

## Solid Tantalum Surface Mount Capacitors

### TANTAMOUNT® Molded Case, Standard Industrial Grade


**FEATURES**

- Terminations: 100 % matte tin, standard, tin/lead available
- Compliant terminations
- Molded case available in six case codes
- Compatible with "High Volume" automatic pick and place equipment
- Optical character recognition qualified
- Meets IEC specification QC300801/US0001 and EIA535BAAC mechanical and performance requirements
- Compliant to RoHS directive 2002/95/EC


**RoHS\***  
COMPLIANT

**PERFORMANCE/ELECTRICAL CHARACTERISTICS**
**Operating Temperature:** - 55 °C to + 125 °C

**Note:** Refer to Doc. 40088

**Capacitance Range:** 0.10 µF to 1000 µF

**Capacitance Tolerance:** ± 5 %, ± 10 %, ± 20 %

**100 % Surge Current Tested (D and E Case Codes)**
**Voltage Rating:** 4 VDC to 63 VDC

**ORDERING INFORMATION**

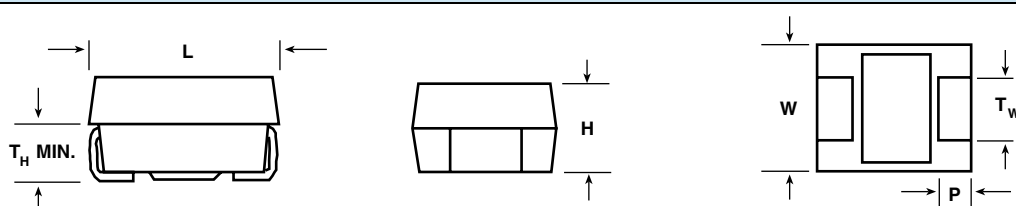
| 293D | 107  | X9                                       | 010  | D                                | 2WE3   |
|------|--|--|--|----------------------------------|--|
| TYPE | CAPACITANCE  | CAPACITANCE TOLERANCE                    | DC VOLTAGE RATING AT + 85 °C   | CASE CODE                        | 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 % | 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 | 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 |

**Note**

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 tin or tin/lead terminations. Codes 2TE3 and 2WE3 specify only matte tin terminations. Codes 8T and 8W specify only tin/lead terminations.

**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] | 0.170 ± 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]  | 0.095 ± 0.004<br>[2.4 ± 0.10] | 0.039<br>[1.0]      |
| E         | 7343-43  | 0.287 ± 0.012<br>[7.3 ± 0.30] | 0.170 ± 0.012<br>[4.3 ± 0.30] | 0.158 ± 0.012<br>[4.0 ± 0.30] | 0.051 ± 0.012<br>[1.3 ± 0.30]  | 0.095 ± 0.004<br>[2.4 ± 0.10] | 0.039<br>[1.0]      |
| V         | 7343-20  | 0.287 ± 0.012<br>[7.3 ± 0.30] | 0.170 ± 0.012<br>[4.3 ± 0.30] | 0.079 max.<br>[2.0 max.]      | 0.051 ± 0.012<br>[1.3 ± 0.30]  | 0.095 ± 0.004<br>[2.4 ± 0.10] | 0.039<br>[1.0]      |

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

| RATINGS AND CASE CODES |         |         |         |       |       |         |       |       |      |
|------------------------|---------|---------|---------|-------|-------|---------|-------|-------|------|
| μF                     | 4 V     | 6.3 V   | 10 V    | 16 V  | 20 V  | 25 V    | 35 V  | 50 V  | 63 V |
| 0.10                   |         |         |         |       |       |         | A     | A     |      |
| 0.15                   |         |         |         |       |       |         | A     | A/B   |      |
| 0.22                   |         |         |         |       |       |         | A     | A/B   |      |
| 0.33                   |         |         |         |       |       |         | A     | A/B   |      |
| 0.47                   |         |         |         |       |       | A       | A/B   | A/B/C |      |
| 0.68                   |         |         |         |       | A     | A       | A/B   | B/C   |      |
| 1.0                    |         |         |         | A     | A     | A/B     | A/B   | B/C   |      |
| 1.5                    |         |         | A       | A     | A     | A/B     | B/C   | B/C   |      |
| 2.2                    |         | A       | A       | A/B   | A/B   | A/B     | B/C   | C/D   |      |
| 3.3                    | A       | A       | A       | A/B   | A/B   | A/B/C   | B/C   | C/D   |      |
| 4.7                    | A       | A/B     | A/B     | A/B   | A/B/C | A/B/C/D | B/C/D | D     | D    |
| 6.8                    | A       | A/B     | A/B     | A/B/C | A/B/C | B/C     | C/D   | D/E   |      |
| 10                     | A/B     | A/B/C   | A/B/C   | A/B/C | B/C   | B/C/D   | C/D   | D/E   | E    |
| 15                     | A/B     | A/B/C   | A/B/C   | B/C   | B/C/D | B/C/D   | D/E   | E     |      |
| 22                     | A/B/C   | A/B/C   | A/B/C   | B/C/D | B/C/D | C/D/V   | D/E   |       |      |
| 33                     | A/B/C   | A/B/C   | B/C/D   | B/C/D | C/D   | D/E     |       |       |      |
| 47                     | A/B/C   | A/B/C/D | B/C/D   | C/D   | D/E   | D/E     |       |       |      |
| 68                     | B/C/D   | B/C/D   | B/C/D/V | D     | D/E   |         |       |       |      |
| 100                    | A/B/C/D | B/C/D/V | B/C/D/V | D/E   | D/E   |         |       |       |      |
| 150                    | B/C/D   | C/D/E   | D/E     | D/E   |       |         |       |       |      |
| 220                    | B/C/D/E | C/D/E   | D/E     | E     |       |         |       |       |      |
| 330                    | D/E     | D/E     | D/E     |       |       |         |       |       |      |
| 470                    | D/E     | D/E     | E       |       |       |         |       |       |      |
| 680                    | E       | E       |         |       |       |         |       |       |      |
| 1000                   | E       |         |         |       |       |         |       |       |      |

**Note**

- Preliminary values, contact factory for availability.

| MARKING  |  |      |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |   |
|--|--|------|-------|------|-----|---|-----|---|----|---|----|---|----|---|----|---|----|---|----|---|---|
| <p>Capacitance Code, pF</p> <p>Indicates Lead (Pb)-free</p> <p>Vishay Sprague Logo</p> <p>Polarity Band (+)</p> <p>Voltage Code</p> <p>104L</p> <p>“A” Case Size</p> | <p>“A” CASE VOLTAGE CODE</p> <table border="1"> <thead> <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> |      | VOLTS | CODE | 4.0 | G | 6.3 | J | 10 | A | 16 | C | 20 | D | 25 | E | 35 | V | 50 | T | <p>Capacitance μF</p> <p>Voltage</p> <p>Indicates Lead (Pb)-free</p> <p>Polarity Band (+)</p> <p>22</p> <p>10L</p> <p>XX</p> <p>②</p> <p>Date Code</p> <p>Vishay Sprague Logo</p> <p>“B, C, D, E, V” Case Sizes</p> |
|  | VOLTS  | CODE |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |   |
|  | 4.0  | G    |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |   |
|  | 6.3  | J    |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |   |
|  | 10   | A    |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |   |
|  | 16   | C    |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |   |
|  | 20   | D    |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |   |
|  | 25   | E    |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |   |
| 35   | V  |      |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |   |
| 50   | T  |      |       |      |     |   |     |   |    |   |    |   |    |   |    |   |    |   |    |   |   |

**Marking**

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.

The Vishay Sprague® trademark is included if space permits. Capacitors rated at 6.3 V are marked 6 V.

A manufacturing date code is marked on all capacitors.

Capacitors might bear a slightly different marking than the one shown above. For example, rating 22 μF 10 V could be marked either as 22-10L or 22R10.

Call the factory for further explanation.



Solid Tantalum Surface Mount Capacitors  
TANTAMOUNT® Molded Case, Standard Industrial Grade

Vishay Sprague

| RATINGS AND PART NUMBER REFERENCE            |           |                   |  |  |   |  |
|--|-----------|-------------------|--|--|---|--|
| 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 VDC AT + 85 °C, 2.7 VDC AT + 125 °C</b> |           |                   |  |  |   |  |
| 3.3  | A         | 293D335(1)004A(2) | 0.5  | 6                                      | 7.6   | 0.10                                       |
| 4.7  | A         | 293D475(1)004A(2) | 0.5  | 6                                      | 6.3   | 0.11                                       |
| 6.8  | A         | 293D685(1)004A(2) | 0.5  | 6                                      | 5.5   | 0.12                                       |
| 10   | A         | 293D106(1)004A(2) | 0.5  | 6                                      | 5.1   | 0.12                                       |
| 10   | B         | 293D106(1)004B(2) | 0.5  | 6                                      | 3.5   | 0.16                                       |
| 15   | A         | 293D156(1)004A(2) | 0.6  | 6                                      | 3.4   | 0.15                                       |
| 15   | B         | 293D156(1)004B(2) | 0.6  | 6                                      | 2.9   | 0.17                                       |
| 22   | A         | 293D226(1)004A(2) | 0.9  | 6                                      | 2.9   | 0.16                                       |
| 22   | B         | 293D226(1)004B(2) | 0.9  | 6                                      | 2.5   | 0.18                                       |
| 22   | C         | 293D226(1)004C(2) | 0.9  | 6                                      | 1.8   | 0.25                                       |
| 33   | A         | 293D336(1)004A(2) | 1.3  | 6                                      | 2.9   | 0.16                                       |
| 33   | B         | 293D336(1)004B(2) | 1.3  | 6                                      | 2.0   | 0.21                                       |
| 33   | C         | 293D336(1)004C(2) | 1.3  | 6                                      | 1.8   | 0.25                                       |
| 47   | A         | 293D476(1)004A(2) | 1.9  | 14                                     | 2.5   | 0.17                                       |
| 47   | B         | 293D476(1)004B(2) | 1.9  | 6                                      | 1.9   | 0.21                                       |
| 47   | C         | 293D476(1)004C(2) | 1.9  | 6                                      | 1.8   | 0.25                                       |
| 68   | B         | 293D686(1)004B(2) | 2.7  | 6                                      | 1.9   | 0.21                                       |
| 68   | C         | 293D686(1)004C(2) | 2.7  | 6                                      | 1.4   | 0.28                                       |
| 68   | D         | 293D686(1)004D(2) | 2.7  | 6                                      | 0.8   | 0.43                                       |
| 100  | A         | 293D107(1)004A(2) | 10.0   | 30                                     | 2.5   | 0.22                                       |
| 100  | B         | 293D107(1)004B(2) | 4.0  | 8                                      | 1.8   | 0.22                                       |
| 100  | C         | 293D107(1)004C(2) | 4.0  | 6                                      | 0.8   | 0.37                                       |
| 100  | D         | 293D107(1)004D(2) | 4.0  | 6                                      | 0.7   | 0.46                                       |
| 150  | B         | 293D157(1)004B(2) | 6.0  | 14                                     | 1.6   | 0.23                                       |
| 150  | C         | 293D157(1)004C(2) | 6.0  | 12                                     | 0.7   | 0.40                                       |
| 150  | D         | 293D157(1)004D(2) | 6.0  | 8                                      | 0.6   | 0.50                                       |
| 220  | B         | 293D227X0004B(2)  | 8.8  | 18                                     | 1.5   | 0.24                                       |
| 220  | C         | 293D227(1)004C(2) | 8.8  | 8                                      | 0.7   | 0.40                                       |
| 220  | D         | 293D227(1)004D(2) | 8.8  | 8                                      | 0.6   | 0.50                                       |
| 220  | E         | 293D227(1)004E(2) | 8.8  | 8                                      | 0.5   | 0.57                                       |
| 330  | D         | 293D337(1)004D(2) | 13.2   | 8                                      | 0.6   | 0.50                                       |
| 330  | E         | 293D337(1)004E(2) | 13.2   | 8                                      | 0.5   | 0.57                                       |
| 470  | D         | 293D477(1)004D(2) | 18.8   | 10                                     | 0.6   | 0.50                                       |
| 470  | E         | 293D477(1)004E(2) | 18.8   | 10                                     | 0.5   | 0.57                                       |
| 680  | E         | 293D687(1)004E(2) | 27.2   | 12                                     | 0.5   | 0.57                                       |
| 1000   | E         | 293D108X0004E(2)  | 40.0   | 20                                     | 0.5   | 0.57                                       |
| <b>6.3 VDC AT + 85 °C, 4 VDC AT + 125 °C</b> |           |                   |  |  |   |  |
| 2.2  | A         | 293D225(1)6R3A(2) | 0.5  | 6                                      | 7.6   | 0.10                                       |
| 3.3  | A         | 293D335(1)6R3A(2) | 0.5  | 6                                      | 6.3   | 0.11                                       |
| 4.7  | A         | 293D475(1)6R3A(2) | 0.5  | 6                                      | 5.5   | 0.12                                       |
| 6.8  | A         | 293D685(1)6R3A(2) | 0.5  | 6                                      | 5.0   | 0.12                                       |
| 6.8  | B         | 293D685(1)6R3B(2) | 0.5  | 6                                      | 3.4   | 0.16                                       |
| 10   | A         | 293D106(1)6R3A(2) | 0.6  | 6                                      | 3.4   | 0.15                                       |
| 10   | B         | 293D106(1)6R3B(2) | 0.6  | 6                                      | 2.9   | 0.17                                       |
| 15   | A         | 293D156(1)6R3A(2) | 0.9  | 6                                      | 2.9   | 0.16                                       |
| 15   | B         | 293D156(1)6R3B(2) | 0.9  | 6                                      | 2.5   | 0.18                                       |
| 15   | C         | 293D156(1)6R3C(2) | 0.9  | 6                                      | 1.8   | 0.25                                       |
| 22   | A         | 293D226(1)6R3A(2) | 1.3  | 6                                      | 2.9   | 0.16                                       |
| 22   | B         | 293D226(1)6R3B(2) | 1.3  | 6                                      | 2.0   | 0.21                                       |
| 22   | C         | 293D226(1)6R3C(2) | 1.3  | 6                                      | 1.8   | 0.25                                       |
| 33   | A         | 293D336(1)6R3A(2) | 2.0  | 14                                     | 2.5   | 0.17                                       |
| 33   | B         | 293D336(1)6R3B(2) | 2.0  | 6                                      | 1.9   | 0.21                                       |
| 33   | C         | 293D336(1)6R3C(2) | 2.0  | 6                                      | 1.5   | 0.27                                       |
| 47   | A         | 293D476(1)6R3A(2) | 2.8  | 12                                     | 1.6   | 0.22                                       |
| 47   | B         | 293D476(1)6R3B(2) | 2.8  | 6                                      | 1.9   | 0.21                                       |
| 47   | C         | 293D476(1)6R3C(2) | 2.8  | 6                                      | 1.4   | 0.28                                       |

**Notes**

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



| RATINGS AND PART NUMBER REFERENCE            |           |                   |  |  |   |  |
|--|-----------|-------------------|--|--|---|--|
| 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>6.3 VDC AT + 85 °C, 4 VDC AT + 125 °C</b> |           |                   |  |  |   |  |
| 47   | D         | 293D476(1)6R3D(2) | 2.8  | 6                                      | 0.8   | 0.43                                       |
| 68   | B         | 293D686(1)6R3B(2) | 4.1  | 6                                      | 1.8   | 0.22                                       |
| 68   | C         | 293D686(1)6R3C(2) | 4.1  | 6                                      | 0.8   | 0.37                                       |
| 68   | D         | 293D686(1)6R3D(2) | 4.1  | 6                                      | 0.7   | 0.46                                       |
| 100  | B         | 293D107(1)6R3B(2) | 6.0  | 15                                     | 1.7   | 0.22                                       |
| 100  | C         | 293D107(1)6R3C(2) | 6.0  | 6                                      | 0.8   | 0.37                                       |
| 100  | D         | 293D107(1)6R3D(2) | 6.0  | 6                                      | 0.7   | 0.46                                       |
| 100  | V         | 293D107(1)6R3V(2) | 6.0  | 8                                      | 0.7   | 0.42                                       |
| 150  | C         | 293D157(1)6R3C(2) | 9.0  | 8                                      | 0.7   | 0.40                                       |
| 150  | D         | 293D157(1)6R3D(2) | 9.0  | 8                                      | 0.6   | 0.50                                       |
| 150  | E         | 293D157(1)6R3E(2) | 9.0  | 8                                      | 0.5   | 0.57                                       |
| 220  | C         | 293D227(1)6R3C(2) | 13.9   | 14                                     | 0.7   | 0.39                                       |
| 220  | D         | 293D227(1)6R3D(2) | 13.2   | 8                                      | 0.6   | 0.50                                       |
| 220  | E         | 293D227(1)6R3E(2) | 13.2   | 8                                      | 0.5   | 0.57                                       |
| 330  | D         | 293D337(1)6R3D(2) | 19.8   | 8                                      | 0.6   | 0.50                                       |
| 330  | E         | 293D337(1)6R3E(2) | 19.8   | 8                                      | 0.5   | 0.57                                       |
| 470  | D         | 293D477(1)6R3D(2) | 28.2   | 14                                     | 0.5   | 0.55                                       |
| 470  | E         | 293E477(1)6R3E(2) | 28.2   | 10                                     | 1.5   | 0.57                                       |
| 680  | E         | 293D687X06R3E(2)  | 42.8   | 20                                     | 0.5   | 0.57                                       |
| <b>10 VDC AT + 85 °C, 7 VDC AT + 125 °C</b>  |           |                   |  |  |   |  |
| 1.5  | A         | 293D155(1)010A(2) | 0.5  | 6                                      | 8.0   | 0.10                                       |
| 2.2  | A         | 293D225(1)010A(2) | 0.5  | 6                                      | 6.3   | 0.11                                       |
| 3.3  | A         | 293D335(1)010A(2) | 0.5  | 6                                      | 5.5   | 0.12                                       |
| 4.7  | A         | 293D475(1)010A(2) | 0.5  | 6                                      | 5.0   | 0.12                                       |
| 4.7  | B         | 293D475(1)010B(2) | 0.5  | 6                                      | 3.4   | 0.16                                       |
| 6.8  | A         | 293D685(1)010A(2) | 0.7  | 6                                      | 4.2   | 0.13                                       |
| 6.8  | B         | 293D685(1)010B(2) | 0.7  | 6                                      | 2.9   | 0.17                                       |
| 10   | A         | 293D106(1)010A(2) | 1.0  | 6                                      | 3.4   | 0.15                                       |
| 10   | B         | 293D106(1)010B(2) | 1.0  | 6                                      | 2.5   | 0.18                                       |
| 10   | C         | 293D106(1)010C(2) | 1.0  | 6                                      | 1.8   | 0.25                                       |
| 15   | A         | 293D156(1)010A(2) | 1.5  | 6                                      | 2.9   | 0.16                                       |
| 15   | B         | 293D156(1)010B(2) | 1.5  | 6                                      | 2.0   | 0.21                                       |
| 15   | C         | 293D156(1)010C(2) | 1.5  | 6                                      | 1.8   | 0.25                                       |
| 22   | A         | 293D226(1)010A(2) | 2.2  | 8                                      | 2.5   | 0.17                                       |
| 22   | B         | 293D226(1)010B(2) | 2.2  | 6                                      | 1.9   | 0.21                                       |
| 22   | C         | 293D226(1)010C(2) | 2.2  | 6                                      | 1.5   | 0.27                                       |
| 33   | B         | 293D336(1)010B(2) | 3.3  | 6                                      | 1.9   | 0.21                                       |
| 33   | C         | 293D336(1)010C(2) | 3.3  | 6                                      | 1.4   | 0.28                                       |
| 33   | D         | 293D336(1)010D(2) | 3.3  | 6                                      | 0.8   | 0.43                                       |
| 47   | B         | 293D476(1)010B(2) | 4.7  | 6                                      | 1.8   | 0.22                                       |
| 47   | C         | 293D476(1)010C(2) | 4.7  | 6                                      | 1.1   | 0.32                                       |
| 47   | D         | 293D476(1)010D(2) | 4.7  | 6                                      | 0.7   | 0.46                                       |
| 68   | B         | 293D686(1)010B(2) | 6.8  | 14                                     | 1.8   | 0.22                                       |
| 68   | C         | 293D686(1)010C(2) | 6.8  | 6                                      | 1.0   | 0.33                                       |
| 68   | D         | 293D686(1)010D(2) | 6.8  | 6                                      | 0.7   | 0.46                                       |
| 68   | V         | 293D686(1)010V(2) | 6.8  | 6                                      | 0.7   | 0.42                                       |

**Notes**

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



Solid Tantalum Surface Mount Capacitors  
TANTAMOUNT® Molded Case, Standard Industrial Grade

Vishay Sprague

| RATINGS AND PART NUMBER REFERENCE            |           |                   |                                 |                               |                                 |  |
|--|-----------|-------------------|---------------------------------|-------------------------------|---------------------------------|--|
| 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 VDC AT + 85 °C, 7 VDC AT + 125 °C</b>  |           |                   |                                 |                               |                                 |  |
| 100  | B         | 293D107X0010B(2)  | 10                              | 25                            | 2.5                             | 0.18                                     |
| 100  | C         | 293D107(1)010C(2) | 10                              | 8                             | 0.9                             | 0.35                                     |
| 100  | D         | 293D107(1)010D(2) | 10                              | 8                             | 0.6                             | 0.50                                     |
| 100  | V         | 293D107(1)010V(2) | 10                              | 8                             | 0.7                             | 0.42                                     |
| 150  | D         | 293D157(1)010D(2) | 15                              | 8                             | 0.6                             | 0.50                                     |
| 150  | E         | 293D157(1)010E(2) | 15                              | 8                             | 0.5                             | 0.57                                     |
| 220  | D         | 293D227(1)010D(2) | 22                              | 8                             | 0.6                             | 0.50                                     |
| 220  | E         | 293D227(1)010E(2) | 22                              | 8                             | 0.5                             | 0.57                                     |
| 330  | D         | 293D337X0010D(2)  | 33                              | 15                            | 0.5                             | 0.57                                     |
| 330  | E         | 293D337(1)010E(2) | 33                              | 10                            | 0.5                             | 0.57                                     |
| 470  | E         | 293D477X0010E(2)  | 47                              | 15                            | 0.5                             | 0.57                                     |
| <b>16 VDC AT + 85 °C, 10 VDC AT + 125 °C</b> |           |                   |                                 |                               |                                 |  |
| 1.0  | A         | 293D105(1)016A(2) | 0.5                             | 4                             | 9.3                             | 0.09                                     |
| 1.5  | A         | 293D155(1)016A(2) | 0.5                             | 6                             | 6.7                             | 0.11                                     |
| 2.2  | A         | 293D225(1)016A(2) | 0.5                             | 6                             | 5.9                             | 0.11                                     |
| 2.2  | B         | 293D225(1)016B(2) | 0.5                             | 6                             | 4.6                             | 0.14                                     |
| 3.3  | A         | 293D335(1)016A(2) | 0.5                             | 6                             | 5.0                             | 0.12                                     |
| 3.3  | B         | 293D335(1)016B(2) | 0.5                             | 6                             | 3.5                             | 0.16                                     |
| 4.7  | A         | 293D475(1)016A(2) | 0.8                             | 6                             | 5.0                             | 0.12                                     |
| 4.7  | B         | 293D475(1)016B(2) | 0.8                             | 6                             | 2.9                             | 0.17                                     |
| 6.8  | A         | 293D685(1)016A(2) | 1.1                             | 6                             | 4.2                             | 0.13                                     |
| 6.8  | B         | 293D685(1)016B(2) | 1.1                             | 6                             | 2.5                             | 0.18                                     |
| 6.8  | C         | 293D685(1)016C(2) | 1.1                             | 6                             | 1.9                             | 0.24                                     |
| 10   | A         | 293D106(1)016A(2) | 1.6                             | 6                             | 3.0                             | 0.16                                     |
| 10   | B         | 293D106(1)016B(2) | 1.6                             | 6                             | 2.0                             | 0.21                                     |
| 10   | C         | 293D106(1)016C(2) | 1.6                             | 6                             | 1.8                             | 0.25                                     |
| 15   | B         | 293D156(1)016B(2) | 2.4                             | 6                             | 2.0                             | 0.21                                     |
| 15   | C         | 293D156(1)016C(2) | 2.4                             | 6                             | 1.5                             | 0.27                                     |
| 22   | B         | 293D226X0016B(2)  | 3.5                             | 6                             | 1.9                             | 0.21                                     |
| 22   | C         | 293D226(1)016C(2) | 3.5                             | 6                             | 1.4                             | 0.28                                     |
| 22   | D         | 293D226(1)016D(2) | 3.5                             | 6                             | 0.8                             | 0.43                                     |
| 33   | B         | 293D336(1)016B(2) | 5.3                             | 6                             | 1.8                             | 0.22                                     |
| 33   | C         | 293D336(1)016C(2) | 5.3                             | 6                             | 1.1                             | 0.32                                     |
| 33   | D         | 293D336(1)016D(2) | 5.3                             | 6                             | 0.7                             | 0.46                                     |
| 47   | C         | 293D476(1)016C(2) | 7.5                             | 6                             | 1.0                             | 0.33                                     |
| 47   | D         | 293D476(1)016D(2) | 7.5                             | 6                             | 0.7                             | 0.46                                     |
| 68   | D         | 293D686(1)016D(2) | 10.9                            | 6                             | 0.6                             | 0.50                                     |
| 100  | D         | 293D107(1)016D(2) | 16                              | 8                             | 0.6                             | 0.50                                     |
| 100  | E         | 293D107(1)016E(2) | 16                              | 8                             | 0.6                             | 0.52                                     |
| 150  | D         | 293D157(1)016D(2) | 24                              | 8                             | 0.6                             | 0.50                                     |
| 150  | E         | 293D157(1)016E(2) | 24                              | 8                             | 0.5                             | 0.57                                     |
| 220  | E         | 293D227(1)016E(2) | 35.2                            | 14                            | 0.5                             | 0.57                                     |
| <b>20 VDC AT + 85 °C, 13 VDC AT + 125 °C</b> |           |                   |                                 |                               |                                 |  |
| 0.68   | A         | 293D684(1)020A(2) | 0.5                             | 4                             | 10.0                            | 0.09                                     |
| 1.0  | A         | 293D105(1)020A(2) | 0.5                             | 4                             | 8.4                             | 0.09                                     |
| 1.5  | A         | 293D155(1)020A(2) | 0.5                             | 6                             | 6.3                             | 0.11                                     |
| 2.2  | A         | 293D225(1)020A(2) | 0.5                             | 6                             | 5.9                             | 0.11                                     |
| 2.2  | B         | 293D225(1)020B(2) | 0.5                             | 6                             | 3.5                             | 0.16                                     |
| 3.3  | A         | 293D335(1)020A(2) | 0.7                             | 6                             | 5.9                             | 0.11                                     |
| 3.3  | B         | 293D335(1)020B(2) | 0.7                             | 6                             | 3.0                             | 0.17                                     |
| 4.7  | A         | 293D475(1)020A(2) | 0.9                             | 6                             | 5.0                             | 0.12                                     |
| 4.7  | B         | 293D475(1)020B(2) | 0.9                             | 6                             | 2.9                             | 0.17                                     |
| 4.7  | C         | 293D475(1)020C(2) | 0.9                             | 6                             | 2.3                             | 0.22                                     |

**Notes**

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



| RATINGS AND PART NUMBER REFERENCE            |           |                   |   |  |   |   |
|--|-----------|-------------------|---|--|---|---|
| CAPACITANCE<br>( $\mu\text{F}$ )             | CASE CODE | PART NUMBER       | MAX. DC<br>LEAKAGE<br>AT + 25 °C<br>( $\mu\text{A}$ ) | 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>$I_{\text{rms}}$<br>(A) |
| <b>20 VDC AT + 85 °C, 13 VDC AT + 125 °C</b> |           |                   |   |  |   |   |
| 6.8  | A         | 293D685(1)020A(2) | 1.4   | 6                                      | 4.5   | 0.13  |
| 6.8  | B         | 293D685(1)020B(2) | 1.4   | 6                                      | 2.5   | 0.18  |
| 6.8  | C         | 293D685(1)020C(2) | 1.4   | 6                                      | 1.9   | 0.24  |
| 10   | B         | 293D106(1)020B(2) | 2.0   | 6                                      | 2.1   | 0.20  |
| 10   | C         | 293D106(1)020C(2) | 2.0   | 6                                      | 1.7   | 0.25  |
| 15   | B         | 293D156(1)020B(2) | 3.0   | 6                                      | 2.3   | 0.19  |
| 15   | C         | 293D156(1)020C(2) | 3.0   | 6                                      | 1.5   | 0.27  |
| 15   | D         | 293D156(1)020D(2) | 3.0   | 6                                      | 0.9   | 0.41  |
| 22   | B         | 293D226(1)020B(2) | 4.4   | 6                                      | 2.1   | 0.20  |
| 22   | C         | 293D226(1)020C(2) | 4.4   | 6                                      | 1.1   | 0.32  |
| 22   | D         | 293D226(1)020D(2) | 4.4   | 6                                      | 0.7   | 0.46  |
| 33   | C         | 293D336(1)020C(2) | 6.6   | 6                                      | 1.0   | 0.33  |
| 33   | D         | 293D336(1)020D(2) | 6.6   | 6                                      | 0.7   | 0.46  |
| 47   | D         | 293D476(1)020D(2) | 9.4   | 6                                      | 0.7   | 0.46  |
| 47   | E         | 293D476(1)020E(2) | 9.4   | 6                                      | 0.6   | 0.52  |
| 68   | D         | 293D686(1)020D(2) | 13.6  | 6                                      | 0.7   | 0.46  |
| 68   | E         | 293D686(1)020E(2) | 13.6  | 6                                      | 0.6   | 0.52  |
| 100  | D         | 293D107(1)020D(2) | 20.0  | 8                                      | 0.6   | 0.50  |
| 100  | E         | 293D107(1)020E(2) | 20.0  | 8                                      | 0.5   | 0.57  |
| <b>25 VDC AT + 85 °C, 17 VDC AT + 125 °C</b> |           |                   |   |  |   |   |
| 0.47   | A         | 293D474(1)025A(2) | 0.5   | 4                                      | 12.0  | 0.08  |
| 0.68   | A         | 293D684(1)025A(2) | 0.5   | 4                                      | 8.4   | 0.09  |
| 1.0  | A         | 293D105(1)025A(2) | 0.5   | 4                                      | 7.6   | 0.10  |
| 1.0  | B         | 293D105(1)025B(2) | 0.5   | 4                                      | 5.0   | 0.13  |
| 1.5  | A         | 293D155(1)025A(2) | 0.5   | 6                                      | 6.7   | 0.11  |
| 1.5  | B         | 293D155(1)025B(2) | 0.5   | 6                                      | 4.6   | 0.14  |
| 2.2  | A         | 293D225(1)025A(2) | 0.6   | 6                                      | 6.3   | 0.11  |
| 2.2  | B         | 293D225(1)025B(2) | 0.6   | 6                                      | 3.8   | 0.15  |
| 3.3  | A         | 293D335(1)025A(2) | 0.8   | 6                                      | 4.0   | 0.14  |
| 3.3  | B         | 293D335(1)025B(2) | 0.8   | 6                                      | 3.1   | 0.17  |
| 3.3  | C         | 293D335(1)025C(2) | 0.8   | 6                                      | 2.3   | 0.22  |
| 4.7  | A         | 293D475(1)025A(2) | 1.2   | 6                                      | 5.5   | 0.12  |
| 4.7  | B         | 293D475(1)025B(2) | 1.2   | 6                                      | 2.8   | 0.17  |
| 4.7  | C         | 293D475(1)025C(2) | 1.2   | 6                                      | 2.0   | 0.24  |
| 4.7  | D         | 293D475(1)025D(2) | 1.2   | 6                                      | 1.3   | 0.34  |
| 6.8  | B         | 293D685(1)025B(2) | 1.7   | 6                                      | 2.4   | 0.19  |
| 6.8  | C         | 293D685(1)025C(2) | 1.7   | 6                                      | 1.7   | 0.25  |
| 10   | B         | 293D106(1)025B(2) | 2.5   | 6                                      | 2.3   | 0.19  |
| 10   | C         | 293D106(1)025C(2) | 2.5   | 6                                      | 1.5   | 0.27  |
| 10   | D         | 293D106(1)025D(2) | 2.5   | 6                                      | 1.0   | 0.39  |
| 15   | B         | 293D156(1)025B(2) | 3.8   | 6                                      | 2.2   | 0.20  |
| 15   | C         | 293D156(1)025C(2) | 3.8   | 6                                      | 1.2   | 0.30  |
| 15   | D         | 293D156(1)025D(2) | 3.8   | 6                                      | 0.8   | 0.43  |
| 22   | C         | 293D226(1)025C(2) | 5.5   | 6                                      | 1.2   | 0.30  |
| 22   | D         | 293D226(1)025D(2) | 5.5   | 6                                      | 0.7   | 0.46  |
| 22   | V         | 293D226(1)025V(2) | 5.5   | 6                                      | 0.7   | 0.42  |
| 33   | D         | 293D336(1)025D(2) | 8.3   | 6                                      | 0.7   | 0.46  |
| 33   | E         | 293D336(1)025E(2) | 8.3   | 6                                      | 0.6   | 0.52  |
| 47   | D         | 293D476(1)025D(2) | 11.8  | 8                                      | 0.7   | 0.46  |
| 47   | E         | 293D476(1)025E(2) | 11.8  | 6                                      | 0.6   | 0.52  |

**Notes**

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



Solid Tantalum Surface Mount Capacitors  
TANTAMOUNT® Molded Case, Standard Industrial Grade

Vishay Sprague

| RATINGS AND PART NUMBER REFERENCE            |           |                   |  |  |   |  |
|--|-----------|-------------------|--|--|---|--|
| 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>35 VDC AT + 85 °C, 23 VDC AT + 125 °C</b> |           |                   |  |  |   |  |
| 0.10   | A         | 293D104(1)035A(2) | 0.5  | 4                                      | 20.0  | 0.06                                       |
| 0.15   | A         | 293D154(1)035A(2) | 0.5  | 4                                      | 18.0  | 0.07                                       |
| 0.22   | A         | 293D224(1)035A(2) | 0.5  | 4                                      | 15.0  | 0.07                                       |
| 0.33   | A         | 293D334(1)035A(2) | 0.5  | 4                                      | 13.0  | 0.08                                       |
| 0.47   | A         | 293D474(1)035A(2) | 0.5  | 4                                      | 10.0  | 0.09                                       |
| 0.47   | B         | 293D474(1)035B(2) | 0.5  | 4                                      | 8.0   | 0.10                                       |
| 0.68   | A         | 293D684(1)035A(2) | 0.5  | 4                                      | 7.6   | 0.10                                       |
| 0.68   | B         | 293D684(1)035B(2) | 0.5  | 4                                      | 6.5   | 0.11                                       |
| 1.0  | A         | 293D105(1)035A(2) | 0.5  | 4                                      | 7.5   | 0.10                                       |
| 1.0  | B         | 293D105(1)035B(2) | 0.5  | 4                                      | 5.0   | 0.13                                       |
| 1.5  | B         | 293D155(1)035B(2) | 0.5  | 6                                      | 4.2   | 0.14                                       |
| 1.5  | C         | 293D155(1)035C(2) | 0.5  | 6                                      | 3.8   | 0.17                                       |
| 2.2  | B         | 293D225(1)035B(2) | 0.8  | 6                                      | 3.8   | 0.15                                       |
| 2.2  | C         | 293D225(1)035C(2) | 0.8  | 6                                      | 2.9   | 0.20                                       |
| 3.3  | B         | 293D335(1)035B(2) | 1.2  | 6                                      | 3.5   | 0.16                                       |
| 3.3  | C         | 293D335(1)035C(2) | 1.2  | 6                                      | 2.1   | 0.23                                       |
| 4.7  | B         | 293D475(1)035B(2) | 1.7  | 6                                      | 3.1   | 0.17                                       |
| 4.7  | C         | 293D475(1)035C(2) | 1.6  | 6                                      | 1.9   | 0.24                                       |
| 4.7  | D         | 293D475(1)035D(2) | 1.6  | 6                                      | 1.3   | 0.34                                       |
| 6.8  | C         | 293D685(1)035C(2) | 2.4  | 6                                      | 1.8   | 0.25                                       |
| 6.8  | D         | 293D685(1)035D(2) | 2.4  | 6                                      | 1.1   | 0.37                                       |
| 10   | C         | 293D106(1)035C(2) | 3.5  | 6                                      | 1.6   | 0.26                                       |
| 10   | D         | 293D106(1)035D(2) | 3.5  | 6                                      | 0.8   | 0.43                                       |
| 15   | D         | 293D156(1)035D(2) | 5.3  | 6                                      | 0.7   | 0.46                                       |
| 15   | E         | 293D156(1)035E(2) | 5.3  | 6                                      | 0.7   | 0.49                                       |
| 22   | D         | 293D226(1)035D(2) | 7.7  | 6                                      | 0.6   | 0.52                                       |
| 22   | E         | 293D226(1)035E(2) | 7.7  | 6                                      | 0.6   | 0.52                                       |
| <b>50 VDC AT + 85 °C, 33 VDC AT + 125 °C</b> |           |                   |  |  |   |  |
| 0.10   | A         | 293D104(1)050A(2) | 0.5  | 4                                      | 19.0  | 0.06                                       |
| 0.15   | A         | 293D154(1)050A(2) | 0.5  | 4                                      | 17.0  | 0.07                                       |
| 0.15   | B         | 293D154(1)050B(2) | 0.5  | 4                                      | 14.0  | 0.08                                       |
| 0.22   | A         | 293D224(1)050A(2) | 0.5  | 4                                      | 15.0  | 0.07                                       |
| 0.22   | B         | 293D224(1)050B(2) | 0.5  | 4                                      | 12.0  | 0.08                                       |
| 0.33   | A         | 293D334(1)050A(2) | 0.5  | 4                                      | 14.0  | 0.07                                       |
| 0.33   | B         | 293D334(1)050B(2) | 0.5  | 4                                      | 10.0  | 0.09                                       |
| 0.47   | A         | 293D474(1)050A(2) | 0.5  | 4                                      | 12.0  | 0.08                                       |
| 0.47   | B         | 293D474(1)050B(2) | 0.5  | 4                                      | 8.4   | 0.10                                       |
| 0.47   | C         | 293D474(1)050C(2) | 0.5  | 4                                      | 6.7   | 0.13                                       |
| 0.68   | B         | 293D684(1)050B(2) | 0.5  | 4                                      | 7.6   | 0.11                                       |
| 0.68   | C         | 293D684(1)050C(2) | 0.5  | 4                                      | 5.9   | 0.14                                       |
| 1.0  | B         | 293D105(1)050B(2) | 0.5  | 4                                      | 6.7   | 0.11                                       |
| 1.0  | C         | 293D105(1)050C(2) | 0.5  | 4                                      | 4.6   | 0.16                                       |
| 1.5  | B         | 293D155(1)050B(2) | 0.8  | 6                                      | 6.0   | 0.12                                       |
| 1.5  | C         | 293D155(1)050C(2) | 0.8  | 6                                      | 3.4   | 0.18                                       |
| 2.2  | C         | 293D225(1)050C(2) | 1.1  | 6                                      | 2.9   | 0.20                                       |
| 2.2  | D         | 293D225(1)050D(2) | 1.1  | 6                                      | 2.1   | 0.27                                       |
| 3.3  | C         | 293D335(1)050C(2) | 1.7  | 6                                      | 2.5   | 0.21                                       |
| 3.3  | D         | 293D335(1)050D(2) | 1.7  | 6                                      | 1.7   | 0.30                                       |
| 4.7  | C         | 293D457(1)050C(2) | 2.4  | 6                                      | 1.5   | 0.27                                       |
| 4.7  | D         | 293D475(1)050D(2) | 2.4  | 6                                      | 1.2   | 0.37                                       |

**Notes**

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



| RATINGS AND PART NUMBER REFERENCE            |           |                   |                                 |                               |                                 |  |
|--|-----------|-------------------|---------------------------------|-------------------------------|---------------------------------|--|
| 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>50 VDC AT + 85 °C, 33 VDC AT + 125 °C</b> |           |                   |                                 |                               |                                 |  |
| 6.8  | D         | 293D685(1)050D(2) | 3.4                             | 6                             | 0.9                             | 0.41                                     |
| 6.8  | E         | 293D685(1)050E(2) | 3.4                             | 6                             | 0.9                             | 0.43                                     |
| 10   | D         | 293D106(1)050D(2) | 5.0                             | 6                             | 0.8                             | 0.43                                     |
| 10   | E         | 293D106(1)050E(2) | 5.0                             | 6                             | 0.8                             | 0.45                                     |
| 15   | E         | 293D156(1)050E(2) | 7.5                             | 6                             | 0.8                             | 0.45                                     |
| <b>63 VDC AT + 85 °C, 40 VDC AT + 125 °C</b> |           |                   |                                 |                               |                                 |  |
| 4.7  | D         | 293D475(1)063D(2) | 3.0                             | 6                             | 1.1                             | 0.37                                     |
| 10   | E         | 293D106(1)063E(2) | 6.3                             | 6                             | 1.0                             | 0.41                                     |

**Notes**

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







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- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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