

## Solid-Electrolyte TANTALEX™ Capacitors, Military MIL-PRF-39003/01 Qualified, Style CSR13



### FEATURES

- Hermetically sealed
- Metal cased
- Axial lead
- Weibull failure rates G, B, C, D
- Exponential failure rates M, P, R, S
- Tape and reel available per EIA-296 standard

### STYLE, MILITARY SPECIFICATION SHEET

Style CSR13, M39003/01 MIL-PRF-39003/1

### PERFORMANCE CHARACTERISTICS

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

**Capacitance Range:** 0.033 µF to 330 µF

### 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 CSR13. 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.

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

**Voltage Rating:** 6 V<sub>DC</sub> to 100 V<sub>DC</sub>

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.

Style CS13 capacitors previously shown in MIL-C-26655 are directly replaced by style CSR13 and style CSR23 capacitors are extended capacitance range versions of military style CSR13.

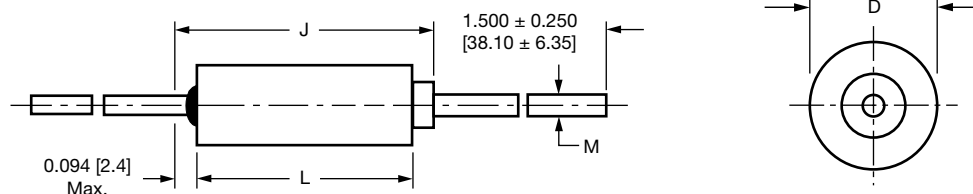
For information on the performance characteristics of these capacitors, please refer to the latest issue of the military specification.

### ORDERING INFORMATION

| M39003                                                        | /01                                                                   | -2254                                               | A                                                                                                                                                                                                                                                                                                                                                                                         | /TR                                                                                                                                                                                                           |
|---------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BASIC DOCUMENT NUMBER                                         | SLASH SHEET                                                           | DASH NUMBER                                         | SURGE CURRENT 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 (no surge current)<br>A = +25 °C, after Weibull<br>B = -55 °C and +85 °C, after Weibull<br>C = -55 °C and +85 °C, before Weibull<br>D = +25 °C, after Weibull, high temperature solder<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 = high temperature solder only (no surge) | 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.)   |
|-----------|---------------------|---------------------------------------|---------------------|---------------|
| A         | 0.286 [7.26]        | 0.135 [3.43]                          | 0.020 [0.51]        | 0.422 [10.72] |
| B         | 0.474 [12.04]       | 0.185 [4.70]                          | 0.020 [0.51]        | 0.610 [15.49] |
| 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**

- The case insulation shall extend 0.015" [0.38 mm] minimum beyond each end. However, when a shrink-fitted insulation is used, it shall lap over the ends of the capacitor body
- A minimum lead length of 1.0" [2.54 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 | 75 V | 100 V |
|-------|-----|------|------|------|------|------|------|-------|
| 0.033 |     |      |      |      |      | A    |      | A     |
| 0.039 |     |      |      |      |      | A    |      | A     |
| 0.047 |     |      |      |      |      | A    |      | A     |
| 0.056 |     |      |      |      |      | A    |      | A     |
| 0.068 |     |      |      |      |      | A    |      | A     |
| 0.082 |     |      |      |      |      | A    |      | A     |
| 0.10  |     |      |      |      |      | A    | A    | A     |
| 0.12  |     |      |      |      |      | A    | A    | A     |
| 0.15  |     |      |      |      |      | A    | A    | A     |
| 0.18  |     |      |      |      |      | A    | A    | A     |
| 0.22  |     |      |      |      |      | A    | A    | A     |
| 0.27  |     |      |      |      |      | A    | A    | A     |
| 0.33  |     |      |      |      |      | A    | A    | A     |
| 0.39  |     |      |      |      |      | A    | A    | A     |
| 0.47  |     |      |      |      |      | A    | A    | A     |
| 0.56  |     |      |      |      |      | A    | A    | A     |
| 0.68  |     |      |      |      |      | A    | A    | B     |
| 0.82  |     |      |      |      |      | A    | B    | B     |
| 1.0   |     |      |      |      |      | A    | B    | B     |
| 1.2   |     |      |      | A    |      | B    | B    | B     |
| 1.5   |     |      |      | A    |      | B    | B    | B     |
| 1.8   |     |      |      | A    |      | B    | B    | B     |
| 2.2   |     |      |      | A    |      | B    | B    | B     |
| 2.7   |     |      | A    |      |      | B    | B    | B     |
| 3.3   |     |      | A    |      |      | B    | B    | C     |
| 3.9   |     | A    |      |      |      | B    | B    | C     |
| 4.7   |     | A    |      |      |      | B    | C    | C     |
| 5.6   | A   |      |      |      | B    | C    | C    | C     |
| 6.8   | A   |      |      |      | B    | C    | C    | C     |

**RATINGS AND CASE CODES**

| $\mu\text{F}$ | 6 V | 10 V | 15 V | 20 V | 35 V | 50 V | 75 V | 100 V |
|---------------|-----|------|------|------|------|------|------|-------|
| 8.2           |     |      |      | B    |      | C    | C    |       |
| 10            |     |      |      | B    |      | C    | C    |       |
| 12            |     |      |      | B    |      | C    | D    |       |
| 15            |     |      |      | B    |      | C    | D    |       |
| 18            |     |      | B    |      |      | C    |      |       |
| 22            |     |      | B    |      | C    | D    |      |       |
| 27            |     | B    |      | C    | D    |      |      |       |
| 33            |     | B    |      | C    | D    |      |      |       |
| 39            |     | B    |      | C    | D    |      |      |       |
| 47            | B   |      |      | C    | D    |      |      |       |
| 56            | B   |      | 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>( $\mu\text{F}$ )                                       | CASE<br>CODE | CAP.<br>TOL.<br>( $\pm$ %) | PART NO. M39003/01-<br>FAILURE RATE LEVEL (%/1000 h) |      |      |       |      |      |      |       | MAX. DCL ( $\mu\text{A}$ ) AT |        |         | MAX. DF (%) AT   |                   |
|------------------------------------------------------------------------|--------------|----------------------------|------------------------------------------------------|------|------|-------|------|------|------|-------|-------------------------------|--------|---------|------------------|-------------------|
|                                                                        |              |                            | M                                                    | P    | R    | S     | G    | B    | C    | D     | +25 °C                        | +85 °C | +125 °C | -55 °C<br>+25 °C | +85 °C<br>+125 °C |
|                                                                        |              |                            | 1.0                                                  | 0.1  | 0.01 | 0.001 | 1.0  | 0.1  | 0.01 | 0.001 |                               |        |         |                  |                   |
| 6 V <sub>DC</sub> AT +85 °C, SURGE = 8 V; 4 V <sub>DC</sub> AT +125 °C |              |                            |                                                      |      |      |       |      |      |      |       |                               |        |         |                  |                   |
| 5.6                                                                    | A            | 5                          | 5001                                                 | 5201 | 5401 | 5601  | 4001 | 6001 | 7001 | 8001  | 0.3                           | 6      | 7.5     | 4                | 4                 |
| 5.6                                                                    | A            | 10                         | 2241                                                 | 2481 | 2721 | 2961  | 4002 | 6002 | 7002 | 8002  | 0.3                           | 6      | 7.5     | 4                | 4                 |
| 6.8                                                                    | A            | 5                          | 5002                                                 | 5202 | 5402 | 5602  | 4003 | 6003 | 7003 | 8003  | 0.3                           | 6      | 7.5     | 6                | 6                 |
| 6.8                                                                    | A            | 10                         | 2242                                                 | 2482 | 2722 | 2962  | 4004 | 6004 | 7004 | 8004  | 0.3                           | 6      | 7.5     | 6                | 6                 |
| 6.8                                                                    | A            | 20                         | 2243                                                 | 2483 | 2723 | 2963  | 4005 | 6005 | 7005 | 8005  | 0.3                           | 6      | 7.5     | 6                | 6                 |
| 47                                                                     | B            | 5                          | 5003                                                 | 5203 | 5403 | 5603  | 4006 | 6006 | 7006 | 8006  | 1.5                           | 24     | 30      | 6                | 6                 |
| 47                                                                     | B            | 10                         | 2244                                                 | 2484 | 2724 | 2964  | 4007 | 6007 | 7007 | 8007  | 1.5                           | 24     | 30      | 6                | 6                 |
| 47                                                                     | B            | 20                         | 2245                                                 | 2485 | 2725 | 2965  | 4008 | 6008 | 7008 | 8008  | 1.5                           | 24     | 30      | 6                | 6                 |
| 56                                                                     | B            | 5                          | 5004                                                 | 5204 | 5404 | 5604  | 4009 | 6009 | 7009 | 8009  | 1.5                           | 24     | 30      | 6                | 6                 |
| 56                                                                     | B            | 10                         | 2246                                                 | 2486 | 2726 | 2966  | 4010 | 6010 | 7010 | 8010  | 1.5                           | 24     | 30      | 6                | 6                 |
| 150                                                                    | C            | 5                          | 5005                                                 | 5205 | 5405 | 5605  | 4011 | 6011 | 7011 | 8011  | 4.5                           | 90     | 113     | 8                | 8                 |
| 150                                                                    | C            | 10                         | 2247                                                 | 2487 | 2727 | 2967  | 4012 | 6012 | 7012 | 8012  | 4.5                           | 90     | 113     | 8                | 8                 |
| 150                                                                    | C            | 20                         | 2248                                                 | 2488 | 2728 | 2968  | 4013 | 6013 | 7013 | 8013  | 4.5                           | 90     | 113     | 8                | 8                 |
| 180                                                                    | C            | 5                          | 5006                                                 | 5206 | 5406 | 5606  | 4014 | 6014 | 7014 | 8014  | 5.5                           | 110    | 138     | 8                | 8                 |
| 180                                                                    | C            | 10                         | 2249                                                 | 2489 | 2729 | 2969  | 4015 | 6015 | 7015 | 8015  | 5.5                           | 110    | 138     | 8                | 8                 |
| 270                                                                    | D            | 5                          | 5007                                                 | 5207 | 5407 | 5607  | 4016 | 6016 | 7016 | 8016  | 6.5                           | 130    | 163     | 8                | 8                 |
| 270                                                                    | D            | 10                         | 2250                                                 | 2490 | 2730 | 2970  | 4017 | 6017 | 7017 | 8017  | 6.5                           | 130    | 163     | 8                | 8                 |
| 330                                                                    | D            | 5                          | 5008                                                 | 5208 | 5408 | 5608  | 4018 | 6018 | 7018 | 8018  | 7.5                           | 150    | 188     | 8                | 8                 |
| 330                                                                    | D            | 10                         | 2251                                                 | 2491 | 2731 | 2971  | 4019 | 6019 | 7019 | 8019  | 7.5                           | 150    | 188     | 8                | 8                 |
| 330                                                                    | D            | 20                         | 2252                                                 | 2492 | 2732 | 2972  | 4020 | 6020 | 7020 | 8020  | 7.5                           | 150    | 188     | 8                | 8                 |



## STANDARD RATINGS

| CAPACITANCE<br>(μF)                                                       | CASE<br>CODE | CAP.<br>TOL.<br>(± %) | PART NO. M39003/01-<br>FAILURE RATE LEVEL (%/1000 h) |      |      |       |      |      |      |       | MAX. DCL (μA) AT |        |         | MAX. DF (%) AT   |                   |
|---------------------------------------------------------------------------|--------------|-----------------------|------------------------------------------------------|------|------|-------|------|------|------|-------|------------------|--------|---------|------------------|-------------------|
|                                                                           |              |                       | M                                                    | P    | R    | S     | G    | B    | C    | D     | +25 °C           | +85 °C | +125 °C | -55 °C<br>+25 °C | +85 °C<br>+125 °C |
|                                                                           |              |                       | 1.0                                                  | 0.1  | 0.01 | 0.001 | 1.0  | 0.1  | 0.01 | 0.001 |                  |        |         |                  |                   |
| 10 V <sub>DC</sub> AT +85 °C, SURGE = 13 V; 7 V <sub>DC</sub> AT +125 °C  |              |                       |                                                      |      |      |       |      |      |      |       |                  |        |         |                  |                   |
| 3.9                                                                       | A            | 5                     | 5009                                                 | 5209 | 5409 | 5609  | 4021 | 6021 | 7021 | 8021  | 0.3              | 6      | 7.5     | 4                | 4                 |
| 3.9                                                                       | A            | 10                    | 2253                                                 | 2493 | 2733 | 2973  | 4022 | 6022 | 7022 | 8022  | 0.3              | 6      | 7.5     | 4                | 4                 |
| 4.7                                                                       | A            | 5                     | 5010                                                 | 5210 | 5410 | 5610  | 4023 | 6023 | 7023 | 8023  | 0.4              | 7      | 8.8     | 4                | 4                 |
| 4.7                                                                       | A            | 10                    | 2254                                                 | 2494 | 2734 | 2974  | 4024 | 6024 | 7024 | 8024  | 0.4              | 7      | 8.8     | 4                | 4                 |
| 4.7                                                                       | A            | 20                    | 2255                                                 | 2495 | 2735 | 2975  | 4025 | 6025 | 7025 | 8025  | 0.4              | 7      | 8.8     | 4                | 4                 |
| 27                                                                        | B            | 5                     | 5011                                                 | 5211 | 5411 | 5611  | 4026 | 6026 | 7026 | 8026  | 2                | 40     | 50      | 6                | 6                 |
| 27                                                                        | B            | 10                    | 2256                                                 | 2496 | 2736 | 2976  | 4027 | 6027 | 7027 | 8027  | 2                | 40     | 50      | 6                | 6                 |
| 33                                                                        | B            | 5                     | 5012                                                 | 5212 | 5412 | 5612  | 4028 | 6028 | 7028 | 8028  | 2.5              | 50     | 63      | 6                | 6                 |
| 33                                                                        | B            | 10                    | 2257                                                 | 2497 | 2737 | 2977  | 4029 | 6029 | 7029 | 8029  | 2.5              | 50     | 63      | 6                | 6                 |
| 33                                                                        | B            | 20                    | 2258                                                 | 2498 | 2738 | 2978  | 4030 | 6030 | 7030 | 8030  | 2.5              | 50     | 63      | 6                | 6                 |
| 39                                                                        | B            | 5                     | 5013                                                 | 5213 | 5413 | 5613  | 4031 | 6031 | 7031 | 8031  | 2.5              | 50     | 63      | 6                | 6                 |
| 39                                                                        | B            | 10                    | 2259                                                 | 2499 | 2739 | 2979  | 4032 | 6032 | 7032 | 8032  | 2.5              | 50     | 63      | 6                | 6                 |
| 82                                                                        | C            | 5                     | 5014                                                 | 5214 | 5414 | 5614  | 4033 | 6033 | 7033 | 8033  | 4                | 80     | 100     | 6                | 6                 |
| 82                                                                        | C            | 10                    | 2260                                                 | 2500 | 2740 | 2980  | 4034 | 6034 | 7034 | 8034  | 4                | 80     | 100     | 6                | 6                 |
| 100                                                                       | C            | 5                     | 5015                                                 | 5215 | 5415 | 5615  | 4035 | 6035 | 7035 | 8035  | 5                | 100    | 125     | 8                | 8                 |
| 100                                                                       | C            | 10                    | 2261                                                 | 2501 | 2741 | 2981  | 4036 | 6036 | 7036 | 8036  | 5                | 100    | 125     | 8                | 8                 |
| 100                                                                       | C            | 20                    | 2262                                                 | 2502 | 2742 | 2982  | 4037 | 6037 | 7037 | 8037  | 5                | 100    | 125     | 8                | 8                 |
| 120                                                                       | C            | 5                     | 5016                                                 | 5216 | 5416 | 5616  | 4038 | 6038 | 7038 | 8038  | 6                | 120    | 150     | 8                | 8                 |
| 120                                                                       | C            | 10                    | 2263                                                 | 2503 | 2743 | 2983  | 4039 | 6039 | 7039 | 8039  | 6                | 120    | 150     | 8                | 8                 |
| 180                                                                       | D            | 5                     | 5017                                                 | 5217 | 5417 | 5617  | 4040 | 6040 | 7040 | 8040  | 9                | 180    | 226     | 8                | 8                 |
| 180                                                                       | D            | 10                    | 2264                                                 | 2504 | 2744 | 2984  | 4041 | 6041 | 7041 | 8041  | 9                | 180    | 226     | 8                | 8                 |
| 220                                                                       | D            | 5                     | 5018                                                 | 5218 | 5418 | 5618  | 4042 | 6042 | 7042 | 8042  | 10               | 200    | 250     | 8                | 8                 |
| 220                                                                       | D            | 10                    | 2265                                                 | 2505 | 2745 | 2985  | 4043 | 6043 | 7043 | 8043  | 10               | 200    | 250     | 8                | 8                 |
| 220                                                                       | D            | 20                    | 2266                                                 | 2506 | 2746 | 2986  | 4044 | 6044 | 7044 | 8044  | 10               | 200    | 250     | 8                | 8                 |
| 15 V <sub>DC</sub> AT +85 °C, SURGE = 20 V; 10 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |      |       |                  |        |         |                  |                   |
| 2.7                                                                       | A            | 5                     | 5019                                                 | 5219 | 5419 | 5619  | 4045 | 6045 | 7045 | 8045  | 0.3              | 6      | 7.5     | 4                | 4                 |
| 2.7                                                                       | A            | 10                    | 2267                                                 | 2507 | 2747 | 2987  | 4046 | 6046 | 7046 | 8046  | 0.3              | 6      | 7.5     | 4                | 4                 |
| 3.3                                                                       | A            | 5                     | 5020                                                 | 5220 | 5420 | 5620  | 4047 | 6047 | 7047 | 8047  | 0.4              | 8      | 10      | 4                | 4                 |
| 3.3                                                                       | A            | 10                    | 2268                                                 | 2508 | 2748 | 2988  | 4048 | 6048 | 7048 | 8048  | 0.4              | 8      | 10      | 4                | 4                 |
| 3.3                                                                       | A            | 20                    | 2269                                                 | 2509 | 2749 | 2989  | 4049 | 6049 | 7049 | 8049  | 0.4              | 8      | 10      | 4                | 4                 |
| 18                                                                        | B            | 5                     | 5021                                                 | 5221 | 5421 | 5621  | 4050 | 6050 | 7050 | 8050  | 2                | 35     | 44      | 6                | 6                 |
| 18                                                                        | B            | 10                    | 2270                                                 | 2510 | 2750 | 2990  | 4051 | 6051 | 7051 | 8051  | 2                | 35     | 44      | 6                | 6                 |
| 22                                                                        | B            | 5                     | 5022                                                 | 5222 | 5422 | 5622  | 4052 | 6052 | 7052 | 8052  | 2                | 40     | 50      | 6                | 6                 |
| 22                                                                        | B            | 10                    | 2271                                                 | 2511 | 2751 | 2991  | 4053 | 6053 | 7053 | 8053  | 2                | 40     | 50      | 6                | 6                 |
| 22                                                                        | B            | 20                    | 2272                                                 | 2512 | 2752 | 2992  | 4054 | 6054 | 7054 | 8054  | 2                | 40     | 50      | 6                | 6                 |
| 56                                                                        | C            | 5                     | 5023                                                 | 5223 | 5423 | 5623  | 4055 | 6055 | 7055 | 8055  | 4                | 80     | 100     | 6                | 6                 |
| 56                                                                        | C            | 10                    | 2273                                                 | 2513 | 2753 | 2993  | 4056 | 6056 | 7056 | 8056  | 4                | 80     | 100     | 6                | 6                 |
| 68                                                                        | C            | 5                     | 5024                                                 | 5224 | 5424 | 5624  | 4057 | 6057 | 7057 | 8057  | 5                | 100    | 125     | 6                | 6                 |
| 68                                                                        | C            | 10                    | 2274                                                 | 2514 | 2754 | 2994  | 4058 | 6058 | 7058 | 8058  | 5                | 100    | 125     | 6                | 6                 |
| 68                                                                        | C            | 20                    | 2275                                                 | 2515 | 2755 | 2995  | 4059 | 6059 | 7059 | 8059  | 5                | 100    | 125     | 6                | 6                 |
| 120                                                                       | D            | 5                     | 5025                                                 | 5225 | 5425 | 5625  | 4060 | 6060 | 7060 | 8060  | 9                | 180    | 226     | 8                | 8                 |
| 120                                                                       | D            | 10                    | 2276                                                 | 2516 | 2756 | 2996  | 4061 | 6061 | 7061 | 8061  | 9                | 180    | 226     | 8                | 8                 |
| 150                                                                       | D            | 5                     | 5026                                                 | 5226 | 5426 | 5626  | 4062 | 6062 | 7062 | 8062  | 10               | 200    | 250     | 8                | 8                 |
| 150                                                                       | D            | 10                    | 2277                                                 | 2517 | 2757 | 2997  | 4063 | 6063 | 7063 | 8063  | 10               | 200    | 250     | 8                | 8                 |
| 150                                                                       | D            | 20                    | 2278                                                 | 2518 | 2758 | 2998  | 4064 | 6064 | 7064 | 8064  | 10               | 200    | 250     | 8                | 8                 |



## STANDARD RATINGS

| CAPACITANCE<br>(μF)                                                       | CASE<br>CODE | CAP.<br>TOL.<br>(± %) | PART NO. M39003/01-<br>FAILURE RATE LEVEL (%/1000 h) |      |      |       |      |      |      |       | MAX. DCL (μA) AT |        |         | MAX. DF (%) AT |         |
|---------------------------------------------------------------------------|--------------|-----------------------|------------------------------------------------------|------|------|-------|------|------|------|-------|------------------|--------|---------|----------------|---------|
|                                                                           |              |                       | M                                                    | P    | R    | S     | G    | B    | C    | D     | +25 °C           | +85 °C | +125 °C | -55 °C         | +85 °C  |
|                                                                           |              |                       | 1.0                                                  | 0.1  | 0.01 | 0.001 | 1.0  | 0.1  | 0.01 | 0.001 |                  |        |         | +25 °C         | +125 °C |
| 20 V <sub>DC</sub> AT +85 °C, SURGE = 26 V; 13 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |      |       |                  |        |         |                |         |
| 1.2                                                                       | A            | 5                     | 5027                                                 | 5227 | 5427 | 5627  | 4065 | 6065 | 7065 | 8065  | 0.3              | 6      | 7.5     | 4              | 4       |
| 1.2                                                                       | A            | 10                    | 2279                                                 | 2519 | 2759 | 2999  | 4066 | 6066 | 7066 | 8066  | 0.3              | 6      | 7.5     | 4              | 4       |
| 1.5                                                                       | A            | 5                     | 5028                                                 | 5228 | 5428 | 5628  | 4067 | 6067 | 7067 | 8067  | 0.3              | 6      | 7.5     | 4              | 4       |
| 1.5                                                                       | A            | 10                    | 2280                                                 | 2520 | 2760 | 3000  | 4068 | 6068 | 7068 | 8068  | 0.3              | 6      | 7.5     | 4              | 4       |
| 1.5                                                                       | A            | 20                    | 2281                                                 | 2521 | 2761 | 3001  | 4069 | 6069 | 7069 | 8069  | 0.3              | 6      | 7.5     | 4              | 4       |
| 1.5                                                                       | A            | 5                     | 5029                                                 | 5229 | 5429 | 5629  | 4070 | 6070 | 7070 | 8070  | 0.3              | 6      | 7.5     | 4              | 4       |
| 1.8                                                                       | A            | 10                    | 2282                                                 | 2522 | 2762 | 3002  | 4071 | 6071 | 7071 | 8071  | 0.3              | 6      | 7.5     | 4              | 4       |
| 2.2                                                                       | A            | 5                     | 5030                                                 | 5230 | 5430 | 5630  | 4072 | 6072 | 7072 | 8072  | 0.4              | 8      | 10      | 4              | 4       |
| 2.2                                                                       | A            | 10                    | 2283                                                 | 2523 | 2763 | 3003  | 4073 | 6073 | 7073 | 8073  | 0.4              | 8      | 10      | 4              | 4       |
| 2.2                                                                       | A            | 20                    | 2284                                                 | 2524 | 2764 | 3004  | 4074 | 6074 | 7074 | 8074  | 0.4              | 8      | 10      | 4              | 4       |
| 8.2                                                                       | B            | 5                     | 5031                                                 | 5231 | 5431 | 5631  | 4075 | 6075 | 7075 | 8075  | 1                | 20     | 25      | 6              | 6       |
| 8.2                                                                       | B            | 10                    | 2285                                                 | 2525 | 2765 | 3005  | 4076 | 6076 | 7076 | 8076  | 1                | 20     | 25      | 6              | 6       |
| 10                                                                        | B            | 5                     | 5032                                                 | 5232 | 5432 | 5632  | 4077 | 6077 | 7077 | 8077  | 1.5              | 30     | 38      | 6              | 6       |
| 10                                                                        | B            | 10                    | 2286                                                 | 2526 | 2766 | 3006  | 4078 | 6078 | 7078 | 8078  | 1.5              | 30     | 38      | 6              | 6       |
| 10                                                                        | B            | 20                    | 2287                                                 | 2527 | 2767 | 3007  | 4079 | 6079 | 7079 | 8079  | 1.5              | 30     | 38      | 6              | 6       |
| 12                                                                        | B            | 5                     | 5033                                                 | 5233 | 5433 | 5633  | 4080 | 6080 | 7080 | 8080  | 1.8              | 35     | 44      | 6              | 6       |
| 12                                                                        | B            | 10                    | 2288                                                 | 2528 | 2768 | 3008  | 4081 | 6081 | 7081 | 8081  | 1.8              | 35     | 44      | 6              | 6       |
| 15                                                                        | B            | 5                     | 5034                                                 | 5234 | 5434 | 5634  | 4082 | 6082 | 7082 | 8082  | 2                | 40     | 50      | 6              | 6       |
| 15                                                                        | B            | 10                    | 2289                                                 | 2529 | 2769 | 3009  | 4083 | 6083 | 7083 | 8083  | 2                | 40     | 50      | 6              | 6       |
| 15                                                                        | B            | 20                    | 2290                                                 | 2530 | 2770 | 3010  | 4084 | 6084 | 7084 | 8084  | 2                | 40     | 50      | 6              | 6       |
| 27                                                                        | C            | 5                     | 5035                                                 | 5235 | 5435 | 5635  | 4085 | 6085 | 7085 | 8085  | 2.5              | 50     | 63      | 6              | 6       |
| 27                                                                        | C            | 10                    | 2291                                                 | 2531 | 2771 | 3011  | 4086 | 6086 | 7086 | 8086  | 2.5              | 50     | 63      | 6              | 6       |
| 33                                                                        | C            | 5                     | 5036                                                 | 5236 | 5436 | 5636  | 4087 | 6087 | 7087 | 8087  | 3.5              | 70     | 88      | 6              | 6       |
| 33                                                                        | C            | 10                    | 2292                                                 | 2532 | 2772 | 3012  | 4088 | 6088 | 7088 | 8088  | 3.5              | 70     | 88      | 6              | 6       |
| 33                                                                        | C            | 20                    | 2293                                                 | 2533 | 2773 | 3013  | 4089 | 6089 | 7089 | 8089  | 3.5              | 70     | 88      | 6              | 6       |
| 39                                                                        | C            | 5                     | 5037                                                 | 5237 | 5437 | 5637  | 4090 | 6090 | 7090 | 8090  | 4                | 80     | 100     | 6              | 6       |
| 39                                                                        | C            | 10                    | 2294                                                 | 2534 | 2774 | 3014  | 4091 | 6091 | 7091 | 8091  | 4                | 80     | 100     | 6              | 6       |
| 47                                                                        | C            | 5                     | 5038                                                 | 5238 | 5438 | 5638  | 4092 | 6092 | 7092 | 8092  | 4.5              | 90     | 113     | 6              | 6       |
| 47                                                                        | C            | 10                    | 2295                                                 | 2535 | 2775 | 3015  | 4093 | 6093 | 7093 | 8093  | 4.5              | 90     | 113     | 6              | 6       |
| 47                                                                        | C            | 20                    | 2296                                                 | 2536 | 2776 | 3016  | 4094 | 6094 | 7094 | 8094  | 4.5              | 90     | 113     | 6              | 6       |
| 56                                                                        | D            | 5                     | 5039                                                 | 5239 | 5439 | 5639  | 4095 | 6095 | 7095 | 8095  | 5.5              | 110    | 138     | 6              | 6       |
| 56                                                                        | D            | 10                    | 2297                                                 | 2537 | 2777 | 3017  | 4096 | 6096 | 7096 | 8096  | 5.5              | 110    | 138     | 6              | 6       |
| 68                                                                        | D            | 5                     | 5040                                                 | 5240 | 5440 | 5640  | 4097 | 6097 | 7097 | 8097  | 7                | 140    | 175     | 6              | 6       |
| 68                                                                        | D            | 10                    | 2298                                                 | 2538 | 2778 | 3018  | 4098 | 6098 | 7098 | 8098  | 7                | 140    | 175     | 6              | 6       |
| 68                                                                        | D            | 20                    | 2299                                                 | 2539 | 2779 | 3019  | 4099 | 6099 | 7099 | 8099  | 7                | 140    | 175     | 6              | 6       |
| 82                                                                        | D            | 5                     | 5041                                                 | 5241 | 5441 | 5641  | 4100 | 6100 | 7100 | 8100  | 8                | 160    | 200     | 6              | 6       |
| 82                                                                        | D            | 10                    | 2300                                                 | 2540 | 2780 | 3020  | 4101 | 6101 | 7101 | 8101  | 8                | 160    | 200     | 6              | 6       |
| 100                                                                       | D            | 5                     | 5042                                                 | 5242 | 5442 | 5642  | 4102 | 6102 | 7102 | 8102  | 10               | 200    | 250     | 8              | 8       |
| 100                                                                       | D            | 10                    | 2301                                                 | 2541 | 2781 | 3021  | 4103 | 6103 | 7103 | 8103  | 10               | 200    | 250     | 8              | 8       |
| 100                                                                       | D            | 20                    | 2302                                                 | 2542 | 2782 | 3022  | 4104 | 6104 | 7104 | 8104  | 10               | 200    | 250     | 8              | 8       |
| 35 V <sub>DC</sub> AT +85 °C, SURGE = 46 V; 23 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |      |       |                  |        |         |                |         |
| 5.6                                                                       | B            | 5                     | 5043                                                 | 5243 | 5443 | 5643  | 4105 | 6105 | 7105 | 8105  | 1.3              | 25     | 32      | 4              | 4       |
| 5.6                                                                       | B            | 10                    | 2303                                                 | 2543 | 2783 | 3023  | 4106 | 6106 | 7106 | 8106  | 1.3              | 25     | 32      | 4              | 4       |
| 6.8                                                                       | B            | 5                     | 5044                                                 | 5244 | 5444 | 5644  | 4107 | 6107 | 7107 | 8107  | 1.5              | 30     | 38      | 6              | 6       |
| 6.8                                                                       | B            | 10                    | 2304                                                 | 2544 | 2784 | 3024  | 4108 | 6108 | 7108 | 8108  | 1.5              | 30     | 38      | 6              | 6       |
| 6.8                                                                       | B            | 20                    | 2305                                                 | 2545 | 2785 | 3025  | 4109 | 6109 | 7109 | 8109  | 1.5              | 30     | 38      | 6              | 6       |
| 22                                                                        | C            | 5                     | 5045                                                 | 5245 | 5445 | 5645  | 4110 | 6110 | 7110 | 8110  | 4                | 80     | 100     | 6              | 6       |
| 22                                                                        | C            | 10                    | 2306                                                 | 2546 | 2786 | 3026  | 4111 | 6111 | 7111 | 8111  | 4                | 80     | 100     | 6              | 6       |
| 22                                                                        | C            | 20                    | 2307                                                 | 2547 | 2787 | 3027  | 4112 | 6112 | 7112 | 8112  | 4                | 80     | 100     | 6              | 6       |
| 27                                                                        | D            | 5                     | 5046                                                 | 5246 | 5446 | 5646  | 4113 | 6113 | 7113 | 8113  | 4.5              | 90     | 113     | 6              | 6       |
| 27                                                                        | D            | 10                    | 2308                                                 | 2548 | 2788 | 3028  | 4114 | 6114 | 7114 | 8114  | 4.5              | 90     | 113     | 6              | 6       |
| 33                                                                        | D            | 5                     | 5047                                                 | 5247 | 5447 | 5647  | 4115 | 6115 | 7115 | 8115  | 5.5              | 110    | 138     | 6              | 6       |
| 33                                                                        | D            | 10                    | 2309                                                 | 2549 | 2789 | 3029  | 4116 | 6116 | 7116 | 8116  | 5.5              | 110    | 138     | 6              | 6       |
| 33                                                                        | D            | 20                    | 2310                                                 | 2550 | 2790 | 3030  | 4117 | 6117 | 7117 | 8117  | 5.5              | 110    | 138     | 6              | 6       |
| 39                                                                        | D            | 5                     | 5048                                                 | 5248 | 5448 | 5648  | 4118 | 6118 | 7118 | 8118  | 7                | 140    | 175     | 6              | 6       |
| 39                                                                        | D            | 10                    | 2311                                                 | 2551 | 2791 | 3031  | 4119 | 6119 | 7119 | 8119  | 7                | 140    | 175     | 6              | 6       |
| 47                                                                        | D            | 5                     | 5049                                                 | 5249 | 5449 | 5649  | 4120 | 6120 | 7120 | 8120  | 8                | 160    | 200     | 6              | 6       |
| 47                                                                        | D            | 10                    | 2312                                                 | 2552 | 2792 | 3032  | 4121 | 6121 | 7121 | 8121  | 8                | 160    | 200     | 6              | 6       |
| 47                                                                        | D            | 20                    | 2313                                                 | 2553 | 2793 | 3033  | 4122 | 6122 | 7122 | 8122  | 8                | 160    | 200     | 6              | 6       |



## STANDARD RATINGS

| CAPACITANCE<br>( $\mu$ F)                                                 | CASE<br>CODE | CAP.<br>TOL.<br>( $\pm$ %) | PART NO. M39003/01-<br>FAILURE RATE LEVEL (%/1000 h) |      |      |       |      |      |      |       | MAX. DCL ( $\mu$ A) AT |        |         | MAX. DF (%) AT |         |
|---------------------------------------------------------------------------|--------------|----------------------------|------------------------------------------------------|------|------|-------|------|------|------|-------|------------------------|--------|---------|----------------|---------|
|                                                                           |              |                            | M                                                    | P    | R    | S     | G    | B    | C    | D     | +25 °C                 | +85 °C | +125 °C | -55 °C         | +85 °C  |
|                                                                           |              |                            | 1.0                                                  | 0.1  | 0.01 | 0.001 | 1.0  | 0.1  | 0.01 | 0.001 |                        |        |         | +25 °C         | +125 °C |
| 50 V <sub>DC</sub> AT +85 °C, SURGE = 65 V; 33 V <sub>DC</sub> AT +125 °C |              |                            |                                                      |      |      |       |      |      |      |       |                        |        |         |                |         |
| 0.033                                                                     | A            | 5                          | 5060                                                 | 5260 | 5460 | 5660  | 4148 | 6148 | 7148 | 8148  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.033                                                                     | A            | 10                         | 2329                                                 | 2569 | 2809 | 3049  | 4149 | 6149 | 7149 | 8149  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.033                                                                     | A            | 20                         | 2330                                                 | 2570 | 2810 | 3050  | 4150 | 6150 | 7150 | 8150  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.039                                                                     | A            | 5                          | 5061                                                 | 5261 | 5461 | 5661  | 4151 | 6151 | 7151 | 8151  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.039                                                                     | A            | 10                         | 2331                                                 | 2571 | 2811 | 3051  | 4152 | 6152 | 7152 | 8152  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.047                                                                     | A            | 5                          | 5062                                                 | 5262 | 5462 | 5662  | 4153 | 6153 | 7153 | 8153  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.047                                                                     | A            | 10                         | 2332                                                 | 2572 | 2812 | 3052  | 4154 | 6154 | 7154 | 8154  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.047                                                                     | A            | 20                         | 2333                                                 | 2573 | 2813 | 3053  | 4155 | 6155 | 7155 | 8155  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.056                                                                     | A            | 5                          | 5063                                                 | 5263 | 5463 | 5663  | 4156 | 6156 | 7156 | 8156  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.056                                                                     | A            | 10                         | 2334                                                 | 2574 | 2814 | 3054  | 4157 | 6157 | 7157 | 8157  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.068                                                                     | A            | 5                          | 5064                                                 | 5264 | 5464 | 5664  | 4158 | 6158 | 7158 | 8158  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.068                                                                     | A            | 10                         | 2335                                                 | 2575 | 2815 | 3055  | 4159 | 6159 | 7159 | 8159  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.068                                                                     | A            | 20                         | 2336                                                 | 2576 | 2816 | 3056  | 4160 | 6160 | 7160 | 8160  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.082                                                                     | A            | 5                          | 5065                                                 | 5265 | 5465 | 5665  | 4161 | 6161 | 7161 | 8161  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.082                                                                     | A            | 10                         | 2337                                                 | 2577 | 2817 | 3057  | 4162 | 6162 | 7162 | 8162  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.10                                                                      | A            | 5                          | 5066                                                 | 5266 | 5466 | 5666  | 4163 | 6163 | 7163 | 8163  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.10                                                                      | A            | 10                         | 2338                                                 | 2578 | 2818 | 3058  | 4164 | 6164 | 7164 | 8164  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.10                                                                      | A            | 20                         | 2339                                                 | 2579 | 2819 | 3059  | 4165 | 6165 | 7165 | 8165  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.12                                                                      | A            | 5                          | 5067                                                 | 5267 | 5467 | 5667  | 4166 | 6166 | 7166 | 8166  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.12                                                                      | A            | 10                         | 2340                                                 | 2580 | 2820 | 3060  | 4167 | 6167 | 7167 | 8167  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.15                                                                      | A            | 5                          | 5068                                                 | 5268 | 5468 | 5668  | 4168 | 6168 | 7168 | 8168  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.15                                                                      | A            | 10                         | 2341                                                 | 2581 | 2821 | 3061  | 4169 | 6169 | 7169 | 8169  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.15                                                                      | A            | 20                         | 2342                                                 | 2582 | 2822 | 3062  | 4170 | 6170 | 7170 | 8170  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.18                                                                      | A            | 5                          | 5069                                                 | 5269 | 5469 | 5669  | 4171 | 6171 | 7171 | 8171  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.18                                                                      | A            | 10                         | 2343                                                 | 2583 | 2823 | 3063  | 4172 | 6172 | 7172 | 8172  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.22                                                                      | A            | 5                          | 5070                                                 | 5270 | 5470 | 5670  | 4173 | 6173 | 7173 | 8173  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.22                                                                      | A            | 10                         | 2344                                                 | 2584 | 2824 | 3064  | 4174 | 6174 | 7174 | 8174  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.22                                                                      | A            | 20                         | 2345                                                 | 2585 | 2825 | 3065  | 4175 | 6175 | 7175 | 8175  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.27                                                                      | A            | 5                          | 5071                                                 | 5271 | 5471 | 5671  | 4176 | 6176 | 7176 | 8176  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.27                                                                      | A            | 10                         | 2346                                                 | 2586 | 2826 | 3066  | 4177 | 6177 | 7177 | 8177  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.33                                                                      | A            | 5                          | 5072                                                 | 5272 | 5472 | 5672  | 4178 | 6178 | 7178 | 8178  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.33                                                                      | A            | 10                         | 2347                                                 | 2587 | 2827 | 3067  | 4179 | 6179 | 7179 | 8179  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.33                                                                      | A            | 20                         | 2348                                                 | 2588 | 2828 | 3068  | 4180 | 6180 | 7180 | 8180  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.39                                                                      | A            | 5                          | 5073                                                 | 5273 | 5473 | 5673  | 4181 | 6181 | 7181 | 8181  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.39                                                                      | A            | 10                         | 2349                                                 | 2589 | 2829 | 3069  | 4182 | 6182 | 7182 | 8182  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.47                                                                      | A            | 5                          | 5074                                                 | 5274 | 5474 | 5674  | 4183 | 6183 | 7183 | 8183  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.47                                                                      | A            | 10                         | 2350                                                 | 2590 | 2830 | 3070  | 4184 | 6184 | 7184 | 8184  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.47                                                                      | A            | 20                         | 2351                                                 | 2591 | 2831 | 3071  | 4185 | 6185 | 7185 | 8185  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.56                                                                      | A            | 5                          | 5075                                                 | 5275 | 5475 | 5675  | 4186 | 6186 | 7186 | 8186  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.56                                                                      | A            | 10                         | 2352                                                 | 2592 | 2832 | 3072  | 4187 | 6187 | 7187 | 8187  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.68                                                                      | A            | 5                          | 5076                                                 | 5276 | 5476 | 5676  | 4188 | 6188 | 7188 | 8188  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.68                                                                      | A            | 10                         | 2353                                                 | 2593 | 2833 | 3073  | 4189 | 6189 | 7189 | 8189  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.68                                                                      | A            | 20                         | 2354                                                 | 2594 | 2834 | 3074  | 4190 | 6190 | 7190 | 8190  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.82                                                                      | A            | 5                          | 5077                                                 | 5277 | 5477 | 5677  | 4191 | 6191 | 7191 | 8191  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 0.82                                                                      | A            | 10                         | 2355                                                 | 2595 | 2835 | 3075  | 4192 | 6192 | 7192 | 8192  | 0.3                    | 5      | 6.3     | 2              | 4       |
| 1.0                                                                       | A            | 5                          | 5078                                                 | 5278 | 5478 | 5678  | 4193 | 6193 | 7193 | 8193  | 0.4                    | 8      | 10      | 2              | 4       |
| 1.0                                                                       | A            | 10                         | 2356                                                 | 2596 | 2836 | 3076  | 4194 | 6194 | 7194 | 8194  | 0.4                    | 8      | 10      | 2              | 4       |
| 1.0                                                                       | A            | 20                         | 2357                                                 | 2597 | 2837 | 3077  | 4195 | 6195 | 7195 | 8195  | 0.4                    | 8      | 10      | 2              | 4       |
| 1.2                                                                       | B            | 5                          | 5079                                                 | 5279 | 5479 | 5679  | 4196 | 6196 | 7196 | 8196  | 0.4                    | 9      | 11      | 4              | 4       |
| 1.2                                                                       | B            | 10                         | 2358                                                 | 2598 | 2838 | 3078  | 4197 | 6197 | 7197 | 8197  | 0.4                    | 9      | 11      | 4              | 4       |
| 1.5                                                                       | B            | 5                          | 5080                                                 | 5280 | 5480 | 5680  | 4198 | 6198 | 7198 | 8198  | 0.6                    | 12     | 15      | 4              | 4       |
| 1.5                                                                       | B            | 10                         | 2359                                                 | 2599 | 2839 | 3079  | 4199 | 6199 | 7199 | 8199  | 0.6                    | 12     | 15      | 4              | 4       |
| 1.5                                                                       | B            | 20                         | 2360                                                 | 2600 | 2840 | 3080  | 4200 | 6200 | 7200 | 8200  | 0.6                    | 12     | 15      | 4              | 4       |
| 1.8                                                                       | B            | 5                          | 5081                                                 | 5281 | 5481 | 5681  | 4201 | 6201 | 7201 | 8201  | 0.7                    | 14     | 18      | 4              | 4       |
| 1.8                                                                       | B            | 10                         | 2361                                                 | 2601 | 2841 | 3081  | 4202 | 6202 | 7202 | 8202  | 0.7                    | 14     | 18      | 4              | 4       |
| 2.2                                                                       | B            | 5                          | 5082                                                 | 5282 | 5482 | 5682  | 4203 | 6203 | 7203 | 8203  | 0.8                    | 17     | 22      | 4              | 4       |
| 2.2                                                                       | B            | 10                         | 2362                                                 | 2602 | 2842 | 3082  | 4204 | 6204 | 7204 | 8204  | 0.8                    | 17     | 22      | 4              | 4       |
| 2.2                                                                       | B            | 20                         | 2363                                                 | 2603 | 2843 | 3083  | 4205 | 6205 | 7205 | 8205  | 0.8                    | 17     | 22      | 4              | 4       |
| 2.7                                                                       | B            | 5                          | 5083                                                 | 5283 | 5483 | 5683  | 4206 | 6206 | 7206 | 8206  | 1                      | 20     | 25      | 4              | 4       |



## STANDARD RATINGS

| CAPACITANCE<br>(μF)                                                       | CASE<br>CODE | CAP.<br>TOL.<br>(± %) | PART NO. M39003/01-<br>FAILURE RATE LEVEL (%/1000 h) |      |      |       |      |      |      |       | MAX. DCL (μA) AT |        |         | MAX. DF (%) AT |         |
|---------------------------------------------------------------------------|--------------|-----------------------|------------------------------------------------------|------|------|-------|------|------|------|-------|------------------|--------|---------|----------------|---------|
|                                                                           |              |                       | M                                                    | P    | R    | S     | G    | B    | C    | D     | +25 °C           | +85 °C | +125 °C | -55 °C         | +85 °C  |
|                                                                           |              |                       | 1.0                                                  | 0.1  | 0.01 | 0.001 | 1.0  | 0.1  | 0.01 | 0.001 |                  |        |         | +25 °C         | +125 °C |
| 50 V <sub>DC</sub> AT +85 °C, SURGE = 65 V; 33 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |      |       |                  |        |         |                |         |
| 2.7                                                                       | B            | 10                    | 2364                                                 | 2604 | 2844 | 3084  | 4207 | 6207 | 7207 | 8207  | 1                | 20     | 25      | 4              | 4       |
| 3.3                                                                       | B            | 5                     | 5084                                                 | 5284 | 5484 | 5684  | 4208 | 6208 | 7208 | 8208  | 1.2              | 25     | 32      | 4              | 4       |
| 3.3                                                                       | B            | 10                    | 2365                                                 | 2605 | 2845 | 3085  | 4209 | 6209 | 7209 | 8209  | 1.2              | 25     | 32      | 4              | 4       |
| 3.3                                                                       | B            | 20                    | 2366                                                 | 2606 | 2846 | 3086  | 4210 | 6210 | 7210 | 8210  | 1.2              | 25     | 32      | 4              | 4       |
| 3.9                                                                       | B            | 5                     | 5085                                                 | 5285 | 5485 | 5685  | 4211 | 6211 | 7211 | 8211  | 1.5              | 30     | 38      | 4              | 4       |
| 3.9                                                                       | B            | 10                    | 2367                                                 | 2607 | 2847 | 3087  | 4212 | 6212 | 7212 | 8212  | 1.5              | 30     | 38      | 4              | 4       |
| 4.7                                                                       | B            | 5                     | 5086                                                 | 5286 | 5486 | 5686  | 4213 | 6213 | 7213 | 8213  | 1.7              | 35     | 44      | 4              | 4       |
| 4.7                                                                       | B            | 10                    | 2368                                                 | 2608 | 2848 | 3088  | 4214 | 6214 | 7214 | 8214  | 1.7              | 35     | 44      | 4              | 4       |
| 4.7                                                                       | B            | 20                    | 2369                                                 | 2609 | 2849 | 3089  | 4215 | 6215 | 7215 | 8215  | 1.7              | 35     | 44      | 4              | 4       |
| 5.6                                                                       | C            | 5                     | 5087                                                 | 5287 | 5487 | 5687  | 4216 | 6216 | 7216 | 8216  | 2.2              | 45     | 56      | 4              | 4       |
| 5.6                                                                       | C            | 10                    | 2370                                                 | 2610 | 2850 | 3090  | 4217 | 6217 | 7217 | 8217  | 2.2              | 45     | 56      | 4              | 4       |
| 6.8                                                                       | C            | 5                     | 5088                                                 | 5288 | 5488 | 5688  | 4218 | 6218 | 7218 | 8218  | 2.2              | 45     | 56      | 6              | 6       |
| 6.8                                                                       | C            | 10                    | 2371                                                 | 2611 | 2851 | 3091  | 4219 | 6219 | 7219 | 8219  | 2.2              | 45     | 56      | 6              | 6       |
| 6.8                                                                       | C            | 20                    | 2372                                                 | 2612 | 2852 | 3092  | 4220 | 6220 | 7220 | 8220  | 2.2              | 45     | 56      | 6              | 6       |
| 8.2                                                                       | C            | 5                     | 5089                                                 | 5289 | 5489 | 5689  | 4221 | 6221 | 7221 | 8221  | 2.5              | 50     | 63      | 6              | 6       |
| 8.2                                                                       | C            | 10                    | 2373                                                 | 2613 | 2853 | 3093  | 4222 | 6222 | 7222 | 8222  | 2.5              | 50     | 63      | 6              | 6       |
| 10                                                                        | C            | 5                     | 5090                                                 | 5290 | 5490 | 5690  | 4223 | 6223 | 7223 | 8223  | 2.5              | 50     | 63      | 6              | 6       |
| 10                                                                        | C            | 10                    | 2374                                                 | 2614 | 2854 | 3094  | 4224 | 6224 | 7224 | 8224  | 2.5              | 50     | 63      | 6              | 6       |
| 10                                                                        | C            | 20                    | 2375                                                 | 2615 | 2855 | 3095  | 4225 | 6225 | 7225 | 8225  | 2.5              | 50     | 63      | 6              | 6       |
| 12                                                                        | C            | 5                     | 5091                                                 | 5291 | 5491 | 5691  | 4226 | 6226 | 7226 | 8226  | 3                | 60     | 75      | 6              | 6       |
| 12                                                                        | C            | 10                    | 2376                                                 | 2616 | 2856 | 3096  | 4227 | 6227 | 7227 | 8227  | 3                | 60     | 75      | 6              | 6       |
| 15                                                                        | C            | 5                     | 5092                                                 | 5292 | 5492 | 5692  | 4228 | 6228 | 7228 | 8228  | 4                | 80     | 100     | 6              | 6       |
| 15                                                                        | C            | 10                    | 2377                                                 | 2617 | 2857 | 3097  | 4229 | 6229 | 7229 | 8229  | 4                | 80     | 100     | 6              | 6       |
| 15                                                                        | C            | 20                    | 2378                                                 | 2618 | 2858 | 3098  | 4230 | 6230 | 7230 | 8230  | 4                | 80     | 100     | 6              | 6       |
| 18                                                                        | C            | 5                     | 5093                                                 | 5293 | 5493 | 5693  | 4231 | 6231 | 7231 | 8231  | 4.5              | 90     | 113     | 6              | 6       |
| 18                                                                        | C            | 10                    | 2379                                                 | 2619 | 2859 | 3099  | 4232 | 6232 | 7232 | 8232  | 4.5              | 90     | 113     | 6              | 6       |
| 22                                                                        | D            | 5                     | 5094                                                 | 5294 | 5494 | 5694  | 4233 | 6233 | 7233 | 8233  | 5.5              | 110    | 138     | 6              | 6       |
| 22                                                                        | D            | 10                    | 2380                                                 | 2620 | 2860 | 3100  | 4234 | 6234 | 7234 | 8234  | 5.5              | 110    | 138     | 6              | 6       |
| 22                                                                        | D            | 20                    | 2381                                                 | 2621 | 2861 | 3101  | 4235 | 6235 | 7235 | 8235  | 5.5              | 110    | 138     | 6              | 6       |
| 75 V <sub>DC</sub> AT +85 °C, SURGE = 98 V; 50 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |      |       |                  |        |         |                |         |
| 0.10                                                                      | A            | 5                     | 5095                                                 | 5295 | 5495 | 5695  | 4236 | 6236 | 7236 | 8236  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.10                                                                      | A            | 10                    | 2382                                                 | 2622 | 2862 | 3102  | 4237 | 6237 | 7237 | 8237  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.10                                                                      | A            | 20                    | 2383                                                 | 2623 | 2863 | 3103  | 4238 | 6238 | 7238 | 8238  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.12                                                                      | A            | 5                     | 5096                                                 | 5296 | 5496 | 5696  | 4239 | 6239 | 7239 | 8239  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.12                                                                      | A            | 10                    | 2384                                                 | 2624 | 2864 | 3104  | 4240 | 6240 | 7240 | 8240  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.15                                                                      | A            | 5                     | 5097                                                 | 5297 | 5497 | 5697  | 4241 | 6241 | 7241 | 8241  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.15                                                                      | A            | 10                    | 2385                                                 | 2625 | 2865 | 3105  | 4242 | 6242 | 7242 | 8242  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.15                                                                      | A            | 20                    | 2386                                                 | 2626 | 2866 | 3106  | 4243 | 6243 | 7243 | 8243  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.18                                                                      | A            | 5                     | 5098                                                 | 5298 | 5498 | 5698  | 4244 | 6244 | 7244 | 8244  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.18                                                                      | A            | 10                    | 2387                                                 | 2627 | 2867 | 3107  | 4245 | 6245 | 7245 | 8245  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.22                                                                      | A            | 5                     | 5099                                                 | 5299 | 5499 | 5699  | 4246 | 6246 | 7246 | 8246  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.22                                                                      | A            | 10                    | 2388                                                 | 2628 | 2868 | 3108  | 4247 | 6247 | 7247 | 8247  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.22                                                                      | A            | 20                    | 2389                                                 | 2629 | 2869 | 3109  | 4248 | 6248 | 7248 | 8248  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.27                                                                      | A            | 5                     | 5100                                                 | 5300 | 5500 | 5700  | 4249 | 6249 | 7249 | 8249  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.27                                                                      | A            | 10                    | 2390                                                 | 2630 | 2870 | 3110  | 4250 | 6250 | 7250 | 8250  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.33                                                                      | A            | 5                     | 5101                                                 | 5301 | 5501 | 5701  | 4251 | 6251 | 7251 | 8251  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.33                                                                      | A            | 10                    | 2391                                                 | 2631 | 2871 | 3111  | 4252 | 6252 | 7252 | 8252  | 0.3              | 5      | 6.3     | 2              | 4       |



## STANDARD RATINGS

| CAPACITANCE<br>(μF)                                                       | CASE<br>CODE | CAP.<br>TOL.<br>(± %) | PART NO. M39003/01-<br>FAILURE RATE LEVEL (%/1000 h) |      |      |       |      |      |      |       | MAX. DCL (μA) AT |        |         | MAX. DF (%) AT |         |
|---------------------------------------------------------------------------|--------------|-----------------------|------------------------------------------------------|------|------|-------|------|------|------|-------|------------------|--------|---------|----------------|---------|
|                                                                           |              |                       | M                                                    | P    | R    | S     | G    | B    | C    | D     | +25 °C           | +85 °C | +125 °C | -55 °C         | +85 °C  |
|                                                                           |              |                       | 1.0                                                  | 0.1  | 0.01 | 0.001 | 1.0  | 0.1  | 0.01 | 0.001 |                  |        |         | +25 °C         | +125 °C |
| 75 V <sub>DC</sub> AT +85 °C, SURGE = 98 V; 50 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |      |       |                  |        |         |                |         |
| 0.33                                                                      | A            | 20                    | 2392                                                 | 2632 | 2872 | 3112  | 4253 | 6253 | 7253 | 8253  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.39                                                                      | A            | 5                     | 5102                                                 | 5302 | 5502 | 5702  | 4254 | 6254 | 7254 | 8254  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.39                                                                      | A            | 10                    | 2393                                                 | 2633 | 2873 | 3113  | 4255 | 6255 | 7255 | 8255  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.47                                                                      | A            | 5                     | 5103                                                 | 5303 | 5503 | 5703  | 4256 | 6256 | 7256 | 8256  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.47                                                                      | A            | 10                    | 2394                                                 | 2634 | 2874 | 3114  | 4257 | 6257 | 7257 | 8257  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.47                                                                      | A            | 20                    | 2395                                                 | 2635 | 2875 | 3115  | 4258 | 6258 | 7258 | 8258  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.56                                                                      | A            | 5                     | 5104                                                 | 5304 | 5504 | 5704  | 4259 | 6259 | 7259 | 8259  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.56                                                                      | A            | 10                    | 2396                                                 | 2636 | 2876 | 3116  | 4260 | 6260 | 7260 | 8260  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.68                                                                      | A            | 5                     | 5105                                                 | 5305 | 5505 | 5705  | 4261 | 6261 | 7261 | 8261  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.68                                                                      | A            | 10                    | 2397                                                 | 2637 | 2877 | 3117  | 4262 | 6262 | 7262 | 8262  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.68                                                                      | A            | 20                    | 2398                                                 | 2638 | 2878 | 3118  | 4263 | 6263 | 7263 | 8263  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.82                                                                      | B            | 5                     | 5106                                                 | 5306 | 5506 | 5706  | 4264 | 6264 | 7264 | 8264  | 0.3              | 5      | 6.3     | 2              | 4       |
| 0.82                                                                      | B            | 10                    | 2399                                                 | 2639 | 2879 | 3119  | 4265 | 6265 | 7265 | 8265  | 0.3              | 5      | 6.3     | 2              | 4       |
| 1.0                                                                       | B            | 5                     | 5107                                                 | 5307 | 5507 | 5707  | 4266 | 6266 | 7266 | 8266  | 0.3              | 5      | 6.3     | 2              | 4       |
| 1.0                                                                       | B            | 10                    | 2400                                                 | 2640 | 2880 | 3120  | 4267 | 6267 | 7267 | 8267  | 0.3              | 5      | 6.3     | 2              | 4       |
| 1.0                                                                       | B            | 20                    | 2401                                                 | 2641 | 2881 | 3121  | 4268 | 6268 | 7268 | 8268  | 0.3              | 5      | 6.3     | 2              | 4       |
| 1.2                                                                       | B            | 5                     | 5108                                                 | 5308 | 5508 | 5708  | 4269 | 6269 | 7269 | 8269  | 0.3              | 5      | 6.3     | 4              | 4       |
| 1.2                                                                       | B            | 10                    | 2402                                                 | 2642 | 2882 | 3122  | 4270 | 6270 | 7270 | 8270  | 0.3              | 5      | 6.3     | 4              | 4       |
| 1.5                                                                       | B            | 5                     | 5109                                                 | 5309 | 5509 | 5709  | 4271 | 6271 | 7271 | 8271  | 0.6              | 10     | 13      | 4              | 4       |
| 1.5                                                                       | B            | 10                    | 2403                                                 | 2643 | 2883 | 3123  | 4272 | 6272 | 7272 | 8272  | 0.6              | 10     | 13      | 4              | 4       |
| 1.5                                                                       | B            | 20                    | 2404                                                 | 2644 | 2884 | 3124  | 4273 | 6273 | 7273 | 8273  | 0.6              | 10     | 13      | 4              | 4       |
| 1.8                                                                       | B            | 5                     | 5110                                                 | 5310 | 5510 | 5710  | 4274 | 6274 | 7274 | 8274  | 0.7              | 10     | 13      | 4              | 4       |
| 1.8                                                                       | B            | 10                    | 2405                                                 | 2645 | 2885 | 3125  | 4275 | 6275 | 7275 | 8275  | 0.7              | 10     | 13      | 4              | 4       |
| 2.2                                                                       | B            | 5                     | 5111                                                 | 5311 | 5511 | 5711  | 4276 | 6276 | 7276 | 8276  | 0.8              | 15     | 19      | 4              | 4       |
| 2.2                                                                       | B            | 10                    | 2406                                                 | 2646 | 2886 | 3126  | 4277 | 6277 | 7277 | 8277  | 0.8              | 15     | 19      | 4              | 4       |
| 2.2                                                                       | B            | 20                    | 2407                                                 | 2647 | 2887 | 3127  | 4278 | 6278 | 7278 | 8278  | 0.8              | 15     | 19      | 4              | 4       |
| 2.7                                                                       | B            | 5                     | 5112                                                 | 5312 | 5512 | 5712  | 4279 | 6279 | 7279 | 8279  | 1                | 15     | 19      | 4              | 4       |
| 2.7                                                                       | B            | 10                    | 2408                                                 | 2648 | 2888 | 3128  | 4280 | 6280 | 7280 | 8280  | 1                | 15     | 19      | 4              | 4       |
| 3.3                                                                       | B            | 5                     | 5113                                                 | 5313 | 5513 | 5713  | 4281 | 6281 | 7281 | 8281  | 1.2              | 20     | 25      | 4              | 4       |
| 3.3                                                                       | B            | 10                    | 2409                                                 | 2649 | 2889 | 3129  | 4282 | 6282 | 7282 | 8282  | 1.2              | 20     | 25      | 4              | 4       |
| 3.3                                                                       | B            | 20                    | 2410                                                 | 2650 | 2890 | 3130  | 4283 | 6283 | 7283 | 8283  | 1.2              | 20     | 25      | 4              | 4       |
| 3.9                                                                       | B            | 5                     | 5114                                                 | 5314 | 5514 | 5714  | 4284 | 6284 | 7284 | 8284  | 1.5              | 20     | 25      | 4              | 4       |
| 3.9                                                                       | B            | 10                    | 2411                                                 | 2651 | 2891 | 3131  | 4285 | 6285 | 7285 | 8285  | 1.5              | 20     | 25      | 4              | 4       |
| 4.7                                                                       | C            | 5                     | 5115                                                 | 5315 | 5515 | 5715  | 4286 | 6286 | 7286 | 8286  | 3                | 60     | 75      | 4              | 4       |
| 4.7                                                                       | C            | 10                    | 2412                                                 | 2652 | 2892 | 3132  | 4287 | 6287 | 7287 | 8287  | 3                | 60     | 75      | 4              | 4       |
| 4.7                                                                       | C            | 20                    | 2413                                                 | 2653 | 2893 | 3133  | 4288 | 6288 | 7288 | 8288  | 3                | 60     | 75      | 4              | 4       |
| 5.6                                                                       | C            | 5                     | 5116                                                 | 5316 | 5516 | 5716  | 4289 | 6289 | 7289 | 8289  | 3                | 60     | 75      | 4              | 4       |
| 5.6                                                                       | C            | 10                    | 2414                                                 | 2654 | 2894 | 3134  | 4290 | 6290 | 7290 | 8290  | 3                | 60     | 75      | 4              | 4       |
| 6.8                                                                       | C            | 5                     | 5117                                                 | 5317 | 5517 | 5717  | 4291 | 6291 | 7291 | 8291  | 5                | 100    | 125     | 6              | 6       |
| 6.8                                                                       | C            | 10                    | 2415                                                 | 2655 | 2895 | 3135  | 4292 | 6292 | 7292 | 8292  | 5                | 100    | 125     | 6              | 6       |
| 6.8                                                                       | C            | 20                    | 2416                                                 | 2656 | 2896 | 3136  | 4293 | 6293 | 7293 | 8293  | 5                | 100    | 125     | 6              | 6       |
| 8.2                                                                       | C            | 5                     | 5118                                                 | 5318 | 5518 | 5718  | 4294 | 6294 | 7294 | 8294  | 5                | 100    | 125     | 6              | 6       |
| 8.2                                                                       | C            | 10                    | 2417                                                 | 2657 | 2897 | 3137  | 4295 | 6295 | 7295 | 8295  | 5                | 100    | 125     | 6              | 6       |
| 10                                                                        | C            | 5                     | 5119                                                 | 5319 | 5519 | 5719  | 4296 | 6296 | 7296 | 8296  | 5                | 100    | 125     | 6              | 6       |
| 10                                                                        | C            | 10                    | 2418                                                 | 2658 | 2898 | 3138  | 4297 | 6297 | 7297 | 8297  | 5                | 100    | 125     | 6              | 6       |
| 10                                                                        | C            | 20                    | 2419                                                 | 2659 | 2899 | 3139  | 4298 | 6298 | 7298 | 8298  | 5                | 100    | 125     | 6              | 6       |
| 12                                                                        | D            | 5                     | 5120                                                 | 5320 | 5520 | 5720  | 4299 | 6299 | 7299 | 8299  | 5                | 100    | 125     | 6              | 6       |
| 12                                                                        | D            | 10                    | 2420                                                 | 2660 | 2900 | 3140  | 4300 | 6300 | 7300 | 8300  | 5                | 100    | 125     | 6              | 6       |
| 15                                                                        | D            | 5                     | 5121                                                 | 5321 | 5521 | 5721  | 4301 | 6301 | 7301 | 8301  | 7                | 140    | 175     | 6              | 6       |
| 15                                                                        | D            | 10                    | 2421                                                 | 2661 | 2901 | 3141  | 4302 | 6302 | 7302 | 8302  | 7                | 140    | 175     | 6              | 6       |
| 15                                                                        | D            | 20                    | 2422                                                 | 2662 | 2902 | 3142  | 4303 | 6303 | 7303 | 8303  | 7                | 140    | 175     | 6              | 6       |



## STANDARD RATINGS

| CAPACITANCE<br>(μF)                                                         | CASE<br>CODE | CAP.<br>TOL.<br>(± %) | PART NO. M39003/01-<br>FAILURE RATE LEVEL (%/1000 h) |      |      |       |      |      |      |       | MAX. DCL (μA) AT |        |         | MAX. DF (%) AT   |                   |
|-----------------------------------------------------------------------------|--------------|-----------------------|------------------------------------------------------|------|------|-------|------|------|------|-------|------------------|--------|---------|------------------|-------------------|
|                                                                             |              |                       | M                                                    | P    | R    | S     | G    | B    | C    | D     | +25 °C           | +85 °C | +125 °C | -55 °C<br>+25 °C | +85 °C<br>+125 °C |
|                                                                             |              |                       | 1.0                                                  | 0.1  | 0.01 | 0.001 | 1.0  | 0.1  | 0.01 | 0.001 |                  |        |         |                  |                   |
| 100 V <sub>DC</sub> AT +85 °C, SURGE = 130 V; 67 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |      |       |                  |        |         |                  |                   |
| 0.033                                                                       | A            | 5                     | 5132                                                 | 5332 | 5532 | 5732  | 4329 | 6329 | 7329 | 8329  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.033                                                                       | A            | 10                    | 2438                                                 | 2678 | 2918 | 3158  | 4330 | 6330 | 7330 | 8330  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.033                                                                       | A            | 20                    | 2439                                                 | 2679 | 2919 | 3159  | 4331 | 6331 | 7331 | 8331  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.039                                                                       | A            | 5                     | 5133                                                 | 5333 | 5533 | 5733  | 4332 | 6332 | 7332 | 8332  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.039                                                                       | A            | 10                    | 2440                                                 | 2680 | 2920 | 3160  | 4333 | 6333 | 7333 | 8333  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.047                                                                       | A            | 5                     | 5134                                                 | 5334 | 5534 | 5734  | 4334 | 6334 | 7334 | 8334  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.047                                                                       | A            | 10                    | 2441                                                 | 2681 | 2921 | 3161  | 4335 | 6335 | 7335 | 8335  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.047                                                                       | A            | 20                    | 2442                                                 | 2682 | 2922 | 3162  | 4336 | 6336 | 7336 | 8336  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.056                                                                       | A            | 5                     | 5135                                                 | 5335 | 5535 | 5735  | 4337 | 6337 | 7337 | 8337  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.056                                                                       | A            | 10                    | 2443                                                 | 2683 | 2923 | 3163  | 4338 | 6338 | 7338 | 8338  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.068                                                                       | A            | 5                     | 5136                                                 | 5336 | 5536 | 5736  | 4339 | 6339 | 7339 | 8339  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.068                                                                       | A            | 10                    | 2444                                                 | 2684 | 2924 | 3164  | 4340 | 6340 | 7340 | 8340  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.068                                                                       | A            | 20                    | 2445                                                 | 2685 | 2925 | 3165  | 4341 | 6341 | 7341 | 8341  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.082                                                                       | A            | 5                     | 5137                                                 | 5337 | 5537 | 5737  | 4342 | 6342 | 7342 | 8342  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.082                                                                       | A            | 10                    | 2446                                                 | 2686 | 2926 | 3166  | 4343 | 6343 | 7343 | 8343  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.10                                                                        | A            | 5                     | 5138                                                 | 5338 | 5538 | 5738  | 4344 | 6344 | 7344 | 8344  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.10                                                                        | A            | 10                    | 2447                                                 | 2687 | 2927 | 3167  | 4345 | 6345 | 7345 | 8345  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.10                                                                        | A            | 20                    | 2448                                                 | 2688 | 2928 | 3168  | 4346 | 6346 | 7346 | 8346  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.12                                                                        | A            | 5                     | 5139                                                 | 5339 | 5539 | 5739  | 4347 | 6347 | 7347 | 8347  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.12                                                                        | A            | 10                    | 2449                                                 | 2689 | 2929 | 3169  | 4348 | 6348 | 7348 | 8348  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.15                                                                        | A            | 5                     | 5140                                                 | 5340 | 5540 | 5740  | 4349 | 6349 | 7349 | 8349  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.15                                                                        | A            | 10                    | 2450                                                 | 2690 | 2930 | 3170  | 4350 | 6350 | 7350 | 8350  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.15                                                                        | A            | 20                    | 2451                                                 | 2691 | 2931 | 3171  | 4351 | 6351 | 7351 | 8351  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.18                                                                        | A            | 5                     | 5141                                                 | 5341 | 5541 | 5741  | 4352 | 6352 | 7352 | 8352  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.18                                                                        | A            | 10                    | 2452                                                 | 2692 | 2932 | 3172  | 4353 | 6353 | 7353 | 8353  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.22                                                                        | A            | 5                     | 5142                                                 | 5342 | 5542 | 5742  | 4354 | 6354 | 7354 | 8354  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.22                                                                        | A            | 10                    | 2453                                                 | 2693 | 2933 | 3173  | 4355 | 6355 | 7355 | 8355  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.22                                                                        | A            | 20                    | 2454                                                 | 2694 | 2934 | 3174  | 4356 | 6356 | 7356 | 8356  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.27                                                                        | A            | 5                     | 5143                                                 | 5343 | 5543 | 5743  | 4357 | 6357 | 7357 | 8357  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.27                                                                        | A            | 10                    | 2455                                                 | 2695 | 2935 | 3175  | 4358 | 6358 | 7358 | 8358  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.33                                                                        | A            | 5                     | 5144                                                 | 5344 | 5544 | 5744  | 4359 | 6359 | 7359 | 8359  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.33                                                                        | A            | 10                    | 2456                                                 | 2696 | 2936 | 3176  | 4360 | 6360 | 7360 | 8360  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.33                                                                        | A            | 20                    | 2457                                                 | 2697 | 2937 | 3177  | 4361 | 6361 | 7361 | 8361  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.39                                                                        | A            | 5                     | 5145                                                 | 5345 | 5545 | 5745  | 4362 | 6362 | 7362 | 8362  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.39                                                                        | A            | 10                    | 2458                                                 | 2698 | 2938 | 3178  | 4363 | 6363 | 7363 | 8363  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.47                                                                        | A            | 5                     | 5146                                                 | 5346 | 5546 | 5746  | 4364 | 6364 | 7364 | 8364  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.47                                                                        | A            | 10                    | 2459                                                 | 2699 | 2939 | 3179  | 4365 | 6365 | 7365 | 8365  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.47                                                                        | A            | 20                    | 2460                                                 | 2700 | 2940 | 3180  | 4366 | 6366 | 7366 | 8366  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.56                                                                        | A            | 5                     | 5147                                                 | 5347 | 5547 | 5747  | 4367 | 6367 | 7367 | 8367  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.56                                                                        | A            | 10                    | 2461                                                 | 2701 | 2941 | 3181  | 4368 | 6368 | 7368 | 8368  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.68                                                                        | B            | 5                     | 5148                                                 | 5348 | 5548 | 5748  | 4369 | 6369 | 7369 | 8369  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.68                                                                        | B            | 10                    | 2462                                                 | 2702 | 2942 | 3182  | 4370 | 6370 | 7370 | 8370  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.68                                                                        | B            | 20                    | 2463                                                 | 2703 | 2943 | 3183  | 4371 | 6371 | 7371 | 8371  | 0.3              | 5      | 6.3     | 2                | 4                 |
| 0.82                                                                        | B            | 5                     | 5149                                                 | 5349 | 5549 | 5749  | 4372 | 6372 | 7372 | 8372  | 0.4              | 5      | 6.3     | 2                | 4                 |
| 0.82                                                                        | B            | 10                    | 2464                                                 | 2704 | 2944 | 3184  | 4373 | 6373 | 7373 | 8373  | 0.4              | 5      | 6.3     | 2                | 4                 |
| 1.0                                                                         | B            | 5                     | 5150                                                 | 5350 | 5550 | 5750  | 4374 | 6374 | 7374 | 8374  | 0.5              | 5      | 6.3     | 2                | 4                 |



## STANDARD RATINGS

| CAPACITANCE<br>(μF)                                                         | CASE<br>CODE | CAP.<br>TOL.<br>(± %) | PART NO. M39003/01-<br>FAILURE RATE LEVEL (%/1000 h) |      |      |       |      |      |            |            | MAX. DCL (μA) AT |        |         | MAX. DF (%) AT   |                   |
|-----------------------------------------------------------------------------|--------------|-----------------------|------------------------------------------------------|------|------|-------|------|------|------------|------------|------------------|--------|---------|------------------|-------------------|
|                                                                             |              |                       | M                                                    | P    | R    | S     | G    | B    | C          | D          | +25 °C           | +85 °C | +125 °C | -55 °C<br>+25 °C | +85 °C<br>+125 °C |
|                                                                             |              |                       | 1.0                                                  | 0.1  | 0.01 | 0.001 | 1.0  | 0.1  | 0.01       | 0.001      |                  |        |         |                  |                   |
| 100 V <sub>DC</sub> AT +85 °C, SURGE = 130 V; 67 V <sub>DC</sub> AT +125 °C |              |                       |                                                      |      |      |       |      |      |            |            |                  |        |         |                  |                   |
| 1.0                                                                         | B            | 10                    | 2465                                                 | 2705 | 2945 | 3185  | 4375 | 6375 | 7375       | 8375       | 0.5              | 5      | 6.3     | 2                | 4                 |
| 1.0                                                                         | B            | 20                    | 2466                                                 | 2706 | 2946 | 3186  | 4376 | 6376 | 7376       | 8376       | 0.5              | 5      | 6.3     | 2                | 4                 |
| 1.2                                                                         | B            | 5                     | 5151                                                 | 5351 | 5551 | 5751  | 4377 | 6377 | 7377       | 8377       | 0.5              | 5      | 6.3     | 4                | 4                 |
| 1.2                                                                         | B            | 10                    | 2467                                                 | 2707 | 2947 | 3187  | 4378 | 6378 | 7378       | 8378       | 0.5              | 5      | 6.3     | 4                | 4                 |
| 1.5                                                                         | B            | 5                     | 5152                                                 | 5352 | 5552 | 5752  | 4379 | 6379 | 7379       | 8379       | 0.7              | 10     | 13      | 4                | 4                 |
| 1.5                                                                         | B            | 10                    | 2468                                                 | 2708 | 2948 | 3188  | 4380 | 6380 | 7380       | 8380       | 0.7              | 10     | 13      | 4                | 4                 |
| 1.5                                                                         | B            | 20                    | 2469                                                 | 2709 | 2949 | 3189  | 4381 | 6381 | 7381       | 8381       | 0.7              | 10     | 13      | 4                | 4                 |
| 1.8                                                                         | B            | 5                     | 5153                                                 | 5353 | 5553 | 5753  | 4382 | 6382 | 7382       | 8382       | 0.7              | 10     | 13      | 4                | 4                 |
| 1.8                                                                         | B            | 10                    | 2470                                                 | 2710 | 2950 | 3190  | 4383 | 6383 | 7383       | 8383       | 0.7              | 10     | 13      | 4                | 4                 |
| 2.2                                                                         | B            | 5                     | 5154                                                 | 5354 | 5554 | 5754  | 4384 | 6384 | 7384       | 8384       | 0.9              | 15     | 19      | 4                | 4                 |
| 2.2                                                                         | B            | 10                    | 2471                                                 | 2711 | 2951 | 3191  | 4385 | 6385 | 7385       | 8385       | 0.9              | 15     | 19      | 4                | 4                 |
| 2.2                                                                         | B            | 20                    | 2472                                                 | 2712 | 2952 | 3192  | 4386 | 6386 | 7386       | 8386       | 0.9              | 15     | 19      | 4                | 4                 |
| 2.7                                                                         | B            | 5                     | 5155                                                 | 5355 | 5555 | 5755  | 4387 | 6387 | 7387       | 8387       | 1.1              | 15     | 19      | 4                | 4                 |
| 2.7                                                                         | B            | 10                    | 2473                                                 | 2713 | 2953 | 3193  | 4388 | 6388 | 7388       | 8388       | 1.1              | 15     | 19      | 4                | 4                 |
| 3.3                                                                         | C            | 5                     | 5156                                                 | 5356 | 5556 | 5756  | 4389 | 6389 | Not<br>QPL | Not<br>QPL | 1.5              | 30     | 38      | 6                | 6                 |
| 3.3                                                                         | C            | 10                    | 5157                                                 | 5357 | 5557 | 5757  | 4390 | 6390 | Not<br>QPL | Not<br>QPL | 1.5              | 30     | 38      | 6                | 6                 |
| 3.3                                                                         | C            | 20                    | 5158                                                 | 5358 | 5558 | 5758  | 4391 | 6391 | Not<br>QPL | Not<br>QPL | 1.5              | 30     | 38      | 6                | 6                 |
| 3.9                                                                         | C            | 5                     | 5159                                                 | 5359 | 5559 | 5759  | 4392 | 6392 | Not<br>QPL | Not<br>QPL | 1.5              | 30     | 38      | 6                | 6                 |
| 3.9                                                                         | C            | 10                    | 5160                                                 | 5360 | 5560 | 5760  | 4393 | 6393 | Not<br>QPL | Not<br>QPL | 1.5              | 30     | 38      | 6                | 6                 |
| 4.7                                                                         | C            | 5                     | 5161                                                 | 5361 | 5561 | 5761  | 4394 | 6394 | Not<br>QPL | Not<br>QPL | 2.5              | 50     | 63      | 6                | 6                 |
| 4.7                                                                         | C            | 10                    | 5162                                                 | 5362 | 5562 | 5762  | 4395 | 6395 | Not<br>QPL | Not<br>QPL | 2.5              | 50     | 63      | 6                | 6                 |
| 4.7                                                                         | C            | 20                    | 5163                                                 | 5363 | 5563 | 5763  | 4396 | 6396 | Not<br>QPL | Not<br>QPL | 2.5              | 50     | 63      | 6                | 6                 |
| 5.6                                                                         | C            | 5                     | 5164                                                 | 5364 | 5564 | 5764  | 4397 | 6397 | Not<br>QPL | Not<br>QPL | 2.5              | 50     | 63      | 6                | 6                 |
| 5.6                                                                         | C            | 10                    | 5165                                                 | 5365 | 5565 | 5765  | 4398 | 6398 | Not<br>QPL | Not<br>QPL | 2.5              | 50     | 63      | 6                | 6                 |
| 6.8                                                                         | C            | 5                     | 5166                                                 | 5366 | 5566 | 5766  | 4399 | 6399 | Not<br>QPL | Not<br>QPL | 2.5              | 50     | 63      | 6                | 6                 |
| 6.8                                                                         | C            | 10                    | 5167                                                 | 5367 | 5567 | 5767  | 4400 | 6400 | Not<br>QPL | Not<br>QPL | 2.5              | 50     | 63      | 6                | 6                 |
| 6.8                                                                         | C            | 20                    | 5168                                                 | 5368 | 5568 | 5768  | 4401 | 6401 | Not<br>QPL | Not<br>QPL | 2.5              | 50     | 63      | 6                | 6                 |

**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 |
| A         | 1000                       | 500              | 100                 | n/a           | 100     |
| B         | 1000                       | 500              | 100                 | 20            | 100     |
| C         | 500                        | 250              | 100                 | 20            | 100     |
| D         | 500                        | 250              | 100                 | 20            | 80      |

**INSIDE TAPE SPACING**

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

**PRODUCT INFORMATION**

|                                                                                |                                                                        |
|--------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Quick Reference Guide                                                          | <a href="http://www.vishay.com/doc?40037">www.vishay.com/doc?40037</a> |
| Selector Guide                                                                 | <a href="http://www.vishay.com/doc?49054">www.vishay.com/doc?49054</a> |
| Parameter Comparison Guide                                                     | <a href="http://www.vishay.com/doc?40033">www.vishay.com/doc?40033</a> |
| Mounting of Through-Hole Components                                            | <a href="http://www.vishay.com/doc?40108">www.vishay.com/doc?40108</a> |
| Frequently Asked Questions                                                     | <a href="http://www.vishay.com/doc?40110">www.vishay.com/doc?40110</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> |



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