



TYPE 199D Solid Tantalum Capacitors

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



Economy and high performance are combined in the Type 199D resin-coated, radial-lead, solid-electrolyte TANTALEX[®] capacitor. These are rugged, reliable capacitors featuring low leakage current and low dissipation factor.

Type 199D capacitors are available in six miniature case sizes and three lead styles suitable for a broad range of consumer, commercial and industrial equipment. All case sizes are available in standard tape and reel packaging per EIA-RS-468.

Standard ratings include replacements for Type 196D capacitors.

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%, special order.

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 current shall not exceed 15 times the values listed in the Standard Ratings Tables.

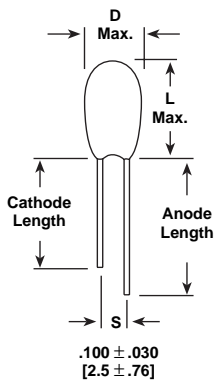
Life Test: Capacitors shall withstand rated DC voltage applied at + 85°C for 1000 hours with a circuit resistance no greater than 3 ohms.

Following the life test:

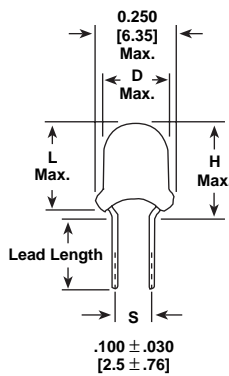
1. DCL shall not exceed 125% of the initial requirement.
2. Dissipation Factor shall meet the initial requirement.
3. Change in capacitance shall not exceed ± 10%.

DIMENSIONAL CONFIGURATIONS [Numbers in brackets indicate millimeters]

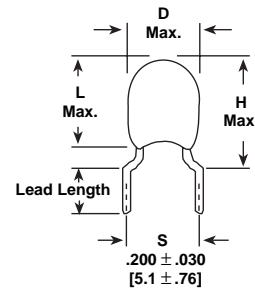
**Lead Style "A1"
"Long/Short"**



**Lead Style "B1"
"Hairpin"**



**Lead Style "E2"
"Outside Hockeystick"**



CASE CODE	DIAMETER D (Max.)	LENGTH L (Max.)	SEATED HEIGHT H (Max.)*	LEAD SPACING	LEAD SIZE	
					AWG NO.	NOM. DIA.
A	0.177 [4.40]	0.280 [7.11]	0.340 [8.64]	All	24	0.020 [0.51]
B	0.196 [5.00]	0.300 [7.62]	0.360 [9.14]	All	24	0.020 [0.51]
C	0.216 [5.50]	0.360 [9.14]	0.420 [10.67]	All	24	0.020 [0.51]
D	0.236 [6.00]	0.400 [10.16]	0.460 [11.68]	All	24	0.020 [0.51]
E	0.340 [8.60]	0.492 [12.50]	0.552 [14.02]	E2**	24	0.020 [0.51]
F	0.380 [9.60]	0.650 [16.50]	0.710 [18.03]	E2**	24	0.020 [0.51]

* Maximum Seated Height is identical to Maximum Length for units ordered with Lead Style 'A'. ** Lead spacing Tol. ± .050 ().

TYPE 199D

STANDARD RATINGS						
CAPACITANCE (μ F)	CASE CODE	PART NUMBER* CAP. TOL. \pm 20%	PART NUMBER* CAP. TOL. \pm 10%	Max. DCL @ + 25°C (μ A)	Max. DF @ + 25°C 120 Hz (%)	
3 WVDC @ + 85°C, SURGE = 3.6 V . . . 2 WVDC @ + 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 @ + 85°C, SURGE = 8 V . . . 4 WVDC @ + 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	
10 WVDC @ + 85°C, SURGE = 13 V . . . 7 WVDC @ + 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 @ + 85°C, SURGE = 20 V . . . 10 WVDC @ + 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	

* 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 How to Order and Lead Style/Spacing Table.

TYPE 199D

STANDARD RATINGS					
CAPACITANCE (µF)	CASE CODE	PART NUMBER* CAP. TOL. ± 20%	PART NUMBER* CAP. TOL. ± 10%	Max. DCL @ + 25°C (µA)	Max. DF @ + 25°C 120 Hz (%)
20 WVDC @ + 85°C, SURGE = 26 V . . . 13 WVDC @ + 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 @ + 85°C, SURGE = 33 V . . . 17 WVDC @ + 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 @ + 85°C, SURGE = 46 V . . . 23 WVDC @ + 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
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 @ + 85°C, SURGE = 65 V . . . 33 WVDC @ + 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 How to Order and Lead Style/Spacing Table.

TYPE 199D

HOW TO ORDER

199D
TYPE

475
CAPACITANCE

This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.

X9
CAPACITANCE TOLERANCE

X0 = ± 20%
X9 = ± 10%

003
DC VOLTAGE RATING AT 85°C

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).

A
CASE CODE

See Rating and Case Codes Table.

A
LEAD STYLE

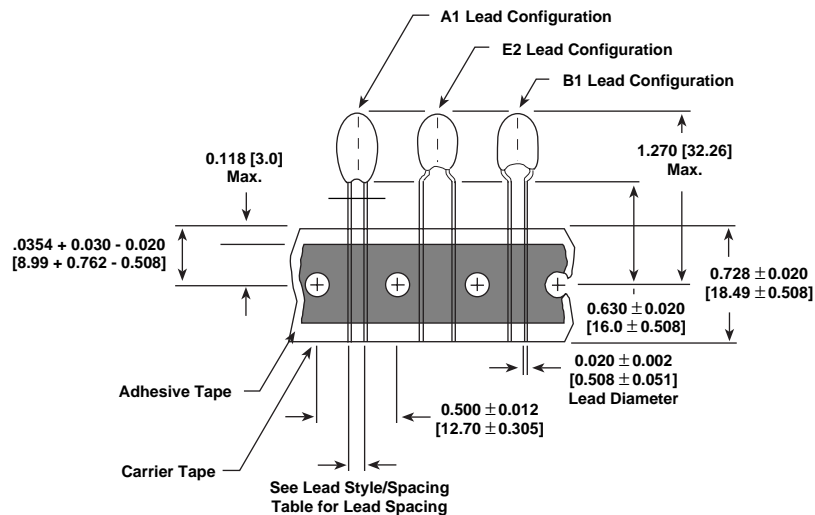
A = Long/Short
B = Hairpin
E = Outside Hockeystick

1
LEAD SPACE

See Lead Style/Spacing Table.

STANDARD REEL PACKAGING SPECIFICATIONS Per EIA RS-468

[Numbers in brackets indicate 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	
	(Minimum)	(Maximum)
A, B	500	2000
C, D	500	1500
E, F	250	500

Lead Spacing	
A1, B1	.100 + .024 - .016 [2.54 + .60 - .40]
E2, G2	.200 + .024 - .016 [5.08 + .60 - .40]