L107(2)016A(3)	10.0	8
150.0	M	T39(1)M157(2)016A(3)	10.0	8
<b>25 VOLT RATING AT 85°C — 16.5 VOLT RATING AT 125°C</b>				
1.0	A	T39(1)A105(2)025A(3)	0.5	3
1.5	A	T39(1)A155(2)025A(3)	0.5	5
2.2	B	T39(1)B225(2)025A(3)	0.5	5
3.3	B	T39(1)B335(2)025A(3)	0.7	5
4.7	C	T39(1)C475(2)025A(3)	0.9	5
6.8	E	T39(1)E685(2)025A(3)	1.4	5
10.0	E	T39(1)E106(2)025A(3)	2.0	6
15.0	G	T39(1)G156(2)025A(3)	3.0	6
22.0	H	T39(1)H226(2)025A(3)	4.4	6
33.0	J	T39(1)J336(2)025A(3)	6.6	6
47.0	K	T39(1)K476(2)025A(3)	9.4	6
68.0	L	T39(1)L686(2)025A(3)	10.0	6
<b>50 VOLT RATING AT 85°C — 33 VOLT RATING AT 125°C</b>				
0.10	A	T39(1)A104(2)050A(3)	0.5	3
0.15	A	T39(1)A154(2)050A(3)	0.5	3
0.22	A	T39(1)A224(2)050A(3)	0.5	3
0.33	A	T39(1)A334(2)050A(3)	0.5	3
0.47	B	T39(1)B474(2)050A(3)	0.5	3
0.68	B	T39(1)B684(2)050A(3)	0.5	3
1.0	B	T39(1)B105(2)050A(3)	0.5	3
1.5	E	T39(1)E155(2)050A(3)	0.6	5
2.2	E	T39(1)E225(2)050A(3)	0.9	5
3.3	F	T39(1)F335(2)050A(3)	1.3	5
4.7	G	T39(1)G475(2)050A(3)	1.9	5
6.8	J	T39(1)J685(2)050A(3)	2.7	5
10.0	K	T39(1)K106(2)050A(3)	4.0	6
15.0	L	T39(1)L156(2)050A(3)	6.0	6
22.0	M	T39(1)M226(2)050A(3)	8.8	6

(1) To complete KEMET Part Number, insert Series Designation as follows: "6" = T396, "8" = T398.  
(2) To complete KEMET Part Number, insert Capacitance Tolerance Symbol as follows: "M" = ±20%, "K" = ±10%.  
(3) To complete KEMET Part Number, insert Lead Material Designation: S = SnPb (tin/lead) and T = 100% Sn (tin).

NOTE: Higher voltage/tighter tolerance products may be shipped, at KEMET's option, within the same case size.

## Tantalum Axial Lead Tape and Reel Packaging

KEMET offers standard reeling of Solid Tantalum Capacitors for automatic insertion or lead forming machines per EIA Specification RS-296E.



Figure 1



Figure 2

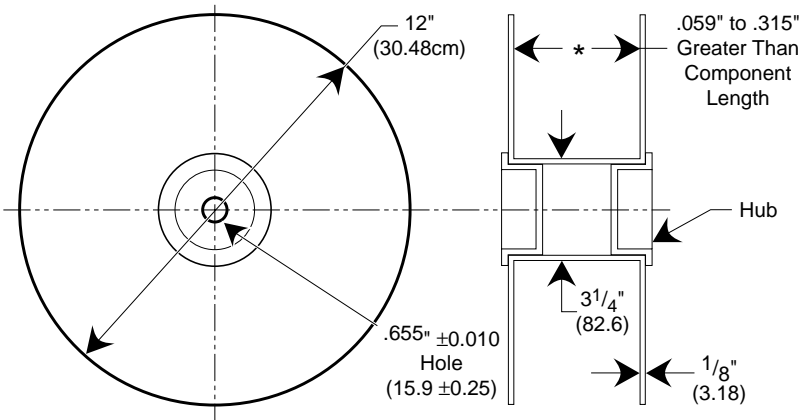


Figure 3



Table 1 Dimensions in Inches & (Millimeters)

COMPONENT BODY DIAMETER	COMPONENT PITCH "A"	INSIDE TAPE SPACING "B" ±1.5mm (0.059")		
	0.020" or (±0.5mm)	I	II	III
0" (0mm) to 0.197" (5mm)	0.200" or (5mm)	2.062"	2.500"	2.874"
0.197" (5.01mm) to 0.394" (10mm)	0.400" or (10mm)	(52.4mm)	(63.5mm)	(73mm)

Capacitors are reeled so that positive leads are oriented as shown in Figure 3. Kraft paper (50lb. test minimum) is inserted between the layers of capacitors wound on reels for component pitch  $\leq 0.200"$  sizes and corrugated paper (70 lb. test minimum), single faced is inserted for component pitch  $\geq 0.400"$  sizes. Capacitor lead length may extend only a maximum of  $.031"$  (0.8 mm) beyond the tape's edges. Capacitors are centered in a row between the two tapes and will deviate only  $\pm 0.031"$  (0.79 mm) from the row center. Figures 1 and 2 show the KEMET standard chipboard tape reel. A minimum of  $36"$  (91.5 cm) leader tape is provided at each end of the reeled capacitors. Universal splicing clips are used to connect the tape. Standard reel quantities are shown on page 73.

KEMET offers Solid Tantalum Capacitors fully compatible for use with automatic insertion machines for radial-lead components. Aris Reeling meets all requirements of EIA Standard RS-468. KEMET capacitors are wound on a precision made ARIS Reel Package. ARIS Ammo Package is also available.

## Tantalum Dipped Radial – ARIS Specification (Automatic Radial Insertion System)

### Tantalum Dipped Tape and Reel Dimensions in Millimeters & (Inches)

Dimension	Symbol	Nominal mm (inch)	Tolerance mm (inch)	Dimension	Symbol	Nominal mm (inch)	Tolerance mm (inch)
Body Height (1)	A	17.0 (0.67)	Maximum	Component Pitch (5)	P	12.7 (.500)	± 1.0 (± .039)
Body Width (1)	A <sub>1</sub>	10.2 (0.40)	Maximum	Sprocket Hole Pitch (2)	P <sub>0</sub>	12.7 (.500)	± 0.3 (±.012)
Sprocket Hole Diameter	D <sub>0</sub>	4.0 (.157)	± 0.3 (±.012)	Sprocket Hole Center to Lead Center (3) (4)	P <sub>1</sub>	See Note Below	± 0.7 (±.028)
Lead Diameter	d	0.51 or 0.64 (.020) (.025)	± 0.05 (.002)	Sprocket Hole Center to Component (5) Center	P <sub>2</sub>	See Note Below	
Lead Center (4)	F	See Note Below		Body Thickness	T <sub>0</sub>	10.2 (.400)	Maximum
Component Base to Tape Center (4)	H	C-7301 C-7303 16.0 (.630) 18.0 (.709)	C-7301 C-7303 ±0.5 (±.020) Minimum	Total Tape Thickness	T	0.7 (0.28)	± .02 (.008)
Lead Standoff Height	H <sub>0</sub>	C-7301 C-7303 16.0 (.630) 18.0 (.709)	C-7301 C-7303 ±0.5 (±.020) Minimum	Carrier Tape Width	W	18.0 (.709)	+ 1.0/-0.5 (+.039/- .020)
Component Height Above Tape Center	H <sub>1</sub>	32.25 (1.270)	Maximum	Hold-Down Tape Width	W <sub>0</sub>	15mm or 6mm (.561) (.236)	+ 1.0/-0.8 (+.039/- .031)
Component Alignment Front to Rear	Δ H	0	1.0 (.039)	Sprocket Hole Location	W <sub>1</sub>	9.0 (.354)	+0.075/-0.5 (+.030/- .020)
Cut Out Length	L	11.0 (.433)	Maximum	Hold-Down Tape Location	W <sub>2</sub>	12mm (.472)	Maximum
Lead Protrusion	L <sub>1</sub>	1.0 (.039)	Maximum				

- Notes: (1) See page 62 for T35X and page 69 for T39X specific dimensions.  
 (2) Cumulative pitch error ± 1.0mm (.039) maximum in 20 consecutive sprocket hole locations.  
 (3) Measured at bottom of standoff.  
 (4) P<sub>1</sub> and F measured at egress from carrier tape.  
 (5) P and P<sub>2</sub> measured at egress from carrier tape.

- On polar devices, the positive (+) lead exits from container first.  
 \* Lead spacings are 2.5mm (.098") center-to-center (T350 A-H)  
 \*\* Lead spacings are 5.0mm (.197") center-to-center  
 # Lead spacings are 6.35mm (.25") center-to-center  
 + Lead spacings are 3.18mm (.125") center-to-center

<b>F Dimensions:</b>	<b>P1 Dimensions:</b>
0.100" ± .015	Lead
0.125" ± .015	Spacing
0.200" ± .015	0.100" - 0.200 ± .028"
0.250" ± .015*	0.125" - 0.187 ± .028"
0.100" ± .015 (3 leaded)	0.200" - 0.150 ± .028"
	0.250" - 0.125 ± .028"
	0.100" - 0.100 ± .028" (3 leaded)



## Tantalum Molded Radial – ARIS Specification (Automatic Radial Insertion System)

### Tantalum Molded Tape and Reel Dimensions in Millimeters & (Inches)

Dimension	Symbol	Nominal mm (inch)	Tolerance mm (inch)	Dimension	Symbol	Nominal mm (inch)	Tolerance mm (inch)
Body Height (1)	A	10.50 (.413)	± .38 (±.015) Maximum	Component Pitch (5)	P	12.7 (.500)	± 1.0 (± .039)
Body Width (1)	A <sub>1</sub>	15.24 (.600)	Maximum ± .38 ± (.015)	Sprocket Hole Pitch (3)	P <sub>0</sub>	12.7 (.500)	± 0.3 (±.012)
Sprocket Hole Diameter	D <sub>0</sub>	4.0 (.157)	± 0.3 (± .012)	Sprocket Hole Center to Lead Center (4) (5)	P <sub>1</sub>	3.85 4.76 5.1 (.152) (.188) (.201)	± 0.7 (±.028)
Lead Diameter	d	0.51 or 0.64 (.020) (.025)	± 0.05 or ± .03 (± .001)	Sprocket Hole Center to Component Center	P <sub>2</sub>	6.35 (.250)	± 1.3 (±.051)
Lead Center (5)	F	5.0 2.5 (.197) (.098)	+ 0.8/ - 0.2 (+ .032/ -.008)	Body Thickness	T <sub>0</sub>	6.35 (.250)	± 1.3 Maximum
Component Base to Tape Center (2)(4)(6)	H	16.0 - 21.0 (.630 - .827)	Reference Only	Total Tape Thickness	T	0.7 (0.28)	± .02 (±.008)
Lead Standoff Height	H <sub>0</sub>	N/A		Carrier Tape Width	W	18.0 (.709)	+ 1.0/-0.5 (+.039/- .020)
Component Height Above Tape Center	H <sub>1</sub>	32.25 (1.270)	Maximum	Hold-Down Tape Width	W <sub>0</sub>	15 or 6 (.561) (.236)	+ 1.0/-0.8 (+.039/.031)
Component Alignment Front to Rear	Δ H	0	± 2.0 (± .079)	Sprocket Hole Location	W <sub>1</sub>	9.0 (.354)	+0.075/-0.5 (+.030/- .020)
Cut Out Length	L	11.0 (.433)	Maximum	Hold-Down Tape Location	W <sub>2</sub>	3.0 or 12.0 (.118) (.472)	Maximum
Lead Protrusion	L <sub>1</sub>	2.0 (.079)	Maximum				

- Notes: (1) See page 50 for T330, page 53 for T340 and page 59 for T35X specific dimensions.  
 (2) Reference Only  
 (3) Cumulative pitch error ± 1.0mm (.039") maximum in 20 consecutive sprocket hole locations.  
 (4) Measured at bottom of standoff.  
 (5) P, P<sub>1</sub> and F measured at egress from carrier tape.  
 (6) H dimensions for T370 D and E 16.5mm ± 0.5mm (0.650" ± 0.020")

- On polar devices, the positive (+) lead exits from container first.  
 \* Lead spacings are 2.5mm (.098") center-to-center  
 \*\* Lead spacings are 5.0mm (.197") center-to-center.





TANTALUM PACKAGING									
KEMET(1) Number	Military Style	Military Specification	Case Size	Standard Bulk(2) Quantity	Standard Reel Quantity	Reel Size	Standard Reeling Spec.	Ammo Pack Quantity	Ammo Pack Spec.
T110/T212, T140/T242, T252, T262	CSR13	MIL-C-39003/1	A	150/Box	3500	12"	C-7200	1500	C-7293
	CSR23	MIL-C-39003/3	B	75/Box	2500	12"	C-7200	1000	Class I
	CSR33	MIL-C-39003/6	C	20/Tray	500	12"	C-7200	250	C-7442
	CSR21	MIL-C-39003/9	D	20/Tray	400	12"	C-7200	250	Class II C-7443 Class III  See Page 71 for class info.
T111/T213	CSR91	MIL-C-39003/4	A	60/Box	3000	12"	C-7200	N/A	N/A
			B	30/Box	2000	12"	C-7200		
			C	10/Card	N/A	N/A	N/A		
			D	10/Card	N/A	N/A	N/A		
T210, T216, T240, T256	CSS13	MIL-C-39003/10	A	40/Tray	3500	12"	C-7200	N/A	N/A
			B	30/Tray	2500	12"	C-7200	N/A	N/A
	CSS33	MIL-C-39003/10	C	20/Tray	500	12"	C-7200	N/A	N/A
			D	20/Tray	400	12"	C-7200	N/A	N/A
T222	CSR09	MIL-C-39003/2	A/B	50/Tray	N/A	N/A	N/A	N/A	N/A
			A	300/Box	N/A	N/A	N/A	N/A	
			B	150/Box					
T322/T323	CX01, CX05	MIL-C-49137/1 & 5	A	300	4500	12"	C-7200	2000	C-7293
			B	250	4000	12"	C-7200	2000	Class I
			C	100	2500	12"	C-7200	1000	C-7442
			D	100	2500	12"	C-7200	1000	Class II
			E	100	500	12"	C-7200	250	C-7443
			F	100	500	12"	C-7200	250	Class III  See Page 71
T330			A	400	1000	12"	C-7301	1600	
			B	300	1000	12"	C-7301	1200	
			C	200	1000	12"	C-7301	1200	
			D	100	N/A	N/A	N/A	N/A	
T340			A	300	1000	12"	C-7301	1600	
			B	300	1000	12"	C-7301	1500	
			C	200	1000	12"	C-7301	1500	
			D	100	250	12"	C-7301	450	
			E	50	150	12"	C-7301	N/A	
			F	100	N/A	N/A	N/A	N/A	
T350, T351, T352, T353, T354, T355, T356			A	1000	1500	12"	C-7301/7303	2500	
			B	1000	1500	12"	C-7301/7303	2500	
			C	1000	1500	12"	C-7301/7303	2500	
			D	1000	1000	12"	C-7301/7303	2000	
			E	1000	1000	12"	C-7301/7303	2000	
			F	500	1000	12"	C-7301/7303	1500	
			G	500	1000	12"	C-7301/7303	1500	
			H	500	800	12"	C-7301/7303	1500	
			J	100	800	12"	C-7301/7303	800	
			K	100	500	12"	C-7301/7303	800	
			L, M	100	500	12"	See Page 72	500	

Lead Tape & Reel Packaging

NOTE: (1) Each KEMET number in its section applies to all case sizes.

(2) Standard packaging refers to number of pieces per bag, box, tray or vial.

TANTALUM PACKAGING (Continued)								
KEMET(1) Number	Military Style	Military Specification	Case Size	Standard Bulk(2) Quantity	Standard Reel Quantity	Reel Size	Standard Reeling Spec.	Ammo Packs
T363	CX02	MIL-C-49137/2	A	1000	1500	12"	C-7301/7303	2500
			B	1000	1500	12"	C-7301/7303	2000
			C	500	500	12"	C-7301/7303	800
			D	500	500	12"	See Page 72	800
T368			C	500	500	12"	C-7301/7303	800
			D	500	500	12"	C-7301/7303	800
T369	CX12	MIL-C-49137/2	A	1000	1500	12"	C-7301/7303	2500
			B	1000	1500	12"	C-7301/7303	2000
T370			C	500	N/A	N/A	N/A	N/A
			D	500	1000	12"	C-7301	N/A
			E	500	1000	12"	C-7301	N/A
			F	250	N/A	N/A	N/A	N/A
T378	CX06	MIL-C-49137/6	D	200	1000	12"	C-7301	N/A
			E	180	1000	12"	C-7301	N/A
			F	50	N/A	N/A	N/A	N/A
T396, T398			A-B	1000	1500	12"	C-7301/7303	2000
			C	500	1500	12"	C-7301/7303	2000
			D-F	500	1000	12"	C-7301/7303	1500
			G	500	1000	12"	C-7301/7303	2000
			H	500	800	12"	C-7301/7303	2000
			J	250	800	12"	C-7301/7303	1600
			K	250	500	12"	C-7301/7303	800
			L-M	250	500	12"	C-7301/7303	500

NOTE: (1) Standard packaging refers to number of pieces per bag, box, tray or vial.

(2) Quantity varies. For further details, please consult the factory.

## INTRODUCTION

KEMET solid tantalum capacitors are identified by the initial "T," followed by a unique "Series" number; for example, T110, T322, T350, etc. Each Series denotes a general physical form and type of encapsulation, as well as limits on dimensions and certain electrical characteristics under standard conditions of 25°C, 50% relative humidity, and one atmosphere pressure. Specific requirements are set forth in the respective Product Series in this catalog. All Military products are 100% electrically screened for the parameters shown in the respective product section. For non-military product, all series are 100% screened for leakage, capacitance and dissipation factor. All Series are inspected to electrical limits using a minimum .1% AQL sampling plans, according to the Military Standard MIL-STD-105, even after 100% testing. This sampling plan, to the best of KEMET Electronics' knowledge, meets or exceeds the generally accepted industry standard for similar products. KEMET capacitors may also be supplied, with prior agreement, to meet specifications with requirements differing from those of KEMET catalogs. **Reference ESR values are provided but are NOT 100% screened**

These Notes apply generally to all KEMET solid tantalum capacitors and illustrate typical performance under normal application conditions, except where noted. Certain Series will respond differently to various environmental conditions. For example, hermetically sealed series are relatively immune to humidity effects, while plastic-encased series are not. The intent of these Notes is not to delineate such differences but to provide general information concerning performance characteristics.

### 1. GENERAL APPLICATION CLASS

Solid tantalum capacitors are usually applied in circuits where the AC component is small compared to the DC component. Typical uses known to KEMET Electronics include blocking, by-passing, decoupling, and filtering. They are also used in timing circuits. If two of these polar capacitors are connected "back-to-back" (i.e., negative-to-negative or positive-to-positive), the pair may be used in AC applications (as a non-polar device).

### 2. STORAGE CONDITIONS

Capacitors may be stored without applied voltage over the operating temperature range specified in the catalogs for each Series. The range is from -55 to +125° C for all Series.

Tantalum capacitors do not lose capacitance from the "de-forming" effect as do liquid-electrolytic capacitors. 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.

Series which are not hermetically sealed exhibit reversible changes in parameters with respect to relative humidity (RH). Capacitance increases with increasing humidity. The limiting change, reached upon establishment of equilibrium with the environment, is approximately -5% to +12% over the range from 25% to 95% RH, referred to the standard 50% RH. The amount of change is dependent upon size (capacitance and voltage rating, ie: CV product); small sizes might change no more than ±5%. Equilibrium at such extremes is seldom attained by plastic-cased capacitors, and the change in capacitance is consequently less. The rate of response to humidity changes increases with increasing temperature. Dissipation factor also increases with increasing RH. The

limiting change, at equilibrium with 95% RH, is approximately 50%.

DC leakage current may rise upon exposure to a combination of high temperature and high humidity, but is normally restored by voltage conditioning under standard conditions. The increase will be greater than that experienced under temperature influence alone because of conduction through absorbed water.

Hermetically-sealed and non-hermetic Series may be affected by absorption of water on external insulating surfaces. The water film may also attract a layer of dust from the air, increasing the effect. The most sensitive parameter is leakage current.

### 3. POLARITY

These capacitors are inherently 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 polarity mark and the capacitor body may include an obvious geometrical shape. However, some Series contain two capacitors connected (negative-to-negative) to form "non-polar" capacitors. Rated voltage (see para. 8) may be applied to these Series in either direction.

### 4. OPERATING ENVIRONMENT

Most of the discussion under "Storage Conditions" will apply also when capacitors are operated within the applicable electrical ratings described below. The temporary increase in leakage current (at standard conditions) following elevated-temperature exposure is not observed, however, if the capacitors are operated with adequate DC voltage applied.

### 5. CAPACITANCE

Capacitance is measured at 120 Hz and 25° C with up to 1 volt rms applied. Note that, in either operation, peak AC plus DC bias must not exceed either rated voltage (normally polarized) or 15% of rated voltage in the reverse direction at 25°C. Measurement circuits are of high impedance, however, and under these conditions 1 volt rms may be applied even to 6 volt capacitors (23% peak reversal) without a DC bias. DC bias is thus normally not used, except when rated voltage is below 6 volts and the AC signal level exceeds 0.3 vrms. However, MIL-C-39003 provides for up to 2.2 volts DC. DC bias is not commonly used at room temperature, but is more commonly used at elevated temperatures.

DC bias causes a small reduction in capacitance, up to about 2% when full rated voltage is applied as bias. DF is also reduced by the presence of DC; rated voltage may cause a decrease in DF of about 0.2% (e.g., a decrease from 3.6 to 3.4% DF).

Capacitance changes very little below 1 kHz but decreases more noticeably at higher frequencies. Larger capacitance values decline more rapidly than small ratings. The effect of frequency upon capacitance is shown in Figure 1.

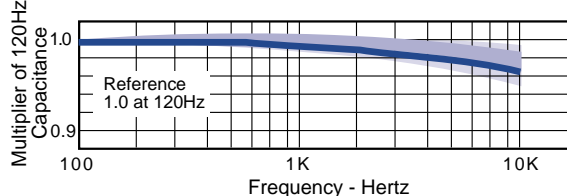


Figure 1. Normal Effect of Frequency upon Capacitance

Capacitance typically changes with temperature according to the curve of Figure 2.



**Figure 2. Typical Effect of Temperature upon Capacitance**

## 6. DISSIPATION FACTOR (DF)

DF is measured at 120 Hz and 25° C with up to 1 volt rms applied. Note that, in either operation, peak AC plus DC bias must not exceed either rated voltage (normally polarized) or 15% of rated voltage in the reverse direction at 25°C. Measurement circuits are of high impedance, however, and under these conditions 1 volt rms may be applied even to 6 volt capacitors (23% peak reversal) without a DC bias. DC bias is thus normally not used, except when rated voltage is below 6 volts and the AC signal level exceeds 0.3 vrms. However, MIL-C-39003 provides for up to 2.2 volts DC. DC bias is not commonly used at room temperature, but is more commonly used at elevated temperatures.

Dissipation Factor (DF) is a useful low-frequency measure of the resistive component in capacitors. It is the ratio of the unavoidable resistance to the capacitive reactance, usually expressed in percent. DF increases with temperature above +25° C and may also increase at lower temperatures. Unfortunately, one general limit for DF cannot be specified for all capacitance/voltage combinations, nor can response to temperature be simply stated. Catalogs for the respective series list DF limits under various conditions.

Dissipation factor increases with increasing frequency as would be expected from the decreasing capacitive reactance. DF is not a very useful parameter above about 1 kHz. The DF of larger capacitance values increases more rapidly than that of smaller ratings. Figure 3 shows typical effect of frequency on DF.



**Figure 3. Normal Effect of Frequency upon Dissipation Factor**

DC bias causes a small reduction in capacitance, up to about 2% when full rated voltage is applied, as bias. DF is also reduced by the presence of DC bias. Rated voltage may cause a decrease in DF of about 0.2% (e.g., a decrease from 3.6 to 3.4% DF).

DF is defined as  $\frac{ESR}{X_c}$  and is also referred to occasionally, as  $\tan d$  or “loss tangent.” The “Quality Factor,”  $Q$ , is the reciprocal of DF (DF is not expressed in

percent in this calculation). Another expression, rarely used, is the “power factor,” or  $\frac{ESR}{Z}$ . Power factor is  $\cos u$ , while DF is  $\tan u$ .

## 7. DC LEAKAGE (DCL)

DC leakage is affected by voltage to a much larger extent, and this effect can frequently be used to advantage in circuits where only very low leakage currents can be tolerated. Typical response of DCL to applied voltage is illustrated in Figure 4.



**Figure 4. Typical Range of DC Leakage as a Function of Applied Voltage**

DC leakage current (DCL) increases with increasing temperature according to the typical curve of Figure 5.



**Figure 5. Typical Effect of Temperature upon DC Leakage Current**

Leakage current is measured at a rated voltage through +85°C and may also be measured at +125°C with 2/3 of rated voltage applied.

## 8. RATED VOLTAGE

This term refers to the maximum continuous DC working voltage permissible at temperatures of +85° C or below. The lower operating temperature is specified as -55° C. Operation above +85° C is permissible, with reduced working voltage. Typical working voltage reduction is to 2/3 of rated voltage at +125° C.

## 9. WORKING VOLTAGE

This is the maximum recommended peak DC operating voltage for continuous duty at or below 85°C without DC voltage surges or AC ripple superimposed. No voltage derating is required below 85°C. Capacitors may be operated to 125°C with working voltage linearly derated to 2/3 of the 85°C rating at 125°C as shown in Figure 6.



Figure 6. Working Voltage Change with Temperature

## 10. SURGE VOLTAGE

Surge voltage is defined as the maximum voltage to which the capacitor should be subjected under transient conditions, including peak AC ripple and all DC transients.

DC Working Voltage @ 85°C	2	3	4	6	10	15/16	20	25	35	50	60	75	100	125
Surge Voltage @ 85°C	2.6	4	5.3	8	13	20	26	33	46	65	78	98	130	140

TABLE 1 Surge Voltage Ratings

A typical surge voltage test is performed at +85°C with the applicable surge voltage per Table 1. The surge voltage is applied for 1000 cycles of 30 seconds on voltage through a 33 ohm series resistor and 30 seconds off voltage with the capacitor discharged through a 33 ohm resistor. Upon completing the test, the capacitors are allowed to stabilize at room temperature. Capacitance, DF, and DCL are then tested:

1. The DCL should not exceed the initial 25°C limit.
2. The capacitance should be within ±10% of initial value.
3. The DF should not exceed the initial 25°C limit.

## 11. 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, °C.	Percentage of Rated Voltage
+25	15
+85	5
+125	1

TABLE 2 Reverse Voltage Ratings

## 12. EQUIVALENT SERIES RESISTANCE (ESR)

Equivalent Series Resistance (ESR) is the preferred high-frequency statement of the resistance unavoidably appearing in these capacitors. ESR is not a pure resistance, and it decreases with increasing frequency. Typical ESR limits are established in each specific product series. However, the ESR limits provided are for reference only, and are not necessarily the actual value that a particular Series product will attain.

Total impedance of the capacitor is the vector sum of capacitive reactance ( $X_C$ ) and ESR, below resonance; above resonance total impedance is the vector sum of inductive reactance ( $X_L$ ) and ESR.



Figure 7a Total Impedance of the Capacitor Below Resonance



Figure 7b Total Impedance of the Capacitor Above Resonance

To understand the many elements of a capacitor, see Figure 8.



Figure 8. The Real Capacitor

A capacitor is a complex impedance consisting of many series and parallel elements, each adding to the complexity of the measurement system.

$L$  — Represents lead wire and construction inductance. In most instances (especially in solid tantalum and

monolithic ceramic capacitors) it is insignificant at the basic measurement frequencies of 120 and 1000 Hz.

RS — Represents the actual ohmic series resistance in series with the capacitance. Lead wires and capacitor electrodes are contributing sources.

RL — Capacitor Leakage Resistance. Typically it can reach 50,000 megohms in a tantalum capacitor. It can exceed  $10^{12}$  ohms in monolithic ceramics and in film capacitors.

Rd — The dielectric loss contributed by dielectric absorption and molecular polarization. It becomes very significant in high frequency measurements and applications. Its value varies with frequency.

Cd — The inherent dielectric absorption of the solid tantalum capacitor which typically equates to 1-2% of the applied voltage.

As frequency increases,  $X_C$  continues to decrease according to its equation above. There is unavoidable inductance as well as resistance in all capacitors, and at some point in frequency, the reactance ceases to be capacitive and becomes inductive. This frequency is called the self-resonant point. In solid tantalum capacitors, the resonance is damped by the ESR, and a smooth, rather than abrupt, transition from capacitive to inductive reactance ( $X_L = 2\pi fL$ ) follows.

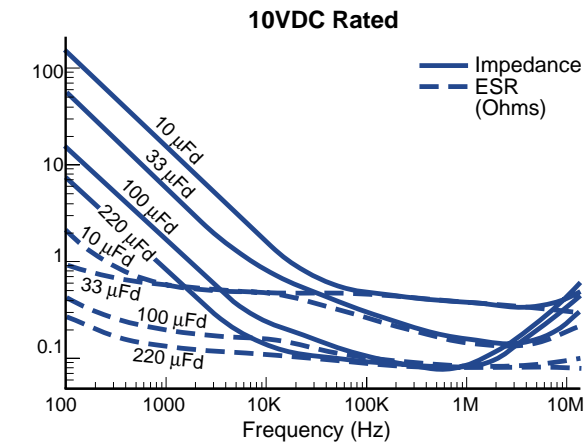


Figure 9. ESR and Impedance vs. Frequency

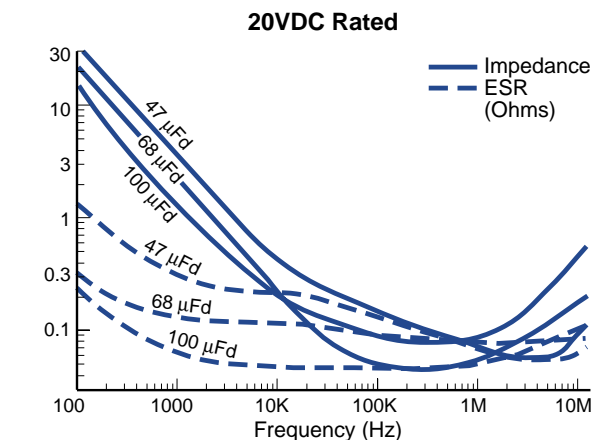


Figure 10. ESR and Impedance vs. Frequency

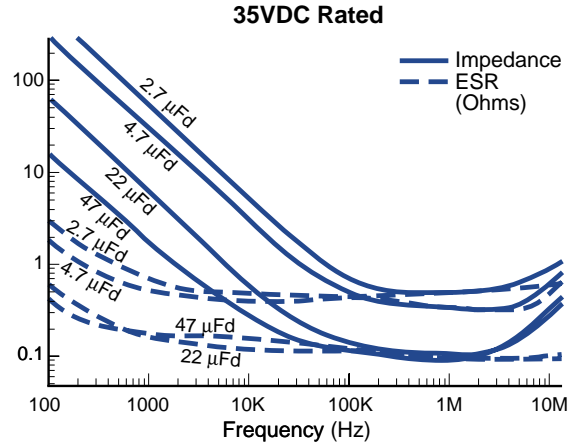


Figure 11a. ESR and Impedance vs. Frequency

Typical ESR and Z performance is given for representative capacitor ratings in Figures 9 through 11. Measured impedance will be affected by the length of lead wire included. Data for the curves were taken by including 1/2" of each lead wire in the measuring circuit.

Despite the fact that the reactance is entirely inductive above the self-resonance, these capacitors find use as decoupling devices above 10 MHz. Special designs have been developed for minimum inductance and are used above 100 MHz.

ESR and Z are also affected by temperature. At 100 kHz, ESR decreases with increasing temperature. The amount of change is influenced by the size of the capacitor and is generally more pronounced on smaller ratings.

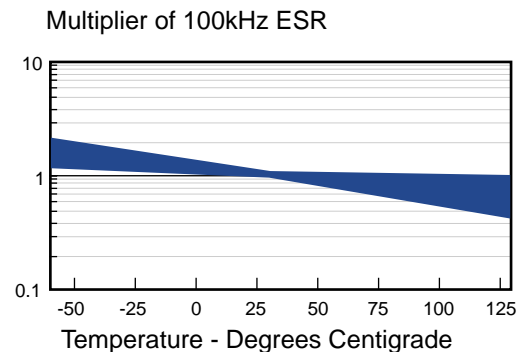


Figure 11b Typical Effect of Temperature on 100 kHz ESR

### 13. POWER DISSIPATION

Permissible power dissipation has been empirically established for all Series and is listed in each respective product section.

See pages 6-41 for herm seal, 42-50 for axial and radial molded, and 61-70 for tantalum dipped.

It is usually most convenient to translate the permissible power into an AC voltage rating. Assuming a sinusoidal waveform, the "ripple voltage" permissible may be calculated from the impedance and ESR data shown in the respective product section. However, three criteria must be observed:

1. Dissipated power must not exceed the limits specified for the Series.

2. The positive peak AC voltage plus the DC voltage must not exceed the maximum working voltage permitted at the ambient temperature.

3. The negative peak AC voltage, in combination with the DC voltage, must not exceed the permissible reverse voltage at the ambient temperature.

The rms ripple voltage limitation imposed by power dissipation is given by:

$$P = I^2R = \frac{E^2R}{Z^2}$$

- where: I = rms ripple current (amperes)  
 E = rms ripple voltage (volts)  
 P = power (watts)  
 Z = impedance at specified frequency (ohms)  
 R = equivalent series resistance at specified frequency (ohms)

Maximum allowable rms ripple voltage may be determined as follows:

$$E(\text{max}) @ 25^\circ\text{C} = Z \sqrt{\frac{P(\text{max})}{R}}$$

$E(\text{max}) = 85^\circ\text{C} = 0.9 E(\text{max}) @ 25^\circ\text{C}$   
 $E(\text{max}) @ 125^\circ\text{C} = 0.4 E(\text{max}) @ 25^\circ\text{C}$   
 $P(\text{max}) =$  maximum watts shown on Performance Characteristic pages 5, 42, 49, 58 and 61.

Permissible AC ripple current can be determined by the following:

$$I_{\text{rms}} = \sqrt{\frac{P(\text{max})}{R}}$$

If two polar capacitors are connected back-to-back, (1) the pair may be operated on AC without need for DC bias. The first two criteria above must be observed. If DC is applied, the sum of DC and peak AC must not exceed, in either direction, the maximum working voltage specified for the ambient temperature.

(1) Some KEMET Series provide convenient assemblies of non-polar pairs. The two negative terminals are connected internally. It is also permissible to connect the two positive terminals to form a non-polar pair.

## 14. LONG-TERM STABILITY

Within the general class of electrolytic capacitors, solid tantalum capacitors offer unusual stability of the three important parameters: capacitance, dissipation factor, and leakage current. These solid-state devices are not subject to the effects of electrolysis, deforming or drying-out associated with liquid-electrolyte capacitors.

When stabilized for measurement at standard conditions, capacitance will typically change less than  $\pm 3\%$  during a 10,000 hour life test  $+85^\circ\text{C}$ . The same comparative change has been observed in shelf tests at  $+25^\circ\text{C}$  extending for 50,000 hours. (Some of this change may stem from instrument or fixture error.)

Dissipation factor exhibits no typical trend. Data from 10,000 hour life tests at  $+85^\circ\text{C}$  show that initial limits (at standard conditions) are not exceeded at the conclusion of these tests.

Leakage current is more variable than capacitance or DF; in fact, leakage current typically exhibits a logarithmic dependence in several respects. MIL-C-39003/1 permits leakage current (measured at standard conditions) to rise

by a factor of four over 10,000 hour life tests. Typical behavior shows a lower rate of change, which may be negative or positive. Initial leakage currents are frequently so low (less than 0.1 nanoampere in the smallest CV capacitors, to about 10 microampere in the largest CV types) that changes of several orders of magnitude have no discernable effect on the usual circuit designs.

## 15. FAILURE MODE

Capacitor failure may be induced by exceeding the rated conditions of forward DC voltage, reverse DC voltage, surge voltage, surge current, power dissipation, or temperature. As with any practical device, these capacitors also possess an inherent, although low, failure rate when operated within the rated condition.

The dominant failure mode is by short-circuit. Minor parametric drifts (see Section 14 "Long-Term Stability") are of no consequence in circuits suitable for solid tantalum capacitors. Catastrophic failure occurs as an avalanche in DC leakage current over a short (millisecond) time span. The failed capacitor, while called "short-circuited", may exhibit a DC resistance of 10 to 104 ohm.

If a failed capacitor is in an unprotected low-impedance circuit, continued flow of current through the capacitor may obviously produce severe overheating. This heat may melt the internal solder (all Series) and the sealing solder used in hermetic Series. The short-circuit failure may thereby be converted to an open-circuit failure. If the circuit does not open promptly, the over-heated capacitor may damage the circuit board or nearby components. Protection against such occurrence is obtained by current-limiting devices or fuses provided by the circuit design.

Fortunately, the inherent failure rate of KEMET solid tantalum capacitors is low, and this failure rate may be further improved by circuit design. Statistical failure rates are provided for those capacitors with characters other than "A" in the next-to-last position of the part number. Relating circuit conditions to failure rate is aided by the guides in the section following.

## 16. RELIABILITY PREDICTION

Three important application conditions largely control failure rate: DC voltage, temperature, and circuit impedance. Estimates of the respective effects are provided by the nomograph in Figure 12 and Table 3 following. The nomograph related failure rate to voltage and temperature while the table relates failure rate to impedance. These estimates apply to steady-state DC conditions, and they assume usage within all other rated conditions.

Standard conditions, which produce a unity failure rate factor, are rated voltage,  $+85^\circ\text{C}$ , and 0.1 ohm-per-volt circuit impedance. While voltage and temperature are straightforward there is sometimes difficulty in determining impedance. What is required is the circuit impedance seen by the capacitor. If several capacitors are connected in parallel, the impedance seen by each is lowered by the source of energy stored in the other capacitors. Energy is similarly stored in series inductors.

Failure rate is conventionally expressed in units of percent per thousand hours. As a sample calculation, suppose a particular batch of capacitors has a failure rate of 0.5% Khr under standard conditions. What would be predicted failure rate at 0.7 times rated voltage,  $+60^\circ\text{C}$  and  $0.8\Omega/\text{V}$ ? The nomograph gives a factor of  $7 \times 10^{-4}$ , and the table gives a factor of 0.3. The failure rate estimate is then:

$$0.5 \times 7 \times 10^{-4} \times 0.3 = 1.05 \times 10^{-4}, \text{ or } 0.0001\% \text{ Khr}$$



**Figure 12. Reliability Nomograph**

Circuit Impedance (ohms/volt)	Failure Rate Improvement (multiplying factors)
0.1	1.0
0.2	.8
0.4	.6
0.6	.4
0.8	.3
1.0	.2
2.0	.1
3 or greater	.07

**TABLE 3 Relationship of Failure Rate to Impedance**

Voltage “de-rating” is a common and useful approach to improved reliability. It can be pursued too far, however, when it leads to installation of higher voltage capacitors of much larger size. Inherent failure rate is roughly proportional to  $CV^{1.6}$ , where C is capacitance and V is rated voltage. The effect becomes particularly noticeable above 50-volt ratings. It is possible to lose more via higher inherent failure rate than is gained by voltage derating.

The relationships shown are more useful when the failure rate has been statistically determined for a given group of capacitors.

Failure rate is statistically determined for each production batch of KEMET High Reliability capacitors, as described in Specification GR500 Catalog F2956. As noted above, not all capacitance/voltage rate values are inherently equal in failure rate. GR500 capacitors are processed and subjected to 100% reliability testing as a homogeneous group of one capacitance/voltage value. Failure rate under standard conditions is available from 1 to 0.001% Khr, depending upon the capacitance/voltage value.

Several Series are qualified under U.S. military specification MIL-C-39003. Failure rates as low as 0.001%/Khr are available for all capacitance/voltage values in given groups under this test program. The specifications and

their accompanying Qualified Products Lists should be consulted for details.

For Series not covered by military specifications, and internal sampling program is operated by KEMET Quality Assurance. The confidence level chosen for reporting the data is 60%. However, the cost of sampling each batch produced is overwhelmingly prohibitive, and no claim is made concerning knowledge of failure rate for any particular lot shipped. It is demonstrated that average failure rate for all commercial Series is between .1 and 1%/Khr at standard conditions and 60% confidence after 2,000 hours' testing, +85°C, and rated voltage and  $\leq 1$  ohm total series resistance.

## 17. SURGE CURRENT

All conventional reliability testing is conducted under steady-state DC voltage. Experience indicates that AC ripple, within the limits prescribed, has little effect on failure rate. Heavy surge currents are possible in some applications, however. Circuit impedance may be very low (below the standard 0.1 ohm/volt) or there may be driving inductance to cause voltage “ringing.” Surge current may appear during turn-on of equipment, for example.

Failure rate under current-surge conditions may not be predictable from conventional life test data. A surge current test is utilized to ensure against a high frequency of such failures, and a description is available free of charge. The test has been adopted for all capacitors under MIL-C-39003/06/09/10 and KEMET's GR500 specifications.

## 18. ENVIRONMENTAL CONSIDERATION

It is not possible to foresee all the conditions to which capacitors may be subjected. Following is a list of standard tests which every Series will survive. Data may be available (upon request) under more severe stresses for certain Series.

- LIFE TEST 85°C OR 125°C, 2000 Hours: When subjected to 2000 hours at 85°C at full rated DC voltage, or 125°C at 2/3 of 85°C voltage, the capacitor shall meet the following requirements when tested at 25°C:

The DCL shall be within 1.25 times the initial DCL limit.

Capacitance shall be within  $\pm 10\%$  of the initial measured value.

The DF shall not exceed the initial limit.

- SHELF LIFE +85°, 2000 hours. Post test of capacitor shall meet the following requirements when tested at 25°C:

The DCL shall be within 1.5 times the initial DCL limit.

Capacitance shall be within  $\pm 10\%$  of the initial measured value.

The DF shall not exceed 1.5 times the initial limit.

- LEAD STRENGTH MIL-STD-202 Method 211: Pull test will be performed as in MIL-STD-202, Method 211. The following details and exceptions shall apply.
  - a. Test condition letter—A
  - b. The body of the capacitor will be securely clamped during test.



- c. Applied force—3 pounds (1.4 kg).
  - d. Test Condition letter—C (M39003 Test Condition letter—D)
  - e. Applied Force—1 pound, 3 bends.
- VIBRATION; HIGH FREQUENCY: Per MIL-STD-202, Method 204, Condition D, 10 Hz to 2000 Hz.
    - a. Mounting—Capacitors shall be mounted on a fixture by the body. Leads shall be supported by rigidly supported terminals.
    - b. Electrical load conditions—During the test, the specified DC rated voltage shall be applied to the capacitors.
    - c. Test condition letter—D (20 G).
    - d. Duration and direction of motion—4 hours in each of two mutually perpendicular directions (total of 8 hours), one parallel and the other perpendicular to the axis.
    - e. Measurements during vibration—During the last cycle, an electrical measurement shall be made to determine intermittent operation or open- or short-circuiting. Observations shall also be made to determine intermittent contact or arcing or open- or short-circuiting. Detecting equipment shall be sufficiently sensitive to detect any interruption with a duration of 0.5 ms, or greater.
    - f. Examination after test—Capacitors shall be visually examined for evidence of mechanical damage.
  - SHOCK TEST: Per MIL-STD-202, Method 213. The following details shall apply:
    - a. Special mounting means—Capacitors shall be rigidly mounted on a mounting fixture by the body. When securing leads, care shall be taken to avoid pinching the heads.
    - b. Test-condition letter—I (100 G peak). 6 ms. (saw-tooth)
    - c. Measurements and electrical loading during shock—During the test, observations shall be made to determine intermittent contact or arcing or open- or short-circuiting. Detecting equipment shall be sufficiently sensitive to detect any interruption with a duration of 0.5 ms. The DC rated voltage shall be applied to the capacitors during the test.
    - d. Examinations after test—Capacitors shall be visually examined for evidence of arcing, breakdown, and mechanical damage.
  - HUMIDITY LIFE TEST: Capacitors shall be capable of withstanding 1000 hours at 55°C with an ambient humidity of 90-95% RH with rated DC voltage applied. After the capacitors have stabilized for a period of 24 hours at 25°C, they shall meet the following limits:
    - DCL shall not exceed 5 times the initial limit.
    - Capacitance shall be within  $\pm 10\%$  of the initial value.
    - DF shall not exceed 2 times the initial limit.
  - THERMAL SHOCK—MIL-STD-202, Method 107: Capacitors shall be subjected to thermal shock in accordance with MIL-STD-202, Method 107, Test Condition A. M39003 Components tested to MIL-STD-202, Method 107, Condition B. Measurements before and after cycling are required. Conditioning prior to the first cycle will be 15 minutes at the following standard inspection conditions:
    - a. Relative Humidity—Less than 50%.
    - b. Ambient Temperature—25°C  $\pm 5^\circ\text{C}$ .
    - c. Final measurements are made after stabilization at room temperature.
  - MOISTURE RESISTANCE—MIL-STD-202, Method 106: Capacitors shall be tested in accordance with MIL-STD-202, Method 106 including the following details:
    - a. Mounting—The capacitors shall be mounted by normal mounting means
    - b. Initial Measurements
    - c. Polarizing and Load Voltage—Not applicable
    - d. Final measurements—After the final cycle and within 2 to 6 hours after removal of the capacitors from the humidity chamber, capacitance, dissipation factor, and DC leakage will be measured.

DCL should not exceed the initial 25°C limit.  
Capacitance should be within  $\pm 10\%$  of the initial measured value.  
DF should not exceed the initial 25°C limit.
  - RESISTANCE TO SOLVENTS — MIL-STD-202, Method 215:
    - Brushing required after test.
    - DCL meets limit shown in respective Part Number Tables.
    - Capacitance meets applicable tolerance.
    - DF meets limits shown in respective Part Number Tables.
    - No visible damage to case or marking.
  - RESISTANCE TO SOLDERING HEAT — MIL-STD-202, Method 210, Test Condition.
    - Letter B. (260° for 10 Sec.)
    - Leads shall be immersed to within  $\frac{1}{4}$  inch of the capacitor body. Capacitance, DF, and DCL should meet original limits shown in respective Part Number Tables.
  - SOLDERABILITY — MIL-STD-202, Method 208;
    - Number of terminations on each capacitor tested: 2.
    - Depth of insertion in flux and solder to within .125" of capacitor body.
  - FLAMMABILITY — The encapsulant for Molded and Conformal Coated Product meets or exceeds the following requirements:
    - Underwriters Lab. UL 94V-0
    - Oxygen Index per ASTM-D-2863
    - 28% min.
  - STABILITY AT LOW AND HIGH TEMPERATURE
    - 55°C to 125°C: Capacitors will be capable of withstanding extreme temperature testing at a succession of continuous steps at +25°C, -55°C, +25°C, +85°C, +125°C, +25°C, in the order stated. Capacitors shall be brought to thermal stability at each test

temperature. Capacitance, DF, and DCL are measured at each test temperature except that DCL is not measured at -55°C. DC bias of 2.0 ±0.5 vdc is recommended for the capacitance and DF measurements.

When measurements are made at the various steps, the electrical limits for each temperature shall not exceed the following limits.

- Step 1, +25°C, DCL as indicated in original limit; capacitance within tolerance specified; DF as indicated in original limit shown in Part Number Tables.
- Step 2, -55°C, Capacitance within ±10% of initial value; ESR, DF within limit shown in Part Number Tables.
- Step 3, +25°C, DCL as indicated in original limit; capacitance within ±5% of initial value; ESR, DF within limit shown in Part Number Tables.
- Step 4, +85°C, DCL shall not exceed 10 times original DCL limit at 25°C. Capacitance shall be within ±10% of the initial value. DF shall be within 125% of limits shown in Part Number Tables. ESR shall be within limits shown in Part Number Tables.
- Step 5, +125°C, DCL shall not exceed 12.5 times the original limit at 25°C. Capacitance shall be within ±12% of initial value. DF shall be within 150% of limits shown in Part Number Tables. ESR shall be within limits shown in Part Number Tables.
- Step 6, +25°C, DCL as indicated in original limit; capacitance within ±5% of initial value; ESR, DF as indicated in original limit shown in Part Number Tables.

Note: M39003 specifies Δ's and limits by individual slash sheet.

- DAMP HEAT, STEADY STATE: Meets requirements of IEC Publication 384-15, method IEC 68-2-3. Climatic category 55/125/56.

## 19. MOUNTING

All encapsulated Series fall into two general classes. The first is provided with leads extending from opposite ends of the body, generally along the principle axis of the body ("axial leads"). The second is provided with parallel leads extending from one side or face of the body ("radial leads"). With either type, mounting points are normally provided by the leads themselves.

Axial leads may be used for point-to-point wiring, but usually, the wires are bent at 90° from the capacitor axis for insertion through printed circuit (PC) boards. Axial capacitors supplied on reels for machine insertion will

withstand the mechanical stresses of bending and inserting by all popular machines known to KEMET at this time. Most KEMET axial Series may be supplied on reels to feed such machines. Radial leads are intended to plug directly into holes of PC boards. Auto-machines will insert compatible radial capacitor designs, and most KEMET capacitors may be supplied in appropriate reeled forms (ARIS).

With either axial or radial types, attention should be paid to treatment of the capacitors during mounting and afterward under service conditions. Difficulty during mounting usually arises from lead damage or from overheating. Hand soldering technique or, more often, wave-solder machines cause the overheating. The internal cathode connection on most Series is made between solder and a silver-pigmented paint. If too much heat is applied, this solder may remelt and degrade the silver-solder interface or cause a direct short-circuit.

KEMET's hermetically-sealed series has an internal space into which molten cathode solder may run, depriving the cathode connection and possibly flowing across the terminals to short-circuit the capacitor from the inside. It is also possible to remelt the solder which bonds the rim of the glass-metal seal, causing loss of hermeticity and possibly a short-circuit. Finally, solder at the exit point of the positive wire may be remelted with similar effect. This solder is a high-temperature alloy, however, and it is much less likely to be melted. (Re-dipping of lead wires is practiced by some users, introducing another hazard of remelting this solder).

Plastic-encased Series have only one site of solder, the internal cathode connection. The rate of heat transfer through the plastic is lower than through the metal can of hermetic Series, but conduction along the negative lead-wire to remelt this solder is very similar. There is little internal void within plastic cases, so remelted solder tends to remain in its original location and solidify when heat is removed. Short-circuiting is very unlikely, but reliability of the internal connection may be compromised by leaching of silver from the paint into the molten solder. The latter effect degrades the cathode connection in hermetic parts as well.

All encased capacitors will pass the Resistance to Soldering Heat Test of MIL-STD-202, Method 210, Condition B. This test dips each leadwire into molten solder at +260° C for 10 seconds while the capacitor body is held vertically above the solder. KEMET capacitors will pass this test when the depth of immersion brings the capacitor body (or closest external solder joint, if it is closer as in some hermetic Series) to a minimum distance of 0.100 inches from the solder surface. 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.

Shown in Figure 13 is a recommended solder wave profile for both axial and radial leaded solid tantalum capacitors.

### Optimum Solder Wave Profile



Figure 13.

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