

## Solid Tantalum Surface Mount Capacitors TANTAMOUNT<sup>®</sup>, Molded Case, Low ESR



Effective September 2005, new capacitor ratings will not be added to the 593D series. All new ratings are available in the TR3 series. The TR3 series offers state-of-the-art low ESR for switch mode power supplies and DC/DC converters.

### PERFORMANCE CHARACTERISTICS

[www.vishay.com/doc?40088](http://www.vishay.com/doc?40088)

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

### FEATURES

- Terminations: 100 % matte tin, standard, tin/lead available
- Compliant terminations
- Molded case available in five case codes
- Compatible with "High Volume" automatic pick and place equipment
- High ripple current carrying capability
- Low ESR
- Meets IEC specification QC300801/US0001 and EIA535BAAC mechanical and performance requirements
- Compliant to RoHS Directive 2002/95/EC
- Moisture sensitivity level 1



### Note

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

**Capacitance Range:** 0.47 µF to 680 µF  
**Capacitance Tolerance:** ± 5 %, ± 10 %, ± 20 %  
**100 % Surge Current Tested (C, D and E Case Sizes)**  
**Voltage Rating:** 4 V<sub>DC</sub> to 50 V<sub>DC</sub>

| ORDERING INFORMATION |   |  |   |                                  |  |
|----------------------|---|--|---|----------------------------------|--|
| 593D                 | 107   | X9   | 010   | D                                | 2WE3   |
| TYPE                 | CAPACITANCE   | CAPACITANCE TOLERANCE                                    | DC VOLTAGE RATING AT + 85 °C  | CASE CODE                        | TERMINATION AND PACKAGING  |
|                      | 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 % (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 V) | See Ratings and Case Codes table | 2TE3: Matte tin, 7" (178 mm) reel<br>2WE3: Matte tin, 13" (330 mm) reel<br>8T: Tin/lead, 7" (178 mm) reel<br>8W: Tin/lead, 13" (330 mm) reel |

### Notes

- We reserve the right to supply higher voltage ratings and tighter capacitance tolerance capacitors in the same case size. Voltage substitutions will be marked with the higher voltage rating. Effective July 15, 2008, part numbers with solderable termination codes 2T and 2W may have either matte or tin/lead terminations. Codes 2TE3 and 2WE3 specify only matte tin terminations. Codes 8T and 8W specify only tin/lead terminations.
- Dry pack is available per request, contact regional marketing.

| DIMENSIONS in inches [millimeters] |          |                               |                               |                               |                                |                               |                       |
|------------------------------------|----------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|-------------------------------|-----------------------|
|                                    |          |                               |                               |                               |                                |                               |                       |
| CASE CODE                          | EIA SIZE | L                             | W                             | H                             | P                              | T <sub>W</sub>                | T <sub>H</sub> (MIN.) |
| A                                  | 3216-18  | 0.126 ± 0.008<br>[3.2 ± 0.20] | 0.063 ± 0.008<br>[1.6 ± 0.20] | 0.063 ± 0.008<br>[1.6 ± 0.20] | 0.031 ± 0.012<br>[0.80 ± 0.30] | 0.047 ± 0.004<br>[1.2 ± 0.10] | 0.028<br>[0.70]       |
| B                                  | 3528-21  | 0.138 ± 0.008<br>[3.5 ± 0.20] | 0.110 ± 0.008<br>[2.8 ± 0.20] | 0.075 ± 0.008<br>[1.9 ± 0.20] | 0.031 ± 0.012<br>[0.80 ± 0.30] | 0.087 ± 0.004<br>[2.2 ± 0.10] | 0.028<br>[0.70]       |
| C                                  | 6032-28  | 0.236 ± 0.012<br>[6.0 ± 0.30] | 0.126 ± 0.012<br>[3.2 ± 0.30] | 0.098 ± 0.012<br>[2.5 ± 0.30] | 0.051 ± 0.012<br>[1.3 ± 0.30]  | 0.087 ± 0.004<br>[2.2 ± 0.10] | 0.039<br>[1.0]        |
| D                                  | 7343-31  | 0.287 ± 0.012<br>[7.3 ± 0.30] | 0.169 ± 0.012<br>[4.3 ± 0.30] | 0.110 ± 0.012<br>[2.8 ± 0.30] | 0.051 ± 0.012<br>[1.3 ± 0.30]  | 0.094 ± 0.004<br>[2.4 ± 0.10] | 0.039<br>[1.0]        |
| E                                  | 7343-43  | 0.287 ± 0.012<br>[7.3 ± 0.30] | 0.169 ± 0.012<br>[4.3 ± 0.30] | 0.157 ± 0.012<br>[4.0 ± 0.30] | 0.051 ± 0.012<br>[1.3 ± 0.30]  | 0.094 ± 0.004<br>[2.4 ± 0.10] | 0.039<br>[1.0]        |

| RATINGS AND CASE CODES |       |       |       |       |      |      |      |      |
|------------------------|-------|-------|-------|-------|------|------|------|------|
| $\mu\text{F}$          | 4 V   | 6.3 V | 10 V  | 16 V  | 20 V | 25 V | 35 V | 50 V |
| 0.47                   |       |       |       |       |      |      | A    |      |
| 0.68                   |       |       |       |       |      |      | A    |      |
| 1.0                    |       |       |       |       | A    | A    | A/B  | B/C  |
| 1.5                    |       |       |       |       |      | A    | B/C  | B/C  |
| 2.2                    |       |       |       |       | A    | A/B  | B/C  | C/D  |
| 3.3                    |       |       |       | A     | A    | B    | C    | C/D  |
| 4.7                    |       |       | A     | A/B   | A/B  | B/C  | C    | D/E  |
| 6.8                    |       |       | A     | A     | B    | C    | C/D  | D/E  |
| 10                     |       | A     | A     | A/B/C | B/C  | C    | C/D  | D/E  |
| 15                     | A     | A     | A/B   | B/C   | B/C  | C/D  | D/E  |      |
| 22                     | A     | A/B   | A/B/C | B/C   | C/D  | D    | D/E  |      |
| 33                     | A/B   | A/B   | B/C   | B/C/D | C/D  | D/E  |      |      |
| 47                     | A/B   | B/C   | B/C/D | C/D   | D/E  | E    |      |      |
| 68                     | B/C   | B/C   | C/D   | D     | D/E  |      |      |      |
| 100                    | B/C   | B/C/D | C/D   | D/E   | E    |      |      |      |
| 150                    | B/C/D | C/D/E | D/E   | E     |      |      |      |      |
| 220                    | C/D   | D/E   | D/E   |       |      |      |      |      |
| 330                    | D     | D/E   | E     |       |      |      |      |      |
| 470                    | D/E   | E     |       |       |      |      |      |      |
| 680                    | E     |       |       |       |      |      |      |      |

| MARKING  |   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
|--|---|--|-----------------------|--|-------|------|-----|---|-----|---|----|---|----|---|----|---|----|---|----|---|----|---|--------------------------------|
| <p><b>A Case</b></p>   | <table border="1"> <thead> <tr> <th colspan="2">"A" CASE VOLTAGE CODE</th> </tr> <tr> <th>VOLTS</th> <th>CODE</th> </tr> </thead> <tbody> <tr><td>4.0</td><td>G</td></tr> <tr><td>6.3</td><td>J</td></tr> <tr><td>10</td><td>A</td></tr> <tr><td>16</td><td>C</td></tr> <tr><td>20</td><td>D</td></tr> <tr><td>25</td><td>E</td></tr> <tr><td>35</td><td>V</td></tr> <tr><td>50</td><td>T</td></tr> </tbody> </table> |  | "A" CASE VOLTAGE CODE |  | VOLTS | CODE | 4.0 | G | 6.3 | J | 10 | A | 16 | C | 20 | D | 25 | E | 35 | V | 50 | T | <p><b>B, C, D, E Cases</b></p> |
|  | "A" CASE VOLTAGE CODE   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
| VOLTS  | CODE  |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
| 4.0  | G   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
| 6.3  | J   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
| 10   | A   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
| 16   | C   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
| 20   | D   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
| 25   | E   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
| 35   | V   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
| 50   | T   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |
| <p><b>Marking</b></p> <p>Capacitor marking includes an anode (+) polarity band, capacitance in microfarads and the voltage rating. "A" Case capacitors use a letter code for the voltage and EIA capacitance code.</p> <p>The Vishay Sprague® trademark is included if space permits. Capacitors rated at 6.3 V are marked 6 V.</p> <p>A manufacturing date code is marked on all capacitors.</p> <p>Capacitors might bear a slightly different marking than the one shown above. For example, rating 22 <math>\mu\text{F}</math> 10 V could be marked either as 22-10L or 22R10.</p> <p>Call the factory for further explanation.</p> |   |  |                       |  |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |                                |



| STANDARD RATINGS   |           |                   |  |  |   |  |
|--|-----------|-------------------|--|--|---|--|
| CAPACITANCE<br>( $\mu$ F)  | CASE CODE | PART NUMBER       | MAX. DC<br>LEAKAGE<br>AT + 25 °C<br>( $\mu$ A) | MAX. DF<br>AT + 25 °C<br>120 Hz<br>(%) | MAX. ESR<br>AT + 25 °C<br>100 kHz<br>( $\Omega$ ) | MAX. RIPPLE<br>100 kHz<br>$I_{RMS}$<br>(A) |
| <b>4 V<sub>DC</sub> AT + 85 °C; 2.7 V<sub>DC</sub> AT + 125 °C</b> |           |                   |  |  |   |  |
| 15   | A         | 593D156(1)004A(2) | 0.6  | 6                                      | 1.500   | 0.22                                       |
| 22   | A         | 593D226(1)004A(2) | 0.9  | 6                                      | 1.500   | 0.22                                       |
| 33   | A         | 593D336(1)004A(2) | 1.3  | 6                                      | 1.500   | 0.22                                       |
| 33   | B         | 593D336(1)004B(2) | 1.3  | 6                                      | 0.500   | 0.41                                       |
| 47   | A         | 593D476(1)004A(2) | 1.9  | 14                                     | 0.800   | 0.31                                       |
| 47   | B         | 593D476(1)004B(2) | 1.9  | 6                                      | 0.500   | 0.41                                       |
| 68   | B         | 593D686(1)004B(2) | 2.7  | 6                                      | 0.500   | 0.41                                       |
| 68   | C         | 593D686(1)004C(2) | 2.7  | 6                                      | 0.275   | 0.63                                       |
| 100  | B         | 593D107(1)004B(2) | 4.0  | 8                                      | 0.450   | 0.43                                       |
| 100  | C         | 593D107(1)004C(2) | 4.0  | 6                                      | 0.225   | 0.66                                       |
| 150  | B         | 593D157(1)004B(2) | 6.0  | 14                                     | 0.500   | 0.41                                       |
| 150  | C         | 593D157(1)004C(2) | 6.0  | 12                                     | 0.250   | 0.66                                       |
| 150  | D         | 593D157(1)004D(2) | 6.0  | 8                                      | 0.150   | 1.00                                       |
| 220  | C         | 593D227(1)004C(2) | 8.8  | 8                                      | 0.200   | 0.74                                       |
| 220  | D         | 593D227(1)004D(2) | 8.8  | 8                                      | 0.150   | 1.00                                       |
| 330  | D         | 593D337(1)004D(2) | 13.2   | 8                                      | 0.150   | 1.00                                       |
| 470  | D         | 593D477(1)004D(2) | 18.8   | 10                                     | 0.125   | 1.10                                       |
| 470  | E         | 593D477(1)004E(2) | 18.8   | 10                                     | 0.100   | 1.28                                       |
| 680  | E         | 593D687(1)004E(2) | 27.2   | 12                                     | 0.100   | 1.28                                       |
| <b>6.3 V<sub>DC</sub> AT + 85 °C; 4 V<sub>DC</sub> AT 125 °C</b>   |           |                   |  |  |   |  |
| 10   | A         | 593D106(1)6R3A(2) | 0.6  | 6                                      | 2.000   | 0.19                                       |
| 15   | A         | 593D156(1)6R3A(2) | 0.9  | 6                                      | 2.000   | 0.19                                       |
| 22   | A         | 593D226(1)6R3A(2) | 1.3  | 6                                      | 2.000   | 0.19                                       |
| 22   | B         | 593D226(1)6R3B(2) | 1.3  | 6                                      | 0.600   | 0.38                                       |
| 33   | A         | 593D336(1)6R3A(2) | 2.0  | 14                                     | 0.800   | 0.31                                       |
| 33   | B         | 593D336(1)6R3B(2) | 2.0  | 6                                      | 0.600   | 0.38                                       |
| 47   | B         | 593D476(1)6R3B(2) | 2.8  | 6                                      | 0.550   | 0.39                                       |
| 47   | C         | 593D476(1)6R3C(2) | 2.8  | 6                                      | 0.300   | 0.61                                       |
| 68   | B         | 593D686(1)6R3B(2) | 4.1  | 6                                      | 0.550   | 0.39                                       |
| 68   | C         | 593D686(1)6R3C(2) | 4.1  | 6                                      | 0.275   | 0.63                                       |
| 100  | B         | 593D107(1)6R3B(2) | 6.0  | 15                                     | 0.500   | 0.41                                       |
| 100  | C         | 593D107(1)6R3C(2) | 6.0  | 6                                      | 0.250   | 0.66                                       |
| 100  | D         | 593D107(1)6R3D(2) | 6.0  | 6                                      | 0.140   | 1.04                                       |
| 150  | C         | 593D157(1)6R3C(2) | 9.0  | 8                                      | 0.200   | 0.74                                       |
| 150  | D         | 593D157(1)6R3D(2) | 9.0  | 8                                      | 0.125   | 1.10                                       |
| 150  | E         | 593D157(1)6R3E(2) | 9.0  | 8                                      | 0.100   | 1.28                                       |
| 220  | D         | 593D227(1)6R3D(2) | 13.2   | 8                                      | 0.100   | 1.22                                       |
| 220  | E         | 593D227(1)6R3E(2) | 13.2   | 8                                      | 0.100   | 1.28                                       |
| 330  | D         | 593D337(1)6R3D(2) | 19.8   | 8                                      | 0.125   | 1.10                                       |
| 330  | E         | 593D337(1)6R3E(2) | 19.8   | 8                                      | 0.100   | 1.28                                       |
| 470  | E         | 593D477(1)6R3E(2) | 28.2   | 10                                     | 0.100   | 1.28                                       |
| <b>10 V<sub>DC</sub> AT + 85 °C; 7 V<sub>DC</sub> AT 125 °C</b>    |           |                   |  |  |   |  |
| 4.7  | A         | 593D475(1)010A(2) | 0.5  | 6                                      | 3.000   | 0.16                                       |
| 6.8  | A         | 593D685(1)010A(2) | 0.7  | 6                                      | 3.000   | 0.16                                       |
| 10   | A         | 593D106(1)010A(2) | 1.0  | 6                                      | 2.000   | 0.19                                       |
| 15   | A         | 593D156(1)010A(2) | 1.5  | 6                                      | 2.000   | 0.19                                       |
| 15   | B         | 593D156(1)010B(2) | 1.5  | 6                                      | 0.700   | 0.35                                       |
| 22   | A         | 593D226(1)010A(2) | 2.2  | 8                                      | 1.500   | 0.22                                       |
| 22   | B         | 593D226(1)010B(2) | 2.2  | 6                                      | 0.700   | 0.35                                       |
| 22   | C         | 593D226(1)010C(2) | 2.2  | 6                                      | 0.345   | 0.56                                       |

**Note**

- Part number definitions:
  - Tolerance: X0, X9, X5
  - Terminations and packaging: 2TE3, 2WE3, 8T, 8W



| STANDARD RATINGS   |           |                   |                                 |                               |                                 |  |
|--|-----------|-------------------|---------------------------------|-------------------------------|---------------------------------|--|
| CAPACITANCE (μF)   | CASE CODE | PART NUMBER       | MAX. DC LEAKAGE AT + 25 °C (μA) | MAX. DF AT + 25 °C 120 Hz (%) | MAX. ESR AT + 25 °C 100 kHz (Ω) | MAX. RIPPLE 100 kHz I <sub>RMS</sub> (A) |
| <b>10 V<sub>DC</sub> AT + 85 °C; 7 V<sub>DC</sub> AT 125 °C</b>    |           |                   |                                 |                               |                                 |  |
| 33   | B         | 593D336(1)010B(2) | 3.3                             | 6                             | 0.600                           | 0.38                                     |
| 33   | C         | 593D336(1)010C(2) | 3.3                             | 6                             | 0.300                           | 0.61                                     |
| 47   | B         | 593D476(1)010B(2) | 4.7                             | 6                             | 0.600                           | 0.38                                     |
| 47   | C         | 593D476(1)010C(2) | 4.7                             | 6                             | 0.300                           | 0.61                                     |
| 47   | D         | 593D476(1)010D(2) | 4.7                             | 6                             | 0.200                           | 0.87                                     |
| 68   | C         | 593D686(1)010C(2) | 6.8                             | 6                             | 0.275                           | 0.63                                     |
| 68   | D         | 593D686(1)010D(2) | 6.8                             | 6                             | 0.150                           | 1.00                                     |
| 100  | C         | 593D107(1)010C(2) | 10.0                            | 8                             | 0.200                           | 0.74                                     |
| 100  | D         | 593D107(1)010D(2) | 10.0                            | 6                             | 0.100                           | 1.22                                     |
| 150  | D         | 593D157(1)010D(2) | 15.0                            | 8                             | 0.100                           | 1.22                                     |
| 150  | E         | 593D157(1)010E(2) | 15.0                            | 8                             | 0.100                           | 1.28                                     |
| 220  | D         | 593D227(1)010D(2) | 22.0                            | 8                             | 0.125                           | 1.10                                     |
| 220  | E         | 593D227(1)010E(2) | 22.0                            | 8                             | 0.100                           | 1.28                                     |
| 330  | E         | 593D337(1)010E(2) | 33.0                            | 10                            | 0.100                           | 1.28                                     |
| <b>16 V<sub>DC</sub> AT + 85 °C; 10 V<sub>DC</sub> AT + 125 °C</b> |           |                   |                                 |                               |                                 |  |
| 3.3  | A         | 593D335(1)016A(2) | 0.5                             | 6                             | 3.500                           | 0.15                                     |
| 4.7  | A         | 593D475(1)016A(2) | 0.8                             | 6                             | 2.500                           | 0.17                                     |
| 4.7  | B         | 593D475(1)016B(2) | 0.8                             | 6                             | 1.500                           | 0.24                                     |
| 6.8  | A         | 593D685(1)016A(2) | 1.1                             | 6                             | 3.000                           | 0.16                                     |
| 10   | A         | 593D106(1)016A(2) | 1.6                             | 6                             | 1.700                           | 0.21                                     |
| 10   | B         | 593D106(1)016B(2) | 1.6                             | 6                             | 0.800                           | 0.33                                     |
| 10   | C         | 593D106(1)016C(2) | 1.6                             | 6                             | 0.450                           | 0.49                                     |
| 15   | B         | 593D156(1)016B(2) | 2.4                             | 6                             | 0.800                           | 0.33                                     |
| 15   | C         | 593D156(1)016C(2) | 2.4                             | 6                             | 0.400                           | 0.52                                     |
| 22   | B         | 593D226(1)016B(2) | 3.5                             | 6                             | 0.700                           | 0.35                                     |
| 22   | C         | 593D226(1)016C(2) | 3.5                             | 6                             | 0.350                           | 0.56                                     |
| 33   | B         | 593D336(1)016B(2) | 5.3                             | 6                             | 0.700                           | 0.35                                     |
| 33   | C         | 593D336(1)016C(2) | 5.3                             | 6                             | 0.300                           | 0.61                                     |
| 33   | D         | 593D336(1)016D(2) | 4.2                             | 4                             | 0.225                           | 0.82                                     |
| 47   | C         | 593D476(1)016C(2) | 7.5                             | 6                             | 0.300                           | 0.61                                     |
| 47   | D         | 593D476(1)016D(2) | 7.5                             | 6                             | 0.150                           | 1.00                                     |
| 68   | D         | 593D686(1)016D(2) | 10.9                            | 6                             | 0.150                           | 1.00                                     |
| 100  | D         | 593D107(1)016D(2) | 16.0                            | 8                             | 0.125                           | 1.10                                     |
| 100  | E         | 593D107(1)016E(2) | 16.0                            | 8                             | 0.100                           | 1.28                                     |
| 150  | E         | 593D157(1)016E(2) | 24.0                            | 8                             | 0.100                           | 1.28                                     |
| <b>20 V<sub>DC</sub> AT + 85 °C; 13 V<sub>DC</sub> AT + 125 °C</b> |           |                   |                                 |                               |                                 |  |
| 1.0  | A         | 593D105(1)020A(2) | 0.5                             | 4                             | 5.500                           | 0.12                                     |
| 2.2  | A         | 593D225(1)020A(2) | 0.5                             | 6                             | 4.000                           | 0.14                                     |
| 3.3  | A         | 593D335(1)020A(2) | 0.7                             | 6                             | 4.000                           | 0.14                                     |
| 4.7  | A         | 593D475(1)020A(2) | 0.9                             | 6                             | 3.500                           | 0.15                                     |
| 4.7  | B         | 593D475(1)020B(2) | 0.9                             | 6                             | 1.000                           | 0.29                                     |
| 6.8  | B         | 593D685(1)020B(2) | 1.4                             | 6                             | 1.000                           | 0.29                                     |
| 10   | B         | 593D106(1)020B(2) | 2.0                             | 6                             | 1.000                           | 0.29                                     |
| 10   | C         | 593D106(1)020C(2) | 2.0                             | 6                             | 0.450                           | 0.49                                     |
| 15   | B         | 593D156(1)020B(2) | 3.0                             | 6                             | 1.000                           | 0.29                                     |
| 15   | C         | 593D156(1)020C(2) | 3.0                             | 6                             | 0.400                           | 0.52                                     |
| 22   | C         | 593D226(1)020C(2) | 4.4                             | 6                             | 0.375                           | 0.54                                     |
| 22   | D         | 593D226(1)020D(2) | 3.5                             | 4                             | 0.225                           | 0.82                                     |
| 33   | C         | 593D336(1)020C(2) | 6.6                             | 6                             | 0.350                           | 0.56                                     |
| 33   | D         | 593D336(1)020D(2) | 6.6                             | 6                             | 0.200                           | 0.87                                     |
| 47   | D         | 593D476(1)020D(2) | 9.4                             | 6                             | 0.200                           | 0.87                                     |
| 47   | E         | 593D476(1)020E(2) | 7.5                             | 4                             | 0.150                           | 1.05                                     |
| 68   | D         | 593D686(1)020D(2) | 13.6                            | 6                             | 0.175                           | 0.93                                     |
| 68   | E         | 593D686(1)020E(2) | 13.6                            | 6                             | 0.150                           | 1.05                                     |
| 100  | E         | 593D107(1)020E(2) | 20.0                            | 8                             | 0.150                           | 1.05                                     |

Note

- Part number definitions:
  - (1) Tolerance: X0, X9, X5
  - (2) Terminations and packaging: 2TE3, 2WE3, 8T, 8W



| STANDARD RATINGS   |           |                   |  |  |   |  |
|--|-----------|-------------------|--|--|---|--|
| CAPACITANCE<br>( $\mu$ F)  | CASE CODE | PART NUMBER       | MAX. DC<br>LEAKAGE<br>AT + 25 °C<br>( $\mu$ A) | MAX. DF<br>AT + 25 °C<br>120 Hz<br>(%) | MAX. ESR<br>AT + 25 °C<br>100 kHz<br>( $\Omega$ ) | MAX. RIPPLE<br>100 kHz<br>$I_{RMS}$<br>(A) |
| <b>25 V<sub>DC</sub> AT + 85 °C; 17 V<sub>DC</sub> AT + 125 °C</b> |           |                   |  |  |   |  |
| 1.0  | A         | 593D105(1)025A(2) | 0.5  | 4                                      | 4.000   | 0.14                                       |
| 1.5  | A         | 593D155(1)025A(2) | 0.5  | 6                                      | 4.000   | 0.14                                       |
| 2.2  | A         | 593D225(1)025A(2) | 0.6  | 6                                      | 4.000   | 0.14                                       |
| 2.2  | B         | 593D225(1)025B(2) | 0.6  | 6                                      | 1.500   | 0.24                                       |
| 3.3  | B         | 593D335(1)025B(2) | 0.8  | 6                                      | 1.500   | 0.24                                       |
| 4.7  | B         | 593D475(1)025B(2) | 1.2  | 6                                      | 1.500   | 0.24                                       |
| 4.7  | C         | 593D475(1)025C(2) | 1.2  | 6                                      | 0.525   | 0.46                                       |
| 6.8  | C         | 593D685(1)025C(2) | 1.7  | 6                                      | 0.500   | 0.47                                       |
| 10   | C         | 593D106(1)025C(2) | 2.5  | 6                                      | 0.450   | 0.49                                       |
| 15   | C         | 593D156(1)025C(2) | 3.8  | 6                                      | 0.425   | 0.51                                       |
| 15   | D         | 593D156(1)025D(2) | 3.8  | 6                                      | 0.250   | 0.77                                       |
| 22   | D         | 593D226(1)025D(2) | 5.5  | 6                                      | 0.200   | 0.87                                       |
| 33   | D         | 593D336(1)025D(2) | 8.3  | 6                                      | 0.200   | 0.87                                       |
| 33   | E         | 593D336(1)025E(2) | 8.3  | 6                                      | 0.200   | 0.91                                       |
| 47   | E         | 593D476(1)025E(2) | 11.8   | 6                                      | 0.200   | 0.91                                       |
| <b>35 V<sub>DC</sub> AT + 85 °C; 23 V<sub>DC</sub> AT + 125 °C</b> |           |                   |  |  |   |  |
| 0.47   | A         | 593D474(1)035A(2) | 0.5  | 4                                      | 4.000   | 0.14                                       |
| 0.68   | A         | 593D684(1)035A(2) | 0.5  | 4                                      | 4.000   | 0.14                                       |
| 1.0  | A         | 593D105(1)035A(2) | 0.5  | 4                                      | 4.000   | 0.14                                       |
| 1.0  | B         | 593D105(1)035B(2) | 0.5  | 4                                      | 2.000   | 0.21                                       |
| 1.5  | B         | 593D155(1)035B(2) | 0.5  | 6                                      | 2.000   | 0.21                                       |
| 1.5  | C         | 593D155(1)035C(2) | 0.5  | 6                                      | 0.900   | 0.35                                       |
| 2.2  | B         | 593D225(1)035B(2) | 0.8  | 6                                      | 2.000   | 0.21                                       |
| 2.2  | C         | 593D225(1)035C(2) | 0.8  | 6                                      | 0.900   | 0.40                                       |
| 3.3  | C         | 593D335(1)035C(2) | 1.2  | 6                                      | 0.700   | 0.45                                       |
| 4.7  | C         | 593D475(1)035C(2) | 1.6  | 6                                      | 0.500   | 0.47                                       |
| 6.8  | C         | 593D685(1)035C(2) | 2.4  | 6                                      | 0.475   | 0.48                                       |
| 6.8  | D         | 593D685(1)035D(2) | 2.4  | 6                                      | 0.300   | 0.71                                       |
| 10   | C         | 593D106(1)035C(2) | 3.5  | 6                                      | 0.450   | 0.49                                       |
| 10   | D         | 593D106(1)035D(2) | 3.5  | 6                                      | 0.300   | 0.71                                       |
| 15   | D         | 593D156(1)035D(2) | 5.3  | 6                                      | 0.300   | 0.71                                       |
| 15   | E         | 593D156(1)035E(2) | 5.3  | 6                                      | 0.300   | 0.74                                       |
| 22   | D         | 593D226(1)035D(2) | 7.7  | 6                                      | 0.300   | 0.71                                       |
| 22   | E         | 593D226(1)035E(2) | 7.7  | 6                                      | 0.275   | 0.77                                       |
| <b>50 V<sub>DC</sub> AT + 85 °C; 33 V<sub>DC</sub> AT + 125 °C</b> |           |                   |  |  |   |  |
| 1.0  | B         | 593D105(1)050B(2) | 0.5  | 4                                      | 2.000   | 0.21                                       |
| 1.0  | C         | 593D105(1)050C(2) | 0.5  | 4                                      | 1.600   | 0.26                                       |
| 1.5  | B         | 593D155(1)050B(2) | 0.8  | 6                                      | 2.000   | 0.21                                       |
| 1.5  | C         | 593D155(1)050C(2) | 0.8  | 6                                      | 1.500   | 0.27                                       |
| 2.2  | C         | 593D225(1)050C(2) | 1.1  | 6                                      | 1.500   | 0.27                                       |
| 2.2  | D         | 593D225(1)050D(2) | 1.1  | 6                                      | 0.800   | 0.43                                       |
| 3.3  | C         | 593D335(1)050C(2) | 1.7  | 6                                      | 1.500   | 0.27                                       |
| 3.3  | D         | 593D335(1)050D(2) | 1.7  | 6                                      | 0.800   | 0.43                                       |
| 4.7  | D         | 593D475(1)050D(2) | 2.4  | 6                                      | 0.600   | 0.50                                       |
| 4.7  | E         | 593D475(1)050E(2) | 1.9  | 6                                      | 0.600   | 0.50                                       |
| 6.8  | D         | 593D685(1)050D(2) | 3.4  | 6                                      | 0.600   | 0.50                                       |
| 6.8  | E         | 593D685(1)050E(2) | 3.4  | 6                                      | 0.550   | 0.55                                       |
| 10   | D         | 593D106(1)050D(2) | 5.0  | 6                                      | 0.550   | 0.52                                       |
| 10   | E         | 593D106(1)050E(2) | 5.0  | 6                                      | 0.550   | 0.55                                       |

**Note**

- Part number definitions:
  - (1) Tolerance: X0, X9, X5
  - (2) Terminations and packaging: 2TE3, 2WE3, 8T, 8W



| <b>RECOMMENDED VOLTAGE DERATING GUIDELINES</b> (for temperatures below + 85 °C) |                   |
|---|-------------------|
| <b>STANDARD CONDITIONS. FOR EXAMPLE: OUTPUT FILTERS</b>                         |                   |
| Capacitor Voltage Rating  | Operating Voltage |
| 4.0   | 2.5               |
| 6.3   | 3.6               |
| 10  | 6.0               |
| 16  | 10                |
| 20  | 12                |
| 25  | 15                |
| 35  | 24                |
| 50  | 28                |
| <b>SEVERE CONDITIONS. FOR EXAMPLE: INPUT FILTERS</b>                            |                   |
| Capacitor Voltage Rating  | Operating Voltage |
| 4.0   | 2.5               |
| 6.3   | 3.3               |
| 10  | 5.0               |
| 16  | 8.0               |
| 20  | 10                |
| 25  | 12                |
| 35  | 15                |
| 50  | 24                |

| <b>POWER DISSIPATION</b> |  |
|--------------------------|--|
| CASE CODE                | MAXIMUM PERMISSIBLE POWER DISSIPATION AT + 25 °C (W) IN FREE AIR |
| A                        | 0.075  |
| B                        | 0.085  |
| C                        | 0.110  |
| D                        | 0.150  |
| E                        | 0.165  |

| <b>STANDARD PACKAGING QUANTITY</b> |                |          |
|------------------------------------|----------------|----------|
| CASE CODE                          | UNITS PER REEL |          |
|                                    | 7" REEL        | 13" REEL |
| A                                  | 2000           | 9000     |
| B                                  | 2000           | 8000     |
| C                                  | 500            | 3000     |
| D                                  | 500            | 2500     |
| E                                  | 400            | 1500     |

| <b>PRODUCT INFORMATION</b>           |  |
|--------------------------------------|--|
| Guide for Molded Tantalum Capacitors | <a href="http://www.vishay.com/doc?40074">www.vishay.com/doc?40074</a> |
| Pad Dimensions                       |  |
| Packaging Dimensions                 |  |
| Moisture Sensitivity                 | <a href="http://www.vishay.com/doc?40135">www.vishay.com/doc?40135</a> |
| <b>SELECTOR GUIDES</b>               |  |
| Solid Tantalum Selector Guide        | <a href="http://www.vishay.com/doc?49053">www.vishay.com/doc?49053</a> |
| Solid Tantalum Chip Capacitors       | <a href="http://www.vishay.com/doc?40091">www.vishay.com/doc?40091</a> |
| <b>FAQ</b>                           |  |
| Frequently Asked Questions           | <a href="http://www.vishay.com/doc?40110">www.vishay.com/doc?40110</a> |



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