

## Solid-Electrolyte TANTALEX™ Capacitors, Military MIL-PRF-39003/09 Qualified, Style CSR21



### PERFORMANCE CHARACTERISTICS

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

**Capacitance Range:** 5.6 µF to 330 µF

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

**Voltage Rating:** 6 V<sub>DC</sub> to 50 V<sub>DC</sub>

### DESCRIPTION

Solid-electrolyte TANTALEX capacitors to military specification MIL-PRF-39003 - Exponential and Weibull Distribution: hermetically sealed, metal cased, axial leaded tubular capacitors manufactured as military style CSR21. These capacitors are furnished to the requirements of the military specification, including marking, testing and inspection.

In accordance with the specification, all capacitors are marked with the military part number (M39003/xx-xxxx) rather than the older style designation (CSRxxxxxxx) and should be ordered as such. All capacitors covered by MIL-PRF-39003 are now ordered with the military part number as illustrated in the Part Numbering System chart. Capacitors must not be ordered using the style number identification.

### FEATURES

- Hermetically sealed
- Metal cased
- Axial lead
- Weibull failure rates B, C, D
- Exponential failure rates M, P, R, S
- Low ESR
- 100 % surge current test
- Tape and reel available per EIA-296 standard

### STYLE, MILITARY SPECIFICATION SHEET

Style CSR21, M39003/09 MIL-PRF-39003/9

MIL-PRF-39003 establishes failure rates (expressed in percent per 1000 h) based on exponential and Weibull distribution. Care must be exercised in ordering to insure the part number correctly identifies the desired failure rate level.

In addition, each order for military style CSR13, CSR21, CSR23 capacitors requiring government inspection must state whether inspection is to be at the destination or at the Vishay plant. Orders requiring source inspection cannot be shipped until this has been accomplished.

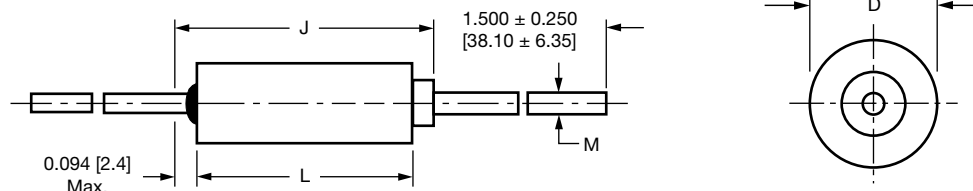
For information on the performance characteristics of these capacitors, please refer to the latest issue of the military specification.

### ORDERING INFORMATION

| M39003                                                        | /09                                                                   | -2085                                               | B                                                                                                                                                                                                                                                                                                                 | /TR                                                                                                                                                                                                           |
|---------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BASIC<br>DOCUMENT NUMBER                                      | SLASH SHEET                                                           | DASH NUMBER                                         | SURGE CURRENT<br>OPTION LETTER                                                                                                                                                                                                                                                                                    | PACKAGING OPTION <sup>(1)</sup>                                                                                                                                                                               |
| Indicates the Basic Specification; in this case MIL-PRF-39003 | Indicates the Specification Sheet of the Basic Military Specification | Taken from Ratings table of the Specification Sheet | Blank = standard, +25 °C, after Weibull<br>B = -55 °C and +85 °C, after Weibull<br>C = -55 °C and +85 °C, before Weibull<br>E = -55 °C and +85 °C, after Weibull, high temperature solder<br>F = -55 °C and +85 °C, before Weibull, high temperature solder<br>H = +25 °C, after Weibull, high temperature solder | Blank = bulk<br>/TR = tape and reel, full reel<br>/HR = tape and reel, half reel<br>/PR = tape and reel, partial reel<br>/RR = tape and reel, option R, full reel<br>/WR = tape and reel, option W, full reel |

#### Note

<sup>(1)</sup> See detailed packaging information following the Standard Ratings table

**DIMENSIONS** in inches [millimeters]


| CASE CODE | L<br>± 0.031 [0.79] | D<br>+ 0.016 [0.41]<br>- 0.015 [0.38] | M<br>± 0.002 [0.05] | J<br>(MAX.)   |
|-----------|---------------------|---------------------------------------|---------------------|---------------|
| C         | 0.686 [17.42]       | 0.289 [7.34]                          | 0.025 [0.64]        | 0.822 [20.88] |
| D         | 0.786 [19.96]       | 0.351 [8.92]                          | 0.025 [0.64]        | 0.922 [23.42] |

**Notes**

- Capacitors of this series are supplied with shrink-fitted insulation sleeve. The insulation sleeve laps over the ends of the capacitor body, extending by 0.015" [0.38 mm] minimum beyond each end. Dimensions L and D include insulation sleeve additives. Dimension J is always larger than L and is not affected by insulation sleeve
- A minimum lead length of 1.0" [25.4 mm] for use with tape and reel automatic insertion equipment is available upon request

**RATINGS AND CASE CODES**

| μF  | 6 V | 10 V | 15 V | 20 V | 35 V | 50 V |
|-----|-----|------|------|------|------|------|
| 5.6 |     |      |      |      |      | C    |
| 6.8 |     |      |      |      |      | C    |
| 8.2 |     |      |      |      |      | C    |
| 10  |     |      |      |      |      | C    |
| 12  |     |      |      |      |      | C    |
| 15  |     |      |      |      |      | C    |
| 18  |     |      |      |      |      | C    |
| 22  |     |      |      |      | C    | D    |
| 27  |     |      |      | C    | D    |      |
| 33  |     |      |      | C    | D    |      |
| 39  |     |      |      | C    | D    |      |
| 47  |     |      |      | C    | D    |      |
| 56  |     |      | C    | D    |      |      |
| 68  |     |      | C    | D    |      |      |
| 82  |     | C    |      | D    |      |      |
| 100 |     | C    |      | D    |      |      |
| 120 |     | C    | D    |      |      |      |
| 150 | C   |      | D    |      |      |      |
| 180 | C   | D    |      |      |      |      |
| 220 |     | D    |      |      |      |      |
| 270 | D   |      |      |      |      |      |
| 330 | D   |      |      |      |      |      |



## STANDARD RATINGS

| CAPACITANCE<br>(μF)                                                       | CASE<br>CODE | CAP.<br>TOL.<br>(± %) | PART NO. M39003/09-<br>FAILURE RATE LEVEL (%/1000 h) |          |           |            |          |           |            | MAX. DCL (μA) AT |        |         | MAX.<br>DF AT<br>+25 °C<br>1 kHz<br>(%) | MAX.<br>ESR AT<br>+25 °C<br>100 kHz<br>(Ω) | DERATED<br>MAX. RIPPLE<br>CURRENT<br>AT +25 °C<br>(A) |       |
|---------------------------------------------------------------------------|--------------|-----------------------|------------------------------------------------------|----------|-----------|------------|----------|-----------|------------|------------------|--------|---------|-----------------------------------------|--------------------------------------------|-------------------------------------------------------|-------|
|                                                                           |              |                       |                                                      |          |           |            |          |           |            |                  |        |         |                                         |                                            |                                                       |       |
|                                                                           |              |                       | M<br>1.0                                             | P<br>0.1 | R<br>0.01 | S<br>0.001 | B<br>0.1 | C<br>0.01 | D<br>0.001 | +25 °C           | +85 °C | +125 °C |                                         |                                            | 40 kHz                                                | 1 kHz |
| 6 V <sub>DC</sub> AT +85 °C, SURGE = 8 V; 4 V <sub>DC</sub> AT +125 °C    |              |                       |                                                      |          |           |            |          |           |            |                  |        |         |                                         |                                            |                                                       |       |
| 150                                                                       | C            | 5                     | 0001                                                 | 0101     | 0201      | 0301       | 2001     | 3001      | 4001       | 4.5              | 90.0   | 113     | 10                                      | 0.065                                      | 3.3                                                   | 2.0   |
| 150                                                                       | C            | 10                    | 0002                                                 | 0102     | 0202      | 0302       | 2002     | 3002      | 4002       | 4.5              | 90.0   | 113     | 10                                      | 0.065                                      | 3.3                                                   | 2.0   |
| 150                                                                       | C            | 20                    | 0003                                                 | 0103     | 0203      | 0303       | 2003     | 3003      | 4003       | 4.5              | 90.0   | 113     | 10                                      | 0.065                                      | 3.3                                                   | 2.0   |
| 180                                                                       | C            | 5                     | 0004                                                 | 0104     | 0204      | 0304       | 2004     | 3004      | 4004       | 5.5              | 110    | 138     | 10                                      | 0.060                                      | 3.4                                                   | 2.4   |
| 180                                                                       | C            | 10                    | 0005                                                 | 0105     | 0205      | 0305       | 2005     | 3005      | 4005       | 5.5              | 110    | 138     | 10                                      | 0.060                                      | 3.4                                                   | 2.4   |
| 270                                                                       | D            | 5                     | 0006                                                 | 0106     | 0206      | 0306       | 2006     | 3006      | 4006       | 6.5              | 130    | 163     | 10                                      | 0.050                                      | 4.1                                                   | 3.4   |
| 270                                                                       | D            | 10                    | 0007                                                 | 0107     | 0207      | 0307       | 2007     | 3007      | 4007       | 6.5              | 130    | 163     | 10                                      | 0.050                                      | 4.1                                                   | 3.4   |
| 330                                                                       | D            | 5                     | 0008                                                 | 0108     | 0208      | 0308       | 2008     | 3008      | 4008       | 7.5              | 150    | 188     | 12                                      | 0.045                                      | 4.3                                                   | 3.8   |
| 330                                                                       | D            | 10                    | 0009                                                 | 0109     | 0209      | 0309       | 2009     | 3009      | 4009       | 7.5              | 150    | 188     | 12                                      | 0.045                                      | 4.3                                                   | 3.8   |
| 330                                                                       | D            | 20                    | 0010                                                 | 0110     | 0210      | 0310       | 2010     | 3010      | 4010       | 7.5              | 150    | 188     | 12                                      | 0.045                                      | 4.3                                                   | 3.8   |
| 10 V <sub>DC</sub> AT +85 °C, SURGE = 13 V; 7 V <sub>DC</sub> AT +125 °C  |              |                       |                                                      |          |           |            |          |           |            |                  |        |         |                                         |                                            |                                                       |       |
| 82                                                                        | C            | 5                     | 0011                                                 | 0111     | 0211      | 0311       | 2011     | 3011      | 4011       | 4.0              | 80.0   | 100     | 8                                       | 0.085                                      | 2.9                                                   | 1.8   |
| 82                                                                        | C            | 10                    | 0012                                                 | 0112     | 0212      | 0312       | 2012     | 3012      | 4012       | 4.0              | 80.0   | 100     | 8                                       | 0.085                                      | 2.9                                                   | 1.8   |
| 100                                                                       | C            | 5                     | 0013                                                 | 0113     | 0213      | 0313       | 2013     | 3013      | 4013       | 5.0              | 100    | 125     | 8                                       | 0.075                                      | 3.0                                                   | 2.2   |
| 100                                                                       | C            | 10                    | 0014                                                 | 0114     | 0214      | 0314       | 2014     | 3014      | 4014       | 5.0              | 100    | 125     | 8                                       | 0.075                                      | 3.0                                                   | 2.2   |
| 100                                                                       | C            | 20                    | 0015                                                 | 0115     | 0215      | 0315       | 2015     | 3015      | 4015       | 5.0              | 100    | 125     | 8                                       | 0.075                                      | 3.0                                                   | 2.2   |
| 120                                                                       | C            | 5                     | 0016                                                 | 0116     | 0216      | 0316       | 2016     | 3016      | 4016       | 6.0              | 120    | 150     | 8                                       | 0.070                                      | 3.2                                                   | 2.5   |
| 120                                                                       | C            | 10                    | 0017                                                 | 0117     | 0217      | 0317       | 2017     | 3017      | 4017       | 6.0              | 120    | 150     | 8                                       | 0.070                                      | 3.2                                                   | 2.5   |
| 180                                                                       | D            | 5                     | 0018                                                 | 0118     | 0218      | 0318       | 2018     | 3018      | 4018       | 9.0              | 180    | 226     | 8                                       | 0.060                                      | 3.7                                                   | 3.4   |
| 180                                                                       | D            | 10                    | 0019                                                 | 0119     | 0219      | 0319       | 2019     | 3019      | 4019       | 9.0              | 180    | 226     | 8                                       | 0.060                                      | 3.7                                                   | 3.4   |
| 220                                                                       | D            | 5                     | 0020                                                 | 0120     | 0220      | 0320       | 2020     | 3020      | 4020       | 10.0             | 200    | 250     | 10                                      | 0.055                                      | 3.9                                                   | 3.4   |
| 220                                                                       | D            | 10                    | 0021                                                 | 0121     | 0221      | 0321       | 2021     | 3021      | 4021       | 10.0             | 200    | 250     | 10                                      | 0.055                                      | 3.9                                                   | 3.4   |
| 220                                                                       | D            | 20                    | 0022                                                 | 0122     | 0222      | 0322       | 2022     | 3022      | 4022       | 10.0             | 200    | 250     | 10                                      | 0.055                                      | 3.9                                                   | 3.4   |
| 15 V <sub>DC</sub> AT +85 °C, SURGE = 20 V; 10 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |          |           |            |          |           |            |                  |        |         |                                         |                                            |                                                       |       |
| 56                                                                        | C            | 5                     | 0023                                                 | 0123     | 0223      | 0323       | 2023     | 3023      | 4023       | 4.0              | 80.0   | 100     | 6                                       | 0.100                                      | 2.6                                                   | 1.8   |
| 56                                                                        | C            | 10                    | 0024                                                 | 0124     | 0224      | 0324       | 2024     | 3024      | 4024       | 4.0              | 80.0   | 100     | 6                                       | 0.100                                      | 2.6                                                   | 1.8   |
| 68                                                                        | C            | 5                     | 0025                                                 | 0125     | 0225      | 0325       | 2025     | 3025      | 4025       | 5.0              | 100    | 125     | 6                                       | 0.095                                      | 2.7                                                   | 2.2   |
| 68                                                                        | C            | 10                    | 0026                                                 | 0126     | 0226      | 0326       | 2026     | 3026      | 4026       | 5.0              | 100    | 125     | 6                                       | 0.095                                      | 2.7                                                   | 2.2   |
| 68                                                                        | C            | 20                    | 0027                                                 | 0127     | 0227      | 0327       | 2027     | 3027      | 4027       | 5.0              | 100    | 125     | 6                                       | 0.095                                      | 2.7                                                   | 2.2   |
| 120                                                                       | D            | 5                     | 0028                                                 | 0128     | 0228      | 0328       | 2028     | 3028      | 4028       | 9.0              | 180    | 226     | 8                                       | 0.070                                      | 3.5                                                   | 2.8   |
| 120                                                                       | D            | 10                    | 0029                                                 | 0129     | 0229      | 0329       | 2029     | 3029      | 4029       | 9.0              | 180    | 226     | 8                                       | 0.070                                      | 3.5                                                   | 2.8   |
| 150                                                                       | D            | 5                     | 0030                                                 | 0130     | 0230      | 0330       | 2030     | 3030      | 4030       | 10.0             | 200    | 250     | 8                                       | 0.065                                      | 3.6                                                   | 3.1   |
| 150                                                                       | D            | 10                    | 0031                                                 | 0131     | 0231      | 0331       | 2031     | 3031      | 4031       | 10.0             | 200    | 250     | 8                                       | 0.065                                      | 3.6                                                   | 3.1   |
| 150                                                                       | D            | 20                    | 0032                                                 | 0132     | 0232      | 0332       | 2032     | 3032      | 4032       | 10.0             | 200    | 250     | 8                                       | 0.065                                      | 3.6                                                   | 3.1   |
| 20 V <sub>DC</sub> AT +85 °C, SURGE = 26 V; 13 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |          |           |            |          |           |            |                  |        |         |                                         |                                            |                                                       |       |
| 27                                                                        | C            | 5                     | 0033                                                 | 0133     | 0233      | 0333       | 2033     | 3033      | 4033       | 2.5              | 50.0   | 63.0    | 5                                       | 0.145                                      | 2.2                                                   | 1.2   |
| 27                                                                        | C            | 10                    | 0034                                                 | 0134     | 0234      | 0334       | 2034     | 3034      | 4034       | 2.5              | 50.0   | 63.0    | 5                                       | 0.145                                      | 2.2                                                   | 1.2   |
| 33                                                                        | C            | 5                     | 0035                                                 | 0135     | 0235      | 0335       | 2035     | 3035      | 4035       | 3.5              | 70.0   | 88.0    | 5                                       | 0.130                                      | 2.3                                                   | 1.4   |
| 33                                                                        | C            | 10                    | 0036                                                 | 0136     | 0236      | 0336       | 2036     | 3036      | 4036       | 3.5              | 70.0   | 88.0    | 5                                       | 0.130                                      | 2.3                                                   | 1.4   |
| 33                                                                        | C            | 20                    | 0037                                                 | 0137     | 0237      | 0337       | 2037     | 3037      | 4037       | 3.5              | 70.0   | 88.0    | 5                                       | 0.130                                      | 2.3                                                   | 1.4   |
| 39                                                                        | C            | 5                     | 0038                                                 | 0138     | 0238      | 0338       | 2038     | 3038      | 4038       | 4.0              | 80.0   | 100     | 5                                       | 0.120                                      | 2.4                                                   | 1.7   |
| 39                                                                        | C            | 10                    | 0039                                                 | 0139     | 0239      | 0339       | 2039     | 3039      | 4039       | 4.0              | 80.0   | 100     | 5                                       | 0.120                                      | 2.4                                                   | 1.7   |
| 47                                                                        | C            | 5                     | 0040                                                 | 0140     | 0240      | 0340       | 2040     | 3040      | 4040       | 4.5              | 90.0   | 113     | 6                                       | 0.110                                      | 2.5                                                   | 1.8   |



## STANDARD RATINGS

| STANDARD FEATURES                                                         |              |                       |                                                      |      |      |       |      |      |       |                  |        |         |                                         |                                            |                                                       |       |
|---------------------------------------------------------------------------|--------------|-----------------------|------------------------------------------------------|------|------|-------|------|------|-------|------------------|--------|---------|-----------------------------------------|--------------------------------------------|-------------------------------------------------------|-------|
| CAPACITANCE<br>(μF)                                                       | CASE<br>CODE | CAP.<br>TOL.<br>(± %) | PART NO. M39003/09-<br>FAILURE RATE LEVEL (%/1000 h) |      |      |       |      |      |       | MAX. DCL (μA) AT |        |         | MAX.<br>DF AT<br>+25 °C<br>1 kHz<br>(%) | MAX.<br>ESR AT<br>+25 °C<br>100 kHz<br>(Ω) | DERATED<br>MAX. RIPPLE<br>CURRENT<br>AT +25 °C<br>(A) |       |
|                                                                           |              |                       | M                                                    | P    | R    | S     | B    | C    | D     | +25 °C           | +85 °C | +125 °C |                                         |                                            | 40 kHz                                                | 1 kHz |
|                                                                           |              |                       | 1.0                                                  | 0.1  | 0.01 | 0.001 | 0.1  | 0.01 | 0.001 |                  |        |         |                                         |                                            |                                                       |       |
| 20 V <sub>DC</sub> AT +85 °C, SURGE = 26 V; 13 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |       |                  |        |         |                                         |                                            |                                                       |       |
| 47                                                                        | C            | 10                    | 0041                                                 | 0141 | 0241 | 0341  | 2041 | 3041 | 4041  | 4.5              | 90.0   | 113     | 6                                       | 0.110                                      | 2.5                                                   | 1.8   |
| 47                                                                        | C            | 20                    | 0042                                                 | 0142 | 0242 | 0342  | 2042 | 3042 | 4042  | 4.5              | 90.0   | 113     | 6                                       | 0.110                                      | 2.5                                                   | 1.8   |
| 56                                                                        | D            | 5                     | 0043                                                 | 0143 | 0243 | 0343  | 2043 | 3043 | 4043  | 5.5              | 110    | 138     | 6                                       | 0.100                                      | 2.9                                                   | 2.2   |
| 56                                                                        | D            | 10                    | 0044                                                 | 0144 | 0244 | 0344  | 2044 | 3044 | 4044  | 5.5              | 110    | 138     | 6                                       | 0.100                                      | 2.9                                                   | 2.2   |
| 68                                                                        | D            | 5                     | 0045                                                 | 0145 | 0245 | 0345  | 2045 | 3045 | 4045  | 7.0              | 140    | 175     | 6                                       | 0.095                                      | 3.0                                                   | 2.4   |
| 68                                                                        | D            | 10                    | 0046                                                 | 0146 | 0246 | 0346  | 2046 | 3046 | 4046  | 7.0              | 140    | 175     | 6                                       | 0.095                                      | 3.0                                                   | 2.4   |
| 68                                                                        | D            | 20                    | 0047                                                 | 0147 | 0247 | 0347  | 2047 | 3047 | 4047  | 7.0              | 140    | 175     | 6                                       | 0.095                                      | 3.0                                                   | 2.4   |
| 82                                                                        | D            | 5                     | 0048                                                 | 0148 | 0248 | 0348  | 2048 | 3048 | 4048  | 8.0              | 160    | 200     | 6                                       | 0.085                                      | 3.1                                                   | 2.5   |
| 82                                                                        | D            | 10                    | 0049                                                 | 0149 | 0249 | 0349  | 2049 | 3049 | 4049  | 8.0              | 160    | 200     | 6                                       | 0.085                                      | 3.1                                                   | 2.5   |
| 100                                                                       | D            | 5                     | 0050                                                 | 0150 | 0250 | 0350  | 2050 | 3050 | 4050  | 10.0             | 200    | 250     | 8                                       | 0.075                                      | 3.3                                                   | 2.5   |
| 100                                                                       | D            | 10                    | 0051                                                 | 0151 | 0251 | 0351  | 2051 | 3051 | 4051  | 10.0             | 200    | 250     | 8                                       | 0.075                                      | 3.3                                                   | 2.5   |
| 100                                                                       | D            | 20                    | 0052                                                 | 0152 | 0252 | 0352  | 2052 | 3052 | 4052  | 10.0             | 200    | 250     | 8                                       | 0.075                                      | 3.3                                                   | 2.5   |
| 35 V <sub>DC</sub> AT +85 °C, SURGE = 46 V; 23 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |       |                  |        |         |                                         |                                            |                                                       |       |
| 22                                                                        | C            | 5                     | 0053                                                 | 0153 | 0253 | 0353  | 2053 | 3053 | 4053  | 4.0              | 80.0   | 100     | 4                                       | 0.160                                      | 2.1                                                   | 1.5   |
| 22                                                                        | C            | 10                    | 0054                                                 | 0154 | 0254 | 0354  | 2054 | 3054 | 4054  | 4.0              | 80.0   | 100     | 4                                       | 0.160                                      | 2.1                                                   | 1.5   |
| 22                                                                        | C            | 20                    | 0055                                                 | 0155 | 0255 | 0355  | 2055 | 3055 | 4055  | 4.0              | 80.0   | 100     | 4                                       | 0.160                                      | 2.1                                                   | 1.5   |
| 27                                                                        | D            | 5                     | 0056                                                 | 0156 | 0256 | 0356  | 2056 | 3056 | 4056  | 4.5              | 90.0   | 113     | 4                                       | 0.145                                      | 2.4                                                   | 1.9   |
| 27                                                                        | D            | 10                    | 0057                                                 | 0157 | 0257 | 0357  | 2057 | 3057 | 4057  | 4.5              | 90.0   | 113     | 4                                       | 0.145                                      | 2.4                                                   | 1.9   |
| 33                                                                        | D            | 5                     | 0058                                                 | 0158 | 0258 | 0358  | 2058 | 3058 | 4058  | 5.5              | 110    | 138     | 5                                       | 0.130                                      | 2.5                                                   | 1.9   |
| 33                                                                        | D            | 10                    | 0059                                                 | 0159 | 0259 | 0359  | 2059 | 3059 | 4059  | 5.5              | 110    | 138     | 5                                       | 0.130                                      | 2.5                                                   | 1.9   |
| 33                                                                        | D            | 20                    | 0060                                                 | 0160 | 0260 | 0360  | 2060 | 3060 | 4060  | 5.5              | 110    | 138     | 5                                       | 0.130                                      | 2.5                                                   | 1.9   |
| 39                                                                        | D            | 5                     | 0061                                                 | 0161 | 0261 | 0361  | 2061 | 3061 | 4061  | 7.0              | 140    | 175     | 5                                       | 0.120                                      | 2.6                                                   | 2.0   |
| 39                                                                        | D            | 10                    | 0062                                                 | 0162 | 0262 | 0362  | 2062 | 3062 | 4062  | 7.0              | 140    | 175     | 5                                       | 0.120                                      | 2.6                                                   | 2.0   |
| 47                                                                        | D            | 5                     | 0063                                                 | 0163 | 0263 | 0363  | 2063 | 3063 | 4063  | 8.0              | 160    | 200     | 5                                       | 0.110                                      | 2.7                                                   | 2.2   |
| 47                                                                        | D            | 10                    | 0064                                                 | 0164 | 0264 | 0364  | 2064 | 3064 | 4064  | 8.0              | 160    | 200     | 5                                       | 0.110                                      | 2.7                                                   | 2.2   |
| 47                                                                        | D            | 20                    | 0065                                                 | 0165 | 0265 | 0365  | 2065 | 3065 | 4065  | 8.0              | 160    | 200     | 5                                       | 0.110                                      | 2.7                                                   | 2.2   |
| 50 V <sub>DC</sub> AT +85 °C, SURGE = 65 V; 33 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |       |                  |        |         |                                         |                                            |                                                       |       |
| 5.6                                                                       | C            | 5                     | 0066                                                 | 0166 | 0266 | 0366  | 2066 | 3066 | 4066  | 2.2              | 45.0   | 56.0    | 3                                       | 0.300                                      | 1.5                                                   | 0.6   |
| 5.6                                                                       | C            | 10                    | 0067                                                 | 0167 | 0267 | 0367  | 2067 | 3067 | 4067  | 2.2              | 45.0   | 56.0    | 3                                       | 0.300                                      | 1.5                                                   | 0.6   |
| 6.8                                                                       | C            | 5                     | 0068                                                 | 0168 | 0268 | 0368  | 2068 | 3068 | 4068  | 2.2              | 45.0   | 56.0    | 3                                       | 0.275                                      | 1.6                                                   | 0.7   |
| 6.8                                                                       | C            | 10                    | 0069                                                 | 0169 | 0269 | 0369  | 2069 | 3069 | 4069  | 2.2              | 45.0   | 56.0    | 3                                       | 0.275                                      | 1.6                                                   | 0.7   |
| 6.8                                                                       | C            | 20                    | 0070                                                 | 0170 | 0270 | 0370  | 2070 | 3070 | 4070  | 2.2              | 45.0   | 56.0    | 3                                       | 0.275                                      | 1.6                                                   | 0.7   |
| 8.2                                                                       | C            | 5                     | 0071                                                 | 0171 | 0271 | 0371  | 2071 | 3071 | 4071  | 2.5              | 50.0   | 63.0    | 3                                       | 0.250                                      | 1.6                                                   | 0.9   |
| 8.2                                                                       | C            | 10                    | 0072                                                 | 0172 | 0272 | 0372  | 2072 | 3072 | 4072  | 2.5              | 50.0   | 63.0    | 3                                       | 0.250                                      | 1.6                                                   | 0.9   |
| 10                                                                        | C            | 5                     | 0073                                                 | 0173 | 0273 | 0373  | 2073 | 3073 | 4073  | 2.5              | 50.0   | 63.0    | 3                                       | 0.230                                      | 1.7                                                   | 1.1   |
| 10                                                                        | C            | 10                    | 0074                                                 | 0174 | 0274 | 0374  | 2074 | 3074 | 4074  | 2.5              | 50.0   | 63.0    | 3                                       | 0.230                                      | 1.7                                                   | 1.1   |
| 10                                                                        | C            | 20                    | 0075                                                 | 0175 | 0275 | 0375  | 2075 | 3075 | 4075  | 2.5              | 50.0   | 63.0    | 3                                       | 0.230                                      | 1.7                                                   | 1.1   |
| 12                                                                        | C            | 5                     | 0076                                                 | 0176 | 0276 | 0376  | 2076 | 3076 | 4076  | 3.0              | 60.0   | 75.0    | 3                                       | 0.210                                      | 1.8                                                   | 1.3   |
| 12                                                                        | C            | 10                    | 0077                                                 | 0177 | 0277 | 0377  | 2077 | 3077 | 4077  | 3.0              | 60.0   | 75.0    | 3                                       | 0.210                                      | 1.8                                                   | 1.3   |
| 15                                                                        | C            | 5                     | 0078                                                 | 0178 | 0278 | 0378  | 2078 | 3078 | 4078  | 4.0              | 80.0   | 100     | 3                                       | 0.190                                      | 1.9                                                   | 1.4   |
| 15                                                                        | C            | 10                    | 0079                                                 | 0179 | 0279 | 0379  | 2079 | 3079 | 4079  | 4.0              | 80.0   | 100     | 3                                       | 0.190                                      | 1.9                                                   | 1.4   |
| 15                                                                        | C            | 20                    | 0080                                                 | 0180 | 0280 | 0380  | 2080 | 3080 | 4080  | 4.0              | 80.0   | 100     | 3                                       | 0.190                                      | 1.9                                                   | 1.4   |
| 18                                                                        | C            | 5                     | 0081                                                 | 0181 | 0281 | 0381  | 2081 | 3081 | 4081  | 4.5              | 90.0   | 113     | 4                                       | 0.175                                      | 2.0                                                   | 1.4   |
| 18                                                                        | C            | 10                    | 0082                                                 | 0182 | 0282 | 0382  | 2082 | 3082 | 4082  | 4.5              | 90.0   | 113     | 4                                       | 0.175                                      | 2.0                                                   | 1.4   |
| 22                                                                        | D            | 5                     | 0083                                                 | 0183 | 0283 | 0383  | 2083 | 3083 | 4083  | 5.5              | 110    | 138     | 4                                       | 0.160                                      | 2.3                                                   | 1.7   |
| 22                                                                        | D            | 10                    | 0084                                                 | 0184 | 0284 | 0384  | 2084 | 3084 | 4084  | 5.5              | 110    | 138     | 4                                       | 0.160                                      | 2.3                                                   | 1.7   |
| 22                                                                        | D            | 20                    | 0085                                                 | 0185 | 0285 | 0385  | 2085 | 3085 | 4085  | 5.5              | 110    | 138     | 4                                       | 0.160                                      | 2.3                                                   | 1.7   |

**STANDARD PACKAGING QUANTITY**

| CASE CODE | QUANTITY (pcs/reel)        |                  |                     | BULK QUANTITY |         |
|-----------|----------------------------|------------------|---------------------|---------------|---------|
|           | FULL REEL<br>/TR; /RR; /WR | HALF REEL<br>/HR | PARTIAL REEL<br>/PR | PER TRAY      | PER BOX |
| C         | 500                        | 250              | 100                 | 20            | 100     |
| D         | 500                        | 250              | 100                 | 20            | 80      |

**INSIDE TAPE SPACING**

| PACKAGING OPTION | CASE CODE | TAPE SPACING                 |
|------------------|-----------|------------------------------|
| /TR; /HR; /PR    | C, D      | 2.88 ± 0.02<br>[73.0 ± 0.51] |
| /RR              | C, D      | 2.47 ± 0.02<br>[62.7 ± 0.51] |
| /WR              | C, D      | 2.05 ± 0.02<br>[52.1 ± 0.51] |

**PRODUCT INFORMATION**

|                                                                                |                                                                        |
|--------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Mounting of Through-Hole Components                                            | <a href="http://www.vishay.com/doc?40108">www.vishay.com/doc?40108</a> |
| Solid Tantalum Capacitors (With MnO <sub>2</sub> Electrolyte) Voltage Derating | <a href="http://www.vishay.com/doc?40246">www.vishay.com/doc?40246</a> |
| <b>SELECTOR GUIDES</b>                                                         |                                                                        |
| Selector Guide                                                                 | <a href="http://www.vishay.com/doc?49054">www.vishay.com/doc?49054</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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