

Solid-Electrolyte TANTALEX[®] Capacitors, Resin-Coated, Radial-Lead



FEATURES

- Terminations: Tin/lead (SnPb), 100 % Tin (Sn)
- Economy and high performance are combined in these radial-lead, solid-electrolyte TANTALEX[®] capacitor
- Rugged, reliable capacitors featuring low leakage current and low dissipation factor
- Six miniature case sizes and three lead styles. All case sizes are available in standard tape and reel packaging per EIA-RS-468
- Standard ratings include replacements for Type 196D capacitors



RoHS*
COMPLIANT

APPLICATIONS

- Suitable for a broad range of consumer, commercial and industrial equipment

PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C.
(To + 125 °C with voltage derating.)

Capacitance Tolerance: At 120 Hz, + 25 °C. ± 20 %, ± 10 % standard. ± 5 % available as special.

Dissipation Factor: At 120 Hz, + 25 °C. Dissipation factor, as determined from the expression $2 \pi fRC$, shall not exceed the values listed in the Standard Ratings Tables.

DC Leakage Current (DCL Max.):

At + 25 °C: Leakage current shall not exceed the values listed in the Standard Ratings Tables.

At + 85 °C: Leakage current shall not exceed 10 times the values listed in the Standard Ratings Tables.

At + 125 °C: Leakage shall not exceed 15 times the values listed in the Standard Ratings Tables.

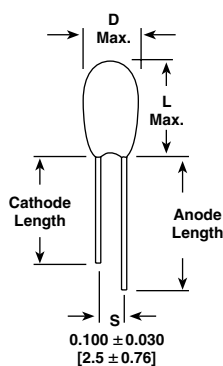
Life Test: Capacitors shall withstand rated DC voltage applied at + 85 °C for 1000 hours with a circuit resistance no greater than 3 ohms.

Following the life test:

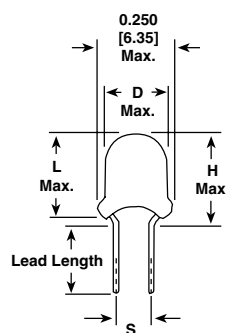
1. DCL shall not exceed 125 % of the initial requirements
2. Dissipation Factor shall meet the initial requirement
3. Change in capacitance shall not exceed ± 10 %

DIMENSIONS in inches [millimeters]

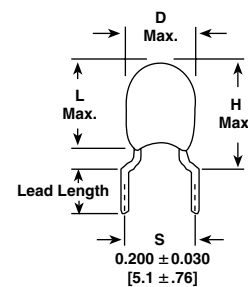
**Lead Style 1
"Long/Short"**



**Lead Style X
"Hairpin"**



**Lead Style 6
"Outside Hockeystick"**



CASE CODE	DIAMETER D (MAX.)	LENGTH L (MAX.)	SEATED HEIGHT H (MAX.)**	LEAD SPACING	LEAD SIZE	
					AWG NO.	NOM. DIA.
A	0.173 [4.40]	0.280 [7.11]	0.437 [11.11]	ALL	24	0.020 [0.51]
B	0.196 [5.00]	0.300 [7.62]	0.457 [11.62]	ALL	24	0.020 [0.51]
C	0.216 [5.50]	0.360 [9.14]	0.517 [13.14]	ALL	24	0.020 [0.51]
D	0.236 [6.00]	0.400 [10.16]	0.557 [14.16]	ALL	24	0.020 [0.51]
E	0.340 [8.60]	0.492 [12.50]	0.610 [15.5]	***	24	0.020 [0.51]
F	0.380 [9.60]	0.650 [16.50]	0.768 [19.5]	***	24	0.020 [0.51]

** Maximum Seated Height is identical to Maximum Length for units with Lead Style 'A'. *** 0.200 inch Lead spacing Tol. ± 0.050.

* Pb containing terminations are not RoHS compliant, exemptions may apply



Solid-Electrolyte TANTALEX® Capacitors,
Resin-Coated, Radial-Lead

Vishay Sprague

ORDERING INFORMATION							
199D	475	X9	003	A	1*	V1	E3
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	LEAD STYLE	PACKAGING	ROHS COMPLIANT
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	X0 = ± 20 % X9 = ± 10 % *X5 = ± 5 % *Special Order	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 volts).	See Ratings and Case Codes Table.	1 = 0.100 sp 2 = 0.100 sp 6 = 0.200 sp 7 = 0.250 sp X = 0.100 sp	V1 = Bulk B1 = Tape and Reel A1 = Ammo	E3 = 100 % tin termination (RoHS compliant) Blank = Tin/lead termination

199D OBSOLETE VS. CURRENT ORDERING CROSS REFERENCE		
OBSOLETE	NEW	DESCRIPTION
A1	1V1	0.100 SP, UNEVEN LL, BULK
A1	2V1	0.100 SP, EVEN LL, BULK
A6	2B1 (2A1)	0.100 SP, EVEN LL, T&R (AMMO)
A2, YV1, 5V1		0.125 (OBSOLETE)
A7, YB1		0.125 T&R (OBSOLETE)
B1	XV1	0.100 SP, EVEN LL, BULK
B2, ZB1		0.125 SP, T&R (OBSOLETE)
B6	XB1 (XA1)	0.100 SP, EVEN LL, T&R (AMMO)
B2, ZB1		0.125 SP, T&R (OBSOLETE)
E2	6V1	0.200 SP, BULK
E3		CASES E&F OBSOLETE
E3	7V1	0.250 SP, BULK, A-D CASE ONLY (10 % ADDED)
E4		OBSOLETE
E7	6B1 (6A1)	0.200 SP, T&R (AMMO)
G2, 9V1		OBSOLETE
G7, 9B1		OBSOLETE

STANDARD RATINGS					
CAPACITANCE (µF)	CASE CODE	PART NUMBER* CAP. TOL. ± 20 %	PART NUMBER* CAP. TOL. ± 10 %	Max. DCL at + 25 °C (µA)	Max. DF at + 25 °C 120 Hz (%)
AT3 WVDC AT + 85 °C, SURGE = 3.6 V . . . 2 WVDC AT + 125 °C, SURGE = 2.4 V					
4.7	A	199D475X0003A _ _	199D475X9003A _ _	0.5	6
6.8	A	199D685X0003A _ _	199D685X9003A _ _	0.5	6
10.0	A	199D106X0003A _ _	199D106X9003A _ _	0.5	8
15.0	A	199D156X0003A _ _	199D156X9003A _ _	0.5	8
22.0	B	199D226X0003B _ _	199D226X9003B _ _	0.6	8
33.0	B	199D336X0003B _ _	199D336X9003B _ _	1.0	8
47.0	C	199D476X0003C _ _	199D476X9003C _ _	1.4	8
68.0	C	199D686X0003C _ _	199D686X9003C _ _	2.0	8
100.0	D	199D107X0003D _ _	199D107X9003D _ _	3.0	10
150.0	D	199D157X0003D _ _	199D157X9003D _ _	4.0	10
220.0	E	199D227X0003E _ _	199D227X9003E _ _	5.0	10
330.0	E	199D337X0003E _ _	199D337X9003E _ _	6.0	10
470.0	F	199D477X0003F _ _	199D477X9003F _ _	8.0	10
680.0	F	199D687X0003F _ _	199D687X9003F _ _	10.0	10
6.3 WVDC AT + 85 °C, SURGE = 8 V . . . 4 WVDC AT + 125 °C, SURGE = 5 V					
4.7	A	199D475X06R3A _ _	199D475X96R3A _ _	0.5	6
6.8	A	199D685X06R3A _ _	199D685X96R3A _ _	0.5	6
10.0	B	199D106X06R3B _ _	199D106X96R3B _ _	0.6	8
15.0	B	199D156X06R3B _ _	199D156X96R3B _ _	0.9	8
22.0	C	199D226X06R3C _ _	199D226X96R3C _ _	1.3	8
33.0	C	199D336X06R3C _ _	199D336X96R3C _ _	2.0	8
47.0	D	199D476X06R3D _ _	199D476X96R3D _ _	2.9	8
68.0	D	199D686X06R3D _ _	199D686X96R3D _ _	4.0	8
100.0	D	199D107X06R3D _ _	199D107X96R3D _ _	5.0	10
150.0	E	199D157X06R3E _ _	199D157X96R3E _ _	6.0	10
220.0	E	199D227X06R3E _ _	199D227X96R3E _ _	7.0	10
330.0	F	199D337X06R3F _ _	199D337X96R3F _ _	8.0	10

STANDARD RATINGS					
CAPACITANCE (μ F)	CASE CODE	PART NUMBER* CAP. TOL. \pm 20 %	PART NUMBER* CAP. TOL. \pm 10 %	Max. DCL at + 25 °C (μ A)	Max. DF at + 25 °C 120 Hz (%)
10 WVDC AT + 85 °C, SURGE = 13 V . . . 7 WVDC AT + 125 °C, SURGE = 9 V					
3.3	A	199D335X0010A__	199D335X9010A__	0.5	6
4.7	A	199D475X0010A__	199D475X9010A__	0.5	6
6.8	B	199D685X0010B__	199D685X9010B__	0.6	6
10.0	B	199D106X0010B__	199D106X9010B__	1.0	8
15.0	C	199D156X0010C__	199D156X9010C__	1.5	8
22.0	C	199D226X0010C__	199D226X9010C__	2.0	8
33.0	D	199D336X0010D__	199D336X9010D__	3.0	8
47.0	D	199D476X0010D__	199D476X9010D__	4.0	8
68.0	D	199D686X0010D__	199D686X9010D__	5.0	8
100.0	E	199D107X0010E__	199D107X9010E__	6.0	10
150.0	E	199D157X0010E__	199D157X9010E__	7.0	10
220.0	F	199D227X0010F__	199D227X9010F__	8.0	10
16 WVDC AT + 85 °C, SURGE = 20 V . . . 10 WVDC AT + 125 °C, SURGE = 12 V					
2.2	A	199D225X0016A__	199D225X9016A__	0.5	6
3.3	A	199D335X0016A__	199D335X9016A__	0.5	6
4.7	B	199D475X0016B__	199D475X9016B__	0.7	6
6.8	B	199D685X0016B__	199D685X9016B__	1.0	6
10.0	C	199D106X0016C__	199D106X9016C__	1.5	8
15.0	C	199D156X0016C__	199D156X9016C__	2.4	8
22.0	D	199D226X0016D__	199D226X9016D__	3.5	8
33.0	D	199D336X0016D__	199D336X9016D__	4.0	8
47.0	E	199D476X0016E__	199D476X9016E__	5.0	8
68.0	E	199D686X0016E__	199D686X9016E__	6.0	8
100.0	F	199D107X0016F__	199D107X9016F__	7.0	10
150.0	F	199D157X0016F__	199D157X9016F__	8.0	10
20 WVDC AT + 85 °C, SURGE = 26 V . . . 13 WVDC AT + 125 °C, SURGE = 16 V					
3.3	B	199D335X0020B__	199D335X9020B__	0.8	6
4.7	B	199D475X0020B__	199D475X9020B__	1.0	6
6.8	C	199D685X0020C__	199D685X9020C__	1.5	6
10.0	C	199D106X0020C__	199D106X9020C__	2.0	8
15.0	D	199D156X0020D__	199D156X9020D__	2.5	8
22.0	D	199D226X0020D__	199D226X9020D__	3.0	8
33.0	E	199D336X0020E__	199D336X9020E__	4.0	8
47.0	E	199D476X0020E__	199D476X9020E__	5.0	8
68.0	F	199D686X0020F__	199D686X9020F__	6.0	8
100.0	F	199D107X0020F__	199D107X9020F__	7.0	10
25 WVDC AT + 85 °C, SURGE = 33 V . . . 17 WVDC AT + 125 °C, SURGE = 21 V					
1.0	A	199D105X0025A__	199D105X9025A__	0.5	4
1.5	A	199D155X0025A__	199D155X9025A__	0.5	6
2.2	A	199D225X0025A__	199D225X9025A__	0.5	6
3.3	B	199D335X0025B__	199D335X9025B__	0.8	6
4.7	B	199D475X0025B__	199D475X9025B__	1.0	6
6.8	C	199D685X0025C__	199D685X9025C__	1.5	6
10.0	C	199D106X0025C__	199D106X9025C__	2.5	8
15.0	D	199D156X0025D__	199D156X9025D__	3.0	8
22.0	D	199D226X0025D__	199D226X9025D__	4.0	8
33.0	E	199D336X0025E__	199D336X9025E__	5.0	8
47.0	E	199D476X0025E__	199D476X9025E__	6.0	8
68.0	F	199D686X0025F__	199D686X9025F__	7.0	8
35 WVDC AT + 85 °C, SURGE = 46 V . . . 23 WVDC AT + 125 °C, SURGE = 28 V					
0.1	A	199D104X0035A__	199D104X9035A__	0.5	4
0.15	A	199D154X0035A__	199D154X9035A__	0.5	4
0.22	A	199D224X0035A__	199D224X9035A__	0.5	4
0.33	A	199D334X0035A__	199D334X9035A__	0.5	4
0.47	A	199D474X0035A__	199D474X9035A__	0.5	4
0.68	A	199D684X0035A__	199D684X9035A__	0.5	4
1.0	A	199D105X0035A__	199D105X9035A__	0.5	4
1.5	A	199D155X0035A__	199D155X9035A__	0.5	6
2.2	B	199D225X0035B__	199D225X9035B__	0.7	6

* Insert capacitance tolerance code "X5"; for \pm 5 % units (special order). To specify Lead Style/Spacing insert the last two characters in the Part Number: Use the appropriate codes shown in the Ordering Information and Lead Style/Spacing Table.



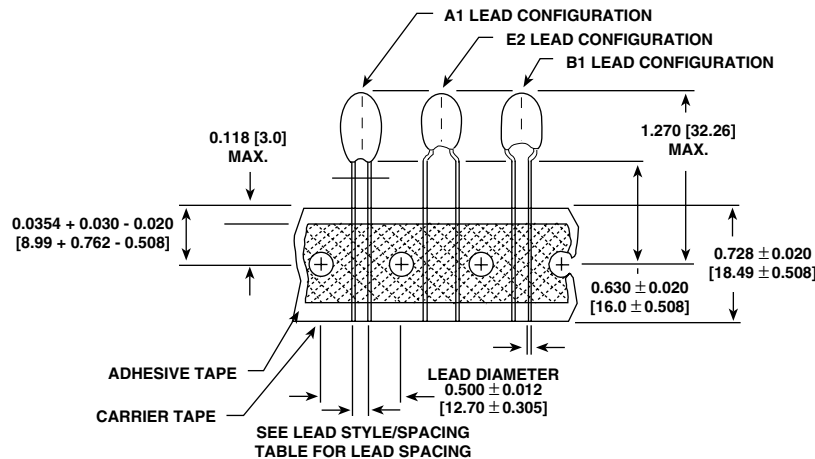
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Resin-Coated, Radial-Lead

Vishay Sprague

STANDARD RATINGS					
CAPACITANCE (µF)	CASE CODE	PART NUMBER* CAP. TOL. ± 20 %	PART NUMBER* CAP. TOL. ± 10 %	Max. DCL at + 25 °C (µA)	Max. DF at + 25 °C 120 Hz (%)
35 WVDC AT + 85 °C, SURGE = 46 V . . . 23 WVDC AT + 125 °C, SURGE = 28 V					
3.3	B	199D335X0035B__	199D335X9035B__	1.0	6
4.7	C	199D475X0035C__	199D475X9035C__	1.5	6
6.8	D	199D685X0035D__	199D685X9035D__	2.3	6
10.0	D	199D106X0035D__	199D106X9035D__	3.5	8
15.0	E	199D156X0035E__	199D156X9035E__	4.0	8
22.0	E	199D226X0035E__	199D226X9035E__	5.0	8
33.0	F	199D336X0035F__	199D336X9035F__	6.0	8
47.0	F	199D476X0035F__	199D476X9035F__	7.0	8
50 WVDC AT + 85 °C, SURGE = 65 V . . . 33 WVDC AT + 125 °C, SURGE = 40 V					
0.1	A	199D104X0050A__	199D104X9050A__	0.5	4
0.15	A	199D154X0050A__	199D154X9050A__	0.5	4
0.22	A	199D224X0050A__	199D224X9050A__	0.5	4
0.33	A	199D334X0050A__	199D334X9050A__	0.5	4
0.47	A	199D474X0050A__	199D474X9050A__	0.5	4
0.68	A	199D684X0050A__	199D684X9050A__	0.5	4
1.0	B	199D105X0050B__	199D105X9050B__	0.5	4
1.5	C	199D155X0050C__	199D155X9050C__	0.7	6
2.2	C	199D225X0050C__	199D225X9050C__	1.1	6
3.3	D	199D335X0050D__	199D335X9050D__	1.5	6
4.7	D	199D475X0050D__	199D475X9050D__	2.0	6
6.8	F	199D685X0050F__	199D685X9050F__	3.0	6
10.0	F	199D106X0050F__	199D106X9050F__	4.0	8
15.0	F	199D156X0050F__	199D156X9050F__	5.0	8
22.0	F	199D226X0050F__	199D226X9050F__	6.0	8

* Insert capacitance tolerance code "X5"; for ± 5 % units (special order). To specify Lead Style/Spacing insert the last two characters in the Part Number: Use the appropriate codes shown in the Ordering Information and Lead Style/Spacing Table.

STANDARD REEL PACKAGING SPECIFICATIONS PER EIA RS-468 in inches [millimeters]



Tape and Reel Packaging: Type 199D radial-leaded tantalum capacitors, (case codes A, B, C and D only) are available tape and reeled per EIA-468. Quantity of components per reel as follows:

CASE CODE	UNITS PER REEL
A, B, C, D	1000
E, F	500

CASE CODE	OBSOLETE	LEAD STYLE	LEAD SPACING	LL (MIN) (BULK)
A, B, C, D	A1, A6	1V1 (BULK), 2B1 (T & R)	0.100 + 0.024 - 0.016 [2.54 + 0.60 - 0.40]	0.187 [4.7]
A, B, C, D	B1, B6	XV1 (BULK), XB1 (T & R)	0.100 + 0.024 - 0.016 [2.54 + 0.60 - 0.40]	0.187 [4.7]
A, B, C, D, E, F	E2, E7	6V1 (BULK), 6B1 (T & R)	0.200 + 0.024 - 0.016 [5.08 + 0.06 - 0.40]	0.187 [4.7]

Note: Lead space measured within 0.05 [1.27] of the body of the capacitor, or from the bottom of the crimp. Lead Style 'A' may be supplied with 0.59 [15] anode lead and 0.47 [12] cathode lead.



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