

# 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<sup>TM</sup> 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 <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

#### 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

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

PERFORMANCE CHARACTERISTICS

**Capacitance Tolerance:** at 120 Hz,  $\pm$ 25 °C,  $\pm$  20 %,  $\pm$  10 % standard.  $\pm$ 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  $\Omega$ .

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 %

| ORDEI | RING INFORMAT  | ION   |  |  |                  |  |  |
|-------|--|---|--|--|------------------|--|--|
| 199D  | 475  | X9  | X9 003   |  | 1 <sup>(1)</sup> | V1   | E3   |
| MODEL | CAPACITANCE  | CAPACITANCE<br>TOLERANCE  | DC VOLTAGE RATING<br>AT +85 °C   | CASE<br>CODE                                     | LEAD<br>STYLE    | PACKAGING  | RoHS-<br>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<br>Ratings<br>and<br>Case<br>Codes<br>table. |                  | V1 = bulk<br>B1 = tape and reel<br>A1 = tape /<br>ammo box | E3 = 100 %<br>tin termination<br>(RoHS-compliant)<br>Blank = tin / lead<br>termination |

### Note

(1) See lead styles table

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| LEAD STYLE CONFIG                          | LEAD STYLE CONFIGURATIONS AND CODES      |   |                     |                         |  |  |  |
|--|--|---|---------------------|-------------------------|--|--|--|
| STRAIGHT UNEVEN LEADS<br>CODES 1, 3, AND Y | STRAIGHT EVEN LEADS<br>CODES 2, 4, AND 5 | "OUTSIDE HOCKEY STICK"<br>CODES 6 AND 7 | "SNAP-IN"<br>CODE 9 | "HAIRPIN"<br>CODES X, Z |  |  |  |
| H P L                                      | H L                                      | P +                                     | 1.1 ± 0.05          | 6.35 max.               |  |  |  |

#### Notes

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

| AVAILABLE LEA     | AVAILABLE LEAD STYLES AND PACKAGING TYPES PER CASE SIZE |              |      |             |              |      |                        |      |              |      |              |
|-------------------|---|--------------|------|-------------|--------------|------|------------------------|------|--------------|------|--------------|
| LEAD STYLE / CASE | 1   | 2            | 3    | 4           | 5            | 6    | 7                      | 9    | х            | Y    | Z            |
| Α                 |   |              |      |             |              |      |                        |      |              |      |              |
| В                 | Bulk  | Bulk<br>Reel |      |             | Bulk<br>Reel |      | Bulk Bulk<br>Reel Reel | Bulk | Bulk<br>Reel | Bulk | Bulk<br>Reel |
| С                 |   | Duik         | Ammo |             | -            | Ammo | Bulk<br>Reel           | Ammo |              | Ammo | Duik         |
| D                 |   |              |      |             |              | Ammo |                        |      |              |      |              |
| E                 |   |              | Bulk | Bulk / Reel |              |      |                        |      |              |      |              |
| F                 | -   | -            | Buik | Ammo        | -            |      | -                      | -    | -            | -    | -            |

| DIMEN | 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<br>(max.)  | P <sup>(1)</sup><br>± 0.024<br>[0.60] | H<br>(max.)      | L <sup>(2)</sup><br>(min.) | L <sup>(2)</sup><br>± 0.118<br>[3.0] | P <sup>(1)</sup><br>± 0.03<br>[0.76] | L <sup>(2)</sup><br>± 0.118<br>[3.0] | P <sup>(1)</sup><br>± 0.024<br>[0.60] | H <sub>1</sub><br>(max.) | L (2)                         |
| А     | 0.173<br>[4.40]  | 0.100<br>[2.54]                       | 0.280<br>[7.11]  | 0.591<br>[15.0]            | 0.748<br>[19.0]                      | 0.125<br>[3.18]                      | 0.748<br>[19.0]                      | 0.200<br>[5.08]                       | 0.378<br>[9.61]          | 0.240 ± 0.030<br>[6.1 ± 0.76] |
| В     | 0.197<br>[5.00]  | 0.100<br>[2.54]                       | 0.300<br>[7.62]  | 0.591<br>[15.0]            | 0.748<br>[19.0]                      | 0.125<br>[3.18]                      | 0.748<br>[19.0]                      | 0.200<br>[5.08]                       | 0.398<br>[10.11]         | 0.240 ± 0.030<br>[6.1 ± 0.76] |
| С     | 0.217<br>[5.50]  | 0.100<br>[2.54]                       | 0.360<br>[9.14]  | 0.591<br>[15.0]            | 0.748<br>[19.0]                      | 0.125<br>[3.18]                      | 0.748<br>[19.0]                      | 0.200<br>[5.08]                       | 0.458<br>[11.64]         | 0.240 ± 0.030<br>[6.1 ± 0.76] |
| D     | 0.236<br>[6.00]  | 0.100<br>[2.54]                       | 0.400<br>[10.16] | 0.591<br>[15.0]            | 0.748<br>[19.0]                      | 0.125<br>[3.18]                      | 0.748<br>[19.0]                      | 0.200<br>[5.08]                       | 0.498<br>[12.66]         | 0.240 ± 0.030<br>[6.1 ± 0.76] |
| Е     | 0.339<br>[8.60]  | 0.200<br>[5.08]                       | 0.492<br>[12.50] | 0.591<br>[15.0]            | 0.748<br>[19.0]                      | n/a                                  | n/a                                  | 0.200<br>[5.08]                       | 0.591<br>[15.00]         | 1.0 ± 0.122<br>[25.4 ± 3.1]   |
| F     | 0.378<br>[9.60]  | 0.200<br>[5.08]                       | 0.650<br>[16.50] | 0.591<br>[15.0]            | 0.748<br>[19.0]                      | n/a                                  | n/a                                  | 0.200<br>[5.08]                       | 0.748<br>[19.00]         | 1.0 ± 0.122<br>[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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| DIME | DIMENSIONS FOR LEAD STYLES 7, 9, X, Z in inches [millimeters] |                                       |                        |                                      |                                       |                        |                                      |           |           |                        |  |                                       |                                       |
|------|---|---------------------------------------|------------------------|--------------------------------------|---------------------------------------|------------------------|--------------------------------------|-----------|-----------|------------------------|--|---------------------------------------|---------------------------------------|
| LEAD | STYLE   |                                       | 7                      |                                      |                                       | 9                      |                                      | X, Z      |           |                        |  | Х                                     | Z                                     |
| CASE | D<br>max.   | P <sup>(1)</sup><br>± 0.024<br>[0.60] | H <sub>1</sub><br>max. | L <sup>(2)</sup><br>± 0.03<br>[0.76] | P <sup>(1)</sup><br>± 0.024<br>[0.60] | H <sub>1</sub><br>max. | L <sup>(2)</sup><br>± 0.03<br>[0.76] | D<br>max. | H<br>max. | H <sub>1</sub><br>max. | L <sup>(2)</sup><br>± 0.125<br>[3.175] | P <sup>(1)</sup><br>± 0.024<br>[0.60] | P <sup>(1)</sup><br>± 0.024<br>[0.60] |
| Α    | 0.173   | 0.25                                  | 0.378                  | 0.240 ± 0.030                        | 0.200                                 | 0.398                  | 0.240                                | 0.173     | 0.280     | 0.340                  | 0.750                                  | 0.100                                 | 0.125                                 |
|      | [4.40]  | [6.35]                                | [9.61]                 | [6.1 ± 0.76]                         | [5.08]                                | [10.11]                | [6.10]                               | [4.40]    | [7.11]    | [8.64]                 | [19.05]                                | [2.54]                                | [3.175]                               |
| В    | 0.197   | 0.25                                  | 0.398                  | 0.240 ± 0.030                        | 0.200                                 | 0.418                  | 0.240                                | 0.197     | 0.300     | 0.360                  | 0.750                                  | 0.100                                 | 0.125                                 |
|      | [5.00]  | [6.35]                                | [10.12]                | [6.1 ± 0.76]                         | [5.08]                                | [10.62]                | [6.10]                               | [5.00]    | [7.62]    | [9.14]                 | [19.05]                                | [2.54]                                | [3.175]                               |
| С    | 0.217   | 0.25                                  | 0.458                  | 0.240 ± 0.030                        | 0.200                                 | 0.478                  | 0.240                                | 0.217     | 0.360     | 0.420                  | 0.750                                  | 0.100                                 | 0.125                                 |
|      | [5.50]  | [6.35]                                | [11.64]                | [6.1 ± 0.76]                         | [5.08]                                | [12.14]                | [6.10]                               | [5.50]    | [9.14]    | [10.67]                | [19.05]                                | [2.54]                                | [3.175]                               |
| D    | 0.236   | 0.25                                  | 0.498                  | 0.240 ± 0.030                        | 0.200                                 | 0.518                  | 0.240                                | 0.236     | 0.400     | 0.460                  | 0.750                                  | 0.100                                 | 0.125                                 |
|      | [6.00]  | [6.35]                                | [12.66]                | [6.1 ± 0.76]                         | [5.08]                                | [13.16]                | [6.10]                               | [6.00]    | [10.16]   | [11.68]                | [19.05]                                | [2.54]                                | [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

| BSOLETE | 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 RA         |                      |  | MAX. DCL               | MAX. DF                 |
|---------------------|----------------------|--|------------------------|-------------------------|
| CAPACITANCE<br>(µF) | CASE CODE            | PART NUMBER                                  | AT +25 °C<br>(μΑ)      | AT +25 °C<br>120 Hz (%) |
|                     | 3 V <sub>DC</sub> AT | +85 °C, SURGE = 3.6 V; 2 V <sub>DC</sub> AT  |                        | 120 112 (70)            |
| 4.7                 | A                    | 199D475(1)003A(2)(3)                         | 0.5                    | 6                       |
| 6.8                 | Α                    | 199D685(1)003A(2)(3)                         | 0.5                    | 6                       |
| 10                  | Α                    | 199D106(1)003A(2)(3)                         | 0.5                    | 8                       |
| 15                  | Α                    | 199D156(1)003A(2)(3)                         | 0.5                    | 8                       |
| 22                  | В                    | 199D226(1)003B(2)(3)                         | 0.6                    | 8                       |
| 33                  | В                    | 199D336(1)003B(2)(3)                         | 1.0                    | 8                       |
| 47                  | С                    | 199D476(1)003C(2)(3)                         | 1.4                    | 8                       |
| 68                  | С                    | 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                 | Е                    | 199D227(1)003E(2)(3)                         | 5.0                    | 10                      |
| 330                 | Е                    | 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 <sub>DC</sub>  | AT +85 °C, SURGE = 8 V; 4 V <sub>DC</sub> A  | T +125 °C, SURGE = 5 V |                         |
| 4.7                 | Α                    | 199D475(1)6R3A(2)(3)                         | 0.5                    | 6                       |
| 6.8                 | Α                    | 199D685(1)6R3A(2)(3)                         | 0.5                    | 6                       |
| 10                  | В                    | 199D106(1)6R3B(2)(3)                         | 0.6                    | 8                       |
| 15                  | В                    | 199D156(1)6R3B(2)(3)                         | 0.9                    | 8                       |
| 22                  | С                    | 199D226(1)6R3C(2)(3)                         | 1.3                    | 8                       |
| 33                  | С                    | 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 <sub>DC</sub> / | AT +85 °C, SURGE = 13 V; 7 V <sub>DC</sub> A | T +125 °C, SURGE = 9 V |                         |
| 3.3                 | А                    | 199D335(1)010A(2)(3)                         | 0.5                    | 6                       |
| 4.7                 | Α                    | 199D475(1)010A(2)(3)                         | 0.5                    | 6                       |
| 6.8                 | В                    | 199D685(1)010B(2)(3)                         | 0.6                    | 6                       |
| 10                  | В                    | 199D106(1)010B(2)(3)                         | 1.0                    | 8                       |
| 15                  | С                    | 199D156(1)010C(2)(3)                         | 1.5                    | 8                       |
| 22                  | С                    | 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                 | Е                    | 199D107(1)010E(2)(3)                         | 6.0                    | 10                      |
| 150                 | Е                    | 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:  $X0 = \pm 20 \%$ ,  $X9 = \pm 10 \%$  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 RA      | ATINGS               |  |                               |                                    |
|------------------|----------------------|--|-------------------------------|------------------------------------|
| CAPACITANCE (μF) | CASE CODE            | PART NUMBER                                  | MAX. DCL<br>AT +25 °C<br>(μΑ) | MAX. DF<br>AT +25 °C<br>120 Hz (%) |
|                  | 16 V <sub>DC</sub> A | Γ +85 °C, SURGE = 20 V; 10 V <sub>DC</sub> A | T +125 °C, SURGE = 12 V       |                                    |
| 2.2              | Α                    | 199D225(1)016A(2)(3)                         | 0.5                           | 6                                  |
| 3.3              | Α                    | 199D335(1)016A(2)(3)                         | 0.5                           | 6                                  |
| 4.7              | В                    | 199D475(1)016B(2)(3)                         | 0.7                           | 6                                  |
| 6.8              | В                    | 199D685(1)016B(2)(3)                         | 1.0                           | 6                                  |
| 10               | С                    | 199D106(1)016C(2)(3)                         | 1.5                           | 8                                  |
| 15               | С                    | 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               | Е                    | 199D476(1)016E(2)(3)                         | 5.0                           | 8                                  |
| 68               | Е                    | 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 <sub>DC</sub> A | T +85 °C, SURGE = 26 V; 13 V <sub>DC</sub> A | T +125 °C, SURGE = 16 V       |                                    |
| 1.0              | Α                    | 199D105(1)020A(2)(3)                         | 0.5                           | 4                                  |
| 2.7              | В                    | 199D275(1)020B(2)(3)                         | 0.7                           | 6                                  |
| 3.3              | В                    | 199D335(1)020B(2)(3)                         | 0.8                           | 6                                  |
| 4.7              | В                    | 199D475(1)020B(2)(3)                         | 1.0                           | 6                                  |
| 6.8              | С                    | 199D685(1)020C(2)(3)                         | 1.5                           | 6                                  |
| 10               | С                    | 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               | Е                    | 199D336(1)020E(2)(3)                         | 4.0                           | 8                                  |
| 47               | Е                    | 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 <sub>DC</sub> A | Γ +85 °C, SURGE = 33 V; 17 V <sub>DC</sub> A | T +125 °C, SURGE = 21 V       |                                    |
| 1.0              | Α                    | 199D105(1)025A(2)(3)                         | 0.5                           | 4                                  |
| 1.5              | Α                    | 199D155(1)025A(2)(3)                         | 0.5                           | 6                                  |
| 2.2              | Α                    | 199D225(1)025A(2)(3)                         | 0.5                           | 6                                  |
| 3.3              | В                    | 199D335(1)025B(2)(3)                         | 0.8                           | 6                                  |
| 4.7              | В                    | 199D475(1)025B(2)(3)                         | 1.0                           | 6                                  |
| 6.8              | С                    | 199D685(1)025C(2)(3)                         | 1.5                           | 6                                  |
| 10               | С                    | 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               | Е                    | 199D336(1)025E(2)(3)                         | 5.0                           | 8                                  |
| 47               | Е                    | 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 =  $\pm$  20 %, X9 =  $\pm$  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

## Vishay Sprague

| STANDARD RA         | ATINGS  |  |                               |                                    |  |  |  |
|---------------------|---|--|-------------------------------|------------------------------------|--|--|--|
| CAPACITANCE<br>(μF) | CASE CODE   | PART NUMBER                                  | MAX. DCL<br>AT +25 °C<br>(μΑ) | MAX. DF<br>AT +25 °C<br>120 Hz (%) |  |  |  |
|                     | 35 V <sub>DC</sub> AT +85 °C, SURGE = 46 V; 23 V <sub>DC</sub> AT +125 °C, SURGE = 28 V |  |                               |                                    |  |  |  |
| 0.10                | А   | 199D104(1)035A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 0.15                | Α   | 199D154(1)035A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 0.22                | Α   | 199D224(1)035A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 0.33                | Α   | 199D334(1)035A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 0.47                | Α   | 199D474(1)035A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 0.68                | Α   | 199D684(1)035A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 1.0                 | Α   | 199D105(1)035A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 1.5                 | Α   | 199D155(1)035A(2)(3)                         | 0.5                           | 6                                  |  |  |  |
| 1.8                 | В   | 199D185(1)035B(2)(3)                         | 0.7                           | 6                                  |  |  |  |
| 2.2                 | В   | 199D225(1)035B(2)(3)                         | 0.7                           | 6                                  |  |  |  |
| 3.3                 | В   | 199D335(1)035B(2)(3)                         | 1.0                           | 6                                  |  |  |  |
| 4.7                 | С   | 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                  | Е   | 199D156(1)035E(2)(3)                         | 4.0                           | 8                                  |  |  |  |
| 22                  | Е   | 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 <sub>DC</sub> A  | T +85 °C, SURGE = 65 V; 33 V <sub>DC</sub> A | T +125 °C, SURGE = 40 V       |                                    |  |  |  |
| 0.10                | Α   | 199D104(1)050A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 0.15                | Α   | 199D154(1)050A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 0.22                | Α   | 199D224(1)050A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 0.33                | Α   | 199D334(1)050A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 0.47                | Α   | 199D474(1)050A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 0.68                | Α   | 199D684(1)050A(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 1.0                 | В   | 199D105(1)050B(2)(3)                         | 0.5                           | 4                                  |  |  |  |
| 1.5                 | С   | 199D155(1)050C(2)(3)                         | 0.7                           | 6                                  |  |  |  |
| 2.2                 | С   | 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

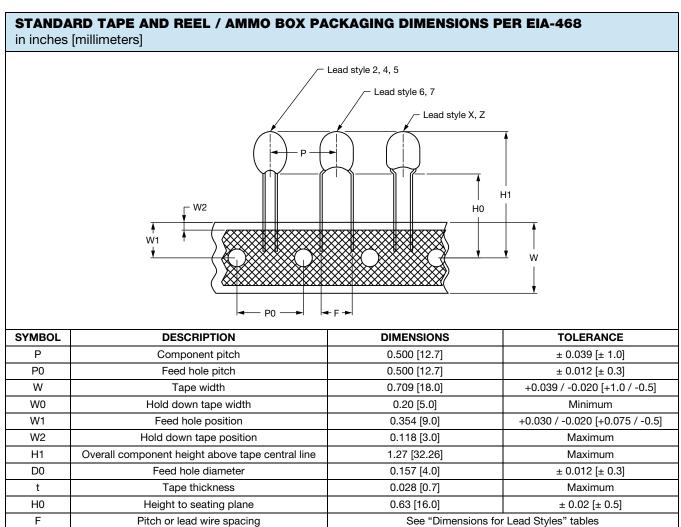
Part number definitions:

<sup>(1)</sup> For capacitance tolerance: X0 =  $\pm$  20 %, X9 =  $\pm$  10 % or X5 = 5 %

<sup>(2)</sup> 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

<sup>(3)</sup> E3 = RoHS-compliant 100 % tin leads. Blank or no suffix = standard tin / lead termination





**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                 | Α    | В    | С    | D    | E  | F  |
|---------------------------|------|------|------|------|----|----|
| Quantity per box bulk     | 10   | 00   | 50   | 00   | 10 | 00 |
| Quantity per box ammopack | 2500 | 2000 | 1500 | 1000 | 50 | 00 |
| Quantity per reel         |      | 10   | 00   |      | 50 | 00 |

| PRODUCT INFORMATION  |                          |  |  |  |  |  |
|--|--------------------------|--|--|--|--|--|
| Mounting of Through Hole Components  | www.vishay.com/doc?40108 |  |  |  |  |  |
| Solid Tantalum Capacitors (With MnO <sub>2</sub> 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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