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# 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™ capacitors
- Rugged, reliable capacitors featuring low leakage current and low dissipation factor
- Six miniature case sizes and five lead styles. All case sizes are available in standard tape and reel packaging per EIA-468
- Standard ratings include replacements for type 196D capacitors
- Lead (Pb)-free capacitors have “L” in body marking
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free Available

RoHS* Available

**Note**

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

## 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, 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 h with a circuit resistance not greater than 3 Ω.

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 %

## ORDERING INFORMATION

| 199D | 475 | X9 | 003 | A | 1 (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 %<br>X9 = ± 10 %<br>** X5 = ± 5 %<br>** Special Order | This is expressed in V. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an “R” (6R3 = 6.3 V). | See Ratings and Case Codes table. | | V1 = bulk<br>B1 = tape and reel<br>A1 = tape / ammo box | E3 = 100 % tin termination (RoHS-compliant)<br>Blank = tin / lead termination |

**Note**

(1) See lead styles table



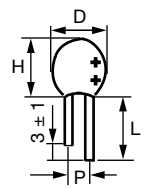
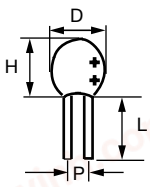
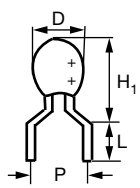
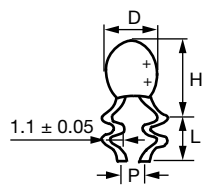
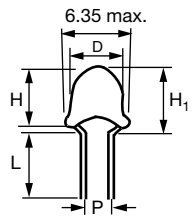
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## LEAD STYLE CONFIGURATIONS AND CODES

| STRAIGHT UNEVEN LEADS CODES 1, 3, AND Y | STRAIGHT EVEN LEADS CODES 2, 4, AND 5 | "OUTSIDE HOCKEY STICK" CODES 6 AND 7 | "SNAP-IN" CODE 9 | "HAIRPIN" CODES X, Z |
|---|---|---|---|---|
|  |  |  |  |  |



**Notes**

- Wire diameter (nominal) 0.020" (0.51 mm)
- L = lead length
- P = pitch or lead spacing

## AVAILABLE LEAD STYLES AND PACKAGING TYPES PER CASE SIZE

| LEAD STYLE / CASE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 9 | X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | Bulk | Bulk Reel Ammo | - | - | Bulk Reel Ammo | Bulk Reel Ammo | Bulk Reel Ammo | Bulk Reel Ammo | Bulk Reel Ammo | Bulk | Bulk Reel Ammo |
| B | | | | | | | | | | | |
| C | | | | | | | | | | | |
| D | | | | | | | | | | | |
| E | - | - | Bulk | Bulk / Reel Ammo | - | | - | - | - | - | - |
| F | | | | | | | | | | | |

## DIMENSIONS FOR LEAD STYLES 1, 2, 3, 4, 5, Y, 6 in inches [millimeters]

| LEAD STYLE | | 1, 2, 3, 4 | | 1, 3 | 2, 4 | 5, Y | | 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CASE | D (max.) | P (1) ± 0.024 [0.60] | H (max.) | L (2) (min.) | L (2) ± 0.118 [3.0] | P (1) ± 0.03 [0.76] | L (2) ± 0.118 [3.0] | P (1) ± 0.024 [0.60] | $H_1$ (max.) | L (2) |
| A | 0.173 [4.40] | 0.100 [2.54] | 0.280 [7.11] | 0.591 [15.0] | 0.748 [19.0] | 0.125 [3.18] | 0.748 [19.0] | 0.200 [5.08] | 0.378 [9.61] | 0.240 ± 0.030 [6.1 ± 0.76] |
| B | 0.197 [5.00] | 0.100 [2.54] | 0.300 [7.62] | 0.591 [15.0] | 0.748 [19.0] | 0.125 [3.18] | 0.748 [19.0] | 0.200 [5.08] | 0.398 [10.11] | 0.240 ± 0.030 [6.1 ± 0.76] |
| C | 0.217 [5.50] | 0.100 [2.54] | 0.360 [9.14] | 0.591 [15.0] | 0.748 [19.0] | 0.125 [3.18] | 0.748 [19.0] | 0.200 [5.08] | 0.458 [11.64] | 0.240 ± 0.030 [6.1 ± 0.76] |
| D | 0.236 [6.00] | 0.100 [2.54] | 0.400 [10.16] | 0.591 [15.0] | 0.748 [19.0] | 0.125 [3.18] | 0.748 [19.0] | 0.200 [5.08] | 0.498 [12.66] | 0.240 ± 0.030 [6.1 ± 0.76] |
| E | 0.339 [8.60] | 0.200 [5.08] | 0.492 [12.50] | 0.591 [15.0] | 0.748 [19.0] | n/a | n/a | 0.200 [5.08] | 0.591 [15.00] | 1.0 ± 0.122 [25.4 ± 3.1] |
| F | 0.378 [9.60] | 0.200 [5.08] | 0.650 [16.50] | 0.591 [15.0] | 0.748 [19.0] | n/a | n/a | 0.200 [5.08] | 0.748 [19.00] | 1.0 ± 0.122 [25.4 ± 3.1] |

**Notes**

(1) Pitch or lead spacing P measured within 0.05" [1.27 mm] of the body of the capacitor or from the bottom of the crimp

(2) Lead length L is for bulk packaging



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| DIMENSIONS FOR LEAD STYLES 7, 9, X, Z in inches [millimeters] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LEAD STYLE | | 7 | | | 9 | | | X, Z | | | | X | Z |
| CASE | D max. | P (1) ± 0.024 [0.60] | $H_1$ max. | L (2) ± 0.03 [0.76] | P (1) ± 0.024 [0.60] | $H_1$ max. | L (2) ± 0.03 [0.76] | D max. | H max. | $H_1$ max. | L (2) ± 0.125 [3.175] | P (1) ± 0.024 [0.60] | P (1) ± 0.024 [0.60] |
| A | 0.173 [4.40] | 0.25 [6.35] | 0.378 [9.61] | 0.240 ± 0.030 [6.1 ± 0.76] | 0.200 [5.08] | 0.398 [10.11] | 0.240 [6.10] | 0.173 [4.40] | 0.280 [7.11] | 0.340 [8.64] | 0.750 [19.05] | 0.100 [2.54] | 0.125 [3.175] |
| B | 0.197 [5.00] | 0.25 [6.35] | 0.398 [10.12] | 0.240 ± 0.030 [6.1 ± 0.76] | 0.200 [5.08] | 0.418 [10.62] | 0.240 [6.10] | 0.197 [5.00] | 0.300 [7.62] | 0.360 [9.14] | 0.750 [19.05] | 0.100 [2.54] | 0.125 [3.175] |
| C | 0.217 [5.50] | 0.25 [6.35] | 0.458 [11.64] | 0.240 ± 0.030 [6.1 ± 0.76] | 0.200 [5.08] | 0.478 [12.14] | 0.240 [6.10] | 0.217 [5.50] | 0.360 [9.14] | 0.420 [10.67] | 0.750 [19.05] | 0.100 [2.54] | 0.125 [3.175] |
| D | 0.236 [6.00] | 0.25 [6.35] | 0.498 [12.66] | 0.240 ± 0.030 [6.1 ± 0.76] | 0.200 [5.08] | 0.518 [13.16] | 0.240 [6.10] | 0.236 [6.00] | 0.400 [10.16] | 0.460 [11.68] | 0.750 [19.05] | 0.100 [2.54] | 0.125 [3.175] |

**Notes**

(1) Pitch or lead spacing P measured within 0.05" [1.27 mm] of the body of the capacitor or from the bottom of the crimp

(2) Lead length L is for bulk packaging

| 199D OBSOLETE VS. CURRENT ORDERING CROSS REFERENCE | | |
|---|---|---|
| OBSOLETE | NEW | DESCRIPTION |
| A1 | 1V1 | PITCH 0.100, UNEVEN STRAIGHT LEADS, BULK CASES A - D |
| A1 | 3V1 | PITCH 0.200, UNEVEN STRAIGHT LEADS, BULK, CASES E, F |
| A1 | 2V1 | PITCH 0.100, EVEN STRAIGHT LEADS, BULK, CASES A - D |
| A6 | 2B1 | PITCH 0.100, EVEN STRAIGHT LEADS, REEL POSITIVE LEADER, CASES A - D |
| A6 | 2A1 | PITCH 0.100, EVEN STRAIGHT LEADS, AMMO, CASES A - D |
| A1 | 4V1 | PITCH 0.200, EVEN STRAIGHT LEADS, BULK, CASES E, F |
| A6 | 4B1 | PITCH 0.200, EVEN STRAIGHT LEADS, REEL POSITIVE LEADER, CASES E, F |
| A6 | 4A1 | PITCH 0.200, EVEN STRAIGHT LEADS, AMMO, CASES E, F |
| A2 | 5V1 | PITCH 0.125, EVEN STRAIGHT LEADS, BULK, CASES A - D |
| A7 | 5B1 | PITCH 0.125, EVEN STRAIGHT LEADS, REEL POSITIVE LEADER, CASES A - D |
| A7 | 5A1 | PITCH 0.125, EVEN STRAIGHT LEADS, AMMO, CASES A - D |
| A2 | YV1 | PITCH 0.125, UNEVEN STRAIGHT LEADS, BULK, CASES A - D |
| B1 | XV1 | PITCH 0.100, HAIRPIN LEADS, BULK CASES A - D |
| B6 | XB1 | PITCH 0.100, HAIRPIN LEADS, REEL POSITIVE LEADER, CASES A - D |
| B6 | XA1 | PITCH 0.100, HAIRPIN LEADS, AMMO, CASES A - D |
| B2 | ZV1 | PITCH 0.125, HAIRPIN LEADS, BULK, CASES A - D |
| B7 | ZB1 | PITCH 0.125, HAIRPIN LEADS, REEL POSITIVE LEADER, CASES A - D |
| B7 | ZA1 | PITCH 0.125, HAIRPIN LEADS, AMMO, CASES A - D |
| E2 | 6V1 | PITCH 0.200, HOCKEY STICK LEADS, BULK, CASES A - F |
| E7 | 6B1 | PITCH 0.200, HOCKEY STICK LEADS, REEL POSITIVE LEADER, CASES A - F |
| E7 | 6A1 | PITCH 0.200, HOCKEY STICK LEADS, AMMO, CASES A - F |
| E3 | 7V1 | PITCH 0.250, HOCKEY STICK LEADS, BULK, CASES A - D |
| E8 | 7B1 | PITCH 0.250, HOCKEY STICK LEADS, REEL POSITIVE LEADER, CASES A - D |
| E8 | 7A1 | PITCH 0.250, HOCKEY STICK LEADS, AMMO, CASES A - D |
| E4 | | OBSOLETE |
| G2 | 9V1 | PITCH 0.200, SNAP-IN LEADS, BULK, CASES A - D |
| G7 | 9B1 | PITCH 0.200, SNAP-IN LEADS, REEL POSITIVE LEADER, CASES A - D |
| G7 | 9A1 | PITCH 0.200, SNAP-IN LEADS, AMMO, CASES A - D |



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## STANDARD RATINGS

| CAPACITANCE (µF) | CASE CODE | PART NUMBER | MAX. DCL AT +25 °C (µA) | MAX. DF AT +25 °C 120 Hz (%) |
|---|---|---|---|---|
| **3 $V_{DC}$ AT +85 °C, SURGE = 3.6 V; 2 $V_{DC}$ AT +125 °C, SURGE = 2.4 V** | | | | |
| 4.7 | A | 199D475(1)003A(2)(3) | 0.5 | 6 |
| 6.8 | A | 199D685(1)003A(2)(3) | 0.5 | 6 |
| 10 | A | 199D106(1)003A(2)(3) | 0.5 | 8 |
| 15 | A | 199D156(1)003A(2)(3) | 0.5 | 8 |
| 22 | B | 199D226(1)003B(2)(3) | 0.6 | 8 |
| 33 | B | 199D336(1)003B(2)(3) | 1.0 | 8 |
| 47 | C | 199D476(1)003C(2)(3) | 1.4 | 8 |
| 68 | C | 199D686(1)003C(2)(3) | 2.0 | 8 |
| 100 | D | 199D107(1)003D(2)(3) | 3.0 | 10 |
| 150 | D | 199D157(1)003D(2)(3) | 4.0 | 10 |
| 220 | E | 199D227(1)003E(2)(3) | 5.0 | 10 |
| 330 | E | 199D337(1)003E(2)(3) | 6.0 | 10 |
| 470 | F | 199D477(1)003F(2)(3) | 8.0 | 10 |
| 680 | F | 199D687(1)003F(2)(3) | 10.0 | 10 |
| **6.3 $V_{DC}$ AT +85 °C, SURGE = 8 V; 4 $V_{DC}$ AT +125 °C, SURGE = 5 V** | | | | |
| 4.7 | A | 199D475(1)6R3A(2)(3) | 0.5 | 6 |
| 6.8 | A | 199D685(1)6R3A(2)(3) | 0.5 | 6 |
| 10 | B | 199D106(1)6R3B(2)(3) | 0.6 | 8 |
| 15 | B | 199D156(1)6R3B(2)(3) | 0.9 | 8 |
| 22 | C | 199D226(1)6R3C(2)(3) | 1.3 | 8 |
| 33 | C | 199D336(1)6R3C(2)(3) | 2.0 | 8 |
| 47 | D | 199D476(1)6R3D(2)(3) | 2.9 | 8 |
| 68 | D | 199D686(1)6R3D(2)(3) | 4.0 | 8 |
| 100 | D | 199D107(1)6R3D(2)(3) | 5.0 | 10 |
| 150 | E | 199D157(1)6R3E(2)(3) | 6.0 | 10 |
| 220 | E | 199D227(1)6R3E(2)(3) | 7.0 | 10 |
| 330 | F | 199D337(1)6R3F(2)(3) | 8.0 | 10 |
| **10 $V_{DC}$ AT +85 °C, SURGE = 13 V; 7 $V_{DC}$ AT +125 °C, SURGE = 9 V** | | | | |
| 3.3 | A | 199D335(1)010A(2)(3) | 0.5 | 6 |
| 4.7 | A | 199D475(1)010A(2)(3) | 0.5 | 6 |
| 6.8 | B | 199D685(1)010B(2)(3) | 0.6 | 6 |
| 10 | B | 199D106(1)010B(2)(3) | 1.0 | 8 |
| 15 | C | 199D156(1)010C(2)(3) | 1.5 | 8 |
| 22 | C | 199D226(1)010C(2)(3) | 2.0 | 8 |
| 33 | D | 199D336(1)010D(2)(3) | 3.0 | 8 |
| 39 | D | 199D396(1)010D(2)(3) | 3.9 | 8 |
| 47 | D | 199D476(1)010D(2)(3) | 4.0 | 8 |
| 68 | D | 199D686(1)010D(2)(3) | 5.0 | 8 |
| 100 | E | 199D107(1)010E(2)(3) | 6.0 | 10 |
| 150 | E | 199D157(1)010E(2)(3) | 7.0 | 10 |
| 220 | F | 199D227(1)010F(2)(3) | 8.0 | 10 |

**Note**

- Part number definitions:
  (1) For capacitance tolerance: X0 = ± 20 %, X9 = ± 10 % or X5 = 5 %
  (2) To specify lead style / spacing / packaging insert the last three characters in the part number. Use the appropriate code shown in the Current Ordering Cross Reference table and explained in the Ordering Information and Lead Styles table
  (3) E3 = RoHS-compliant 100 % tin leads. Blank or no suffix = standard tin / lead termination



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## STANDARD RATINGS

| CAPACITANCE (µF) | CASE CODE | PART NUMBER | MAX. DCL AT +25 °C (µA) | MAX. DF AT +25 °C 120 Hz (%) |
|---|---|---|---|---|
| **16 $V_{DC}$ AT +85 °C, SURGE = 20 V; 10 $V_{DC}$ AT +125 °C, SURGE = 12 V** | | | | |
| 2.2 | A | 199D225(1)016A(2)(3) | 0.5 | 6 |
| 3.3 | A | 199D335(1)016A(2)(3) | 0.5 | 6 |
| 4.7 | B | 199D475(1)016B(2)(3) | 0.7 | 6 |
| 6.8 | B | 199D685(1)016B(2)(3) | 1.0 | 6 |
| 10 | C | 199D106(1)016C(2)(3) | 1.5 | 8 |
| 15 | C | 199D156(1)016C(2)(3) | 2.4 | 8 |
| 22 | D | 199D226(1)016D(2)(3) | 3.5 | 8 |
| 33 | D | 199D336(1)016D(2)(3) | 4.0 | 8 |
| 47 | E | 199D476(1)016E(2)(3) | 5.0 | 8 |
| 68 | E | 199D686(1)016E(2)(3) | 6.0 | 8 |
| 100 | F | 199D107(1)016F(2)(3) | 7.0 | 10 |
| 150 | F | 199D157(1)016F(2)(3) | 8.0 | 10 |
| **20 $V_{DC}$ AT +85 °C, SURGE = 26 V; 13 $V_{DC}$ AT +125 °C, SURGE = 16 V** | | | | |
| 1.0 | A | 199D105(1)020A(2)(3) | 0.5 | 4 |
| 2.7 | B | 199D275(1)020B(2)(3) | 0.7 | 6 |
| 3.3 | B | 199D335(1)020B(2)(3) | 0.8 | 6 |
| 4.7 | B | 199D475(1)020B(2)(3) | 1.0 | 6 |
| 6.8 | C | 199D685(1)020C(2)(3) | 1.5 | 6 |
| 10 | C | 199D106(1)020C(2)(3) | 2.0 | 8 |
| 15 | D | 199D156(1)020D(2)(3) | 2.5 | 8 |
| 22 | D | 199D226(1)020D(2)(3) | 3.0 | 8 |
| 33 | E | 199D336(1)020E(2)(3) | 4.0 | 8 |
| 47 | E | 199D476(1)020E(2)(3) | 5.0 | 8 |
| 68 | F | 199D686(1)020F(2)(3) | 6.0 | 8 |
| 100 | F | 199D107(1)020F(2)(3) | 7.0 | 10 |
| **25 $V_{DC}$ AT +85 °C, SURGE = 33 V; 17 $V_{DC}$ AT +125 °C, SURGE = 21 V** | | | | |
| 1.0 | A | 199D105(1)025A(2)(3) | 0.5 | 4 |
| 1.5 | A | 199D155(1)025A(2)(3) | 0.5 | 6 |
| 2.2 | A | 199D225(1)025A(2)(3) | 0.5 | 6 |
| 3.3 | B | 199D335(1)025B(2)(3) | 0.8 | 6 |
| 4.7 | B | 199D475(1)025B(2)(3) | 1.0 | 6 |
| 6.8 | C | 199D685(1)025C(2)(3) | 1.5 | 6 |
| 10 | C | 199D106(1)025C(2)(3) | 2.5 | 8 |
| 15 | D | 199D156(1)025D(2)(3) | 3.0 | 8 |
| 22 | D | 199D226(1)025D(2)(3) | 4.0 | 8 |
| 33 | E | 199D336(1)025E(2)(3) | 5.0 | 8 |
| 47 | E | 199D476(1)025E(2)(3) | 6.0 | 8 |
| 68 | F | 199D686(1)025F(2)(3) | 7.0 | 8 |

**Note**

- Part number definitions:
  (1) For capacitance tolerance: X0 = ± 20 %, X9 = ± 10 % or X5 = 5 %
  (2) To specify lead style / spacing / packaging insert the last three characters in the part number. Use the appropriate code shown in the Current Ordering Cross Reference table and explained in the Ordering Information and Lead Styles table
  (3) E3 = RoHS-compliant 100 % tin leads. Blank or no suffix = standard tin / lead termination



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## STANDARD RATINGS

| CAPACITANCE (µF) | CASE CODE | PART NUMBER | MAX. DCL AT +25 °C (µA) | MAX. DF AT +25 °C 120 Hz (%) |
|---|---|---|---|---|
| 35 $V_{DC}$ AT +85 °C, SURGE = 46 V; 23 $V_{DC}$ AT +125 °C, SURGE = 28 V | | | | |
| 0.10 | A | 199D104(1)035A(2)(3) | 0.5 | 4 |
| 0.15 | A | 199D154(1)035A(2)(3) | 0.5 | 4 |
| 0.22 | A | 199D224(1)035A(2)(3) | 0.5 | 4 |
| 0.33 | A | 199D334(1)035A(2)(3) | 0.5 | 4 |
| 0.47 | A | 199D474(1)035A(2)(3) | 0.5 | 4 |
| 0.68 | A | 199D684(1)035A(2)(3) | 0.5 | 4 |
| 1.0 | A | 199D105(1)035A(2)(3) | 0.5 | 4 |
| 1.5 | A | 199D155(1)035A(2)(3) | 0.5 | 6 |
| 1.8 | B | 199D185(1)035B(2)(3) | 0.7 | 6 |
| 2.2 | B | 199D225(1)035B(2)(3) | 0.7 | 6 |
| 3.3 | B | 199D335(1)035B(2)(3) | 1.0 | 6 |
| 4.7 | C | 199D475(1)035C(2)(3) | 1.5 | 6 |
| 5.6 | D | 199D565(1)035D(2)(3) | 1.9 | 6 |
| 6.8 | D | 199D685(1)035D(2)(3) | 2.3 | 6 |
| 10 | D | 199D106(1)035D(2)(3) | 3.5 | 8 |
| 15 | E | 199D156(1)035E(2)(3) | 4.0 | 8 |
| 22 | E | 199D226(1)035E(2)(3) | 5.0 | 8 |
| 33 | F | 199D336(1)035F(2)(3) | 6.0 | 8 |
| 47 | F | 199D476(1)035F(2)(3) | 7.0 | 8 |
| 50 $V_{DC}$ AT +85 °C, SURGE = 65 V; 33 $V_{DC}$ AT +125 °C, SURGE = 40 V | | | | |
| 0.10 | A | 199D104(1)050A(2)(3) | 0.5 | 4 |
| 0.15 | A | 199D154(1)050A(2)(3) | 0.5 | 4 |
| 0.22 | A | 199D224(1)050A(2)(3) | 0.5 | 4 |
| 0.33 | A | 199D334(1)050A(2)(3) | 0.5 | 4 |
| 0.47 | A | 199D474(1)050A(2)(3) | 0.5 | 4 |
| 0.68 | A | 199D684(1)050A(2)(3) | 0.5 | 4 |
| 1.0 | B | 199D105(1)050B(2)(3) | 0.5 | 4 |
| 1.5 | C | 199D155(1)050C(2)(3) | 0.7 | 6 |
| 2.2 | C | 199D225(1)050C(2)(3) | 1.1 | 6 |
| 3.3 | D | 199D335(1)050D(2)(3) | 1.5 | 6 |
| 4.7 | D | 199D475(1)050D(2)(3) | 2.0 | 6 |
| 6.8 | F | 199D685(1)050F(2)(3) | 3.0 | 6 |
| 10 | F | 199D106(1)050F(2)(3) | 4.0 | 8 |
| 15 | F | 199D156(1)050F(2)(3) | 5.0 | 8 |
| 22 | F | 199D226(1)050F(2)(3) | 6.0 | 8 |

**Note**

- Part number definitions:
  (1) For capacitance tolerance: X0 = ± 20 %, X9 = ± 10 % or X5 = 5 %
  (2) To specify lead style / spacing / packaging insert the last three characters in the part number. Use the appropriate code shown in the Current Ordering Cross Reference table and explained in the Ordering Information and Lead Styles table
  (3) E3 = RoHS-compliant 100 % tin leads. Blank or no suffix = standard tin / lead termination

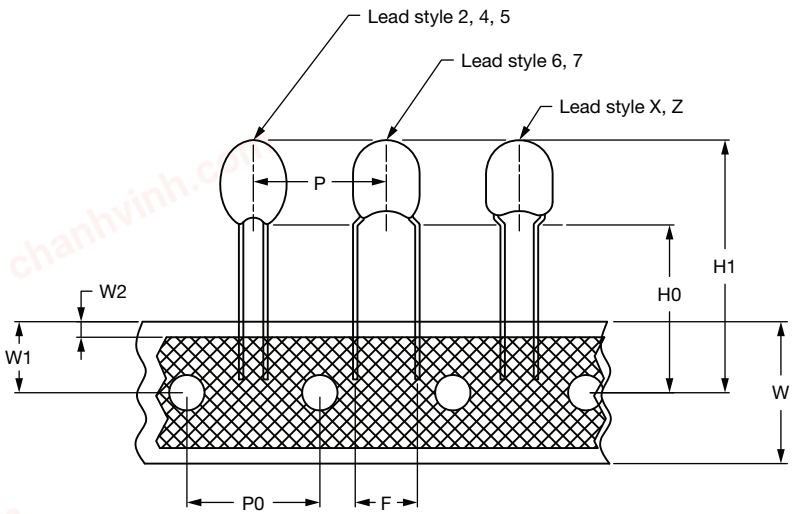

For technical questions, contact: tantalum@vishay.com
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## STANDARD TAPE AND REEL / AMMO BOX PACKAGING DIMENSIONS PER EIA-468

in inches [millimeters]




| SYMBOL | DESCRIPTION | DIMENSIONS | TOLERANCE |
|---|---|---|---|
| P | Component pitch | 0.500 [12.7] | ± 0.039 [± 1.0] |
| P0 | Feed hole pitch | 0.500 [12.7] | ± 0.012 [± 0.3] |
| W | Tape width | 0.709 [18.0] | +0.039 / -0.020 [+1.0 / -0.5] |
| W0 | Hold down tape width | 0.20 [5.0] | Minimum |
| W1 | Feed hole position | 0.354 [9.0] | +0.030 / -0.020 [+0.075 / -0.5] |
| W2 | Hold down tape position | 0.118 [3.0] | Maximum |
| H1 | Overall component height above tape central line | 1.27 [32.26] | Maximum |
| D0 | Feed hole diameter | 0.157 [4.0] | ± 0.012 [± 0.3] |
| t | Tape thickness | 0.028 [0.7] | Maximum |
| H0 | Height to seating plane | 0.63 [16.0] | ± 0.02 [± 0.5] |
| F | Pitch or lead wire spacing | See “Dimensions for Lead Styles” tables | |

**Tape and Reel Packaging:** type 199D radial-leaded tantalum capacitors, all lead styles except 1, 3, and Y are available taped and reeled per EIA-468.

| CASE CODE | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| **Quantity per box bulk** | 1000 | | 500 | | 100 | |
| **Quantity per box ammopack** | 2500 | 2000 | 1500 | 1000 | 500 | |
| **Quantity per reel** | 1000 | | | | 500 | |

| PRODUCT INFORMATION | |
|---|---|
| Mounting of Through Hole Components | www.vishay.com/doc?40108 |
| Solid Tantalum Capacitors (With $MnO_2$ Electrolyte) Voltage Derating | www.vishay.com/doc?40246 |
| **SELECTOR GUIDES** | |
| Quick Reference Guide | www.vishay.com/doc?40037 |
| Selector Guide | www.vishay.com/doc?49054 |
| Parameter Comparison Guide | www.vishay.com/doc?40033 |
| **FAQ** | |
| Frequently Asked Questions | www.vishay.com/doc?40110 |



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