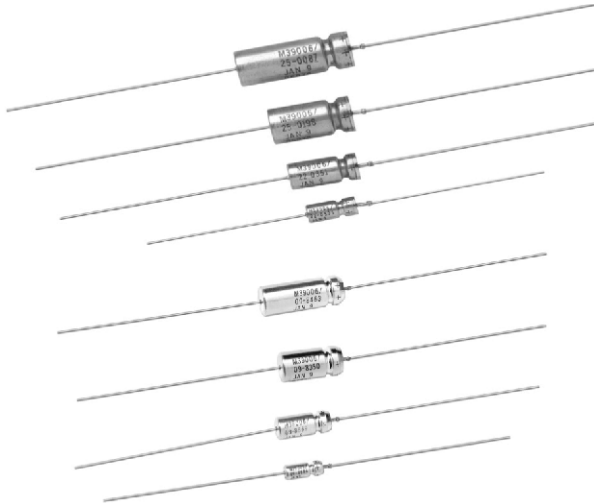




# Wet Tantalum Capacitors, Military Established Reliability, MIL-PRF-39006/22/25 Qualified Styles CLR79, CLR81



### FEATURES

- Hermetically sealed
- Metal cased
- Axial lead
- Tubular

### STYLE, MILITARY SPECIFICATION

- CLR79, M39006/22 MIL-PRF-39006/22
- CLR81, M39006/25 MIL-PRF-39006/25

### PERFORMANCE CHARACTERISTICS

**Operating Temperature:** - 55 °C to + 125 °C

**Capacitance Range:** M39006/22 - 1.7 µF to 1200 µF; M39006/25 - 6.8 µF to 2200 µF

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

**Voltage Rating:** 6 V<sub>DC</sub> to 125 V<sub>DC</sub>

**Established Reliability Tantalum Capacitors to Military Specification MIL-PRF-39006:** In accordance with the military specification MIL-PRF-39006 all capacitors are marked with the military part number (M39006/xx-xxxx) rather than the older style designation (CLR79, CLR81) and should be ordered as such.

For information on the performance characteristics of these capacitors, please refer to the latest issue of the Military Specification. MIL-PRF-39006 establishes 1000 h failure

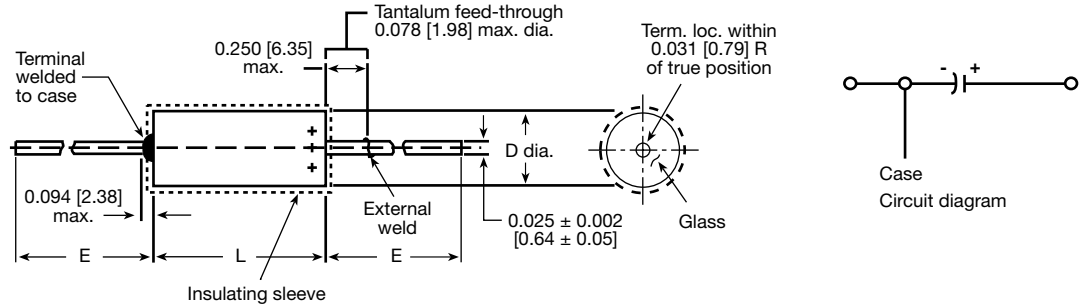
rate levels of 1 %, 0.1 %, and 0.01 %. When ordering these parts, care must be exercised that the correct part number expressing the appropriate failure level be specified.

Each order for military style 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.

| ORDERING INFORMATION  |   |   |  |
|---|---|---|--|
| <b>M39006</b>   | <b>/22</b>  | <b>-0441</b>                                | <b>H</b>                                 |
| BASIC DOCUMENT NUMBER   | SLASH SHEET   | DASH NUMBER                                 | DESIGNATION OF HIGH VIBRATION (OPTIONAL) |
| Indicates the basic specification; in this case MIL-PRF-39006 | Indicates the specification sheet of the basic military specification | Taken from Standard/Extended Ratings tables | H, optional, if specified                |

**DIMENSIONS** in inches [millimeters]

Style CLR79  
Style CLR81



| CASE CODE | BARE CASE                      |  | WITH INSULATING SLEEVE |                  | E<br>LEAD LENGTH                | WEIGHT<br>(oz./g)<br>(Max.) |
|-----------|--------------------------------|--|------------------------|------------------|---------------------------------|-----------------------------|
|           | D                              | L  | D (Max.)               | L (Max.)         |                                 |                             |
| T1        | 0.188 ± 0.016<br>[4.78 ± 0.41] | 0.453 + 0.031/- 0.016<br>[11.51 + 0.79/- 0.41] | 0.219<br>[5.56]        | 0.515<br>[13.08] | 1.500 ± 0.250<br>[38.10 ± 6.35] | 0.09<br>[2.6]               |
| T2        | 0.281 ± 0.016<br>[7.14 ± 0.41] | 0.641 + 0.031/- 0.016<br>[16.28 + 0.79/- 0.41] | 0.312<br>[7.92]        | 0.704<br>[17.88] | 2.250 ± 0.250<br>[57.15 ± 6.35] | 0.22<br>[6.2]               |
| T3        | 0.375 ± 0.016<br>[9.53 ± 0.41] | 0.766 + 0.031/- 0.016<br>[19.46 + 0.79/- 0.41] | 0.406<br>[10.31]       | 0.828<br>[21.03] | 2.250 ± 0.250<br>[57.15 ± 6.35] | 0.41<br>[11.6]              |
| T4        | 0.375 ± 0.016<br>[9.53 ± 0.41] | 1.062 + 0.031/- 0.016<br>[26.97 + 0.79/- 0.41] | 0.406<br>[10.31]       | 1.126<br>[28.60] | 2.250 ± 0.250<br>[57.15 ± 6.35] | 0.62<br>[17.7]              |

**RATINGS AND CASE CODES - M39006/22**

| μF  | 6  | 8  | 10 | 15 | 25 | 30 | 50 | 60 | 75 | 100 | 125 |
|-----|----|----|----|----|----|----|----|----|----|-----|-----|
| 1.7 |    |    |    |    |    |    |    |    |    |     | T1  |
| 2.5 |    |    |    |    |    |    |    |    |    | T1  |     |
| 3.5 |    |    |    |    |    |    |    |    | T1 |     |     |
| 3.6 |    |    |    |    |    |    |    |    |    |     | T1  |
| 4.0 |    |    |    |    |    |    |    | T1 |    |     |     |
| 4.7 |    |    |    |    |    |    |    |    |    | T1  |     |
| 5.0 |    |    |    |    |    |    | T1 |    |    |     |     |
| 6.8 |    |    |    |    |    |    |    |    | T1 |     |     |
| 8.0 |    |    |    |    |    | T1 |    |    |    |     |     |
| 8.2 |    |    |    |    |    |    |    | T1 |    |     |     |
| 9.0 |    |    |    |    |    |    |    |    |    |     | T2  |
| 10  |    |    |    |    | T1 |    | T1 |    |    |     |     |
| 11  |    |    |    |    |    |    |    |    |    | T2  |     |
| 14  |    |    |    |    |    |    |    |    |    |     | T2  |
| 15  |    |    |    | T1 |    | T1 |    |    | T2 |     |     |
| 18  |    |    |    |    |    |    |    |    |    |     | T3  |
| 20  |    |    | T1 |    |    |    |    | T2 |    |     |     |
| 22  |    |    |    |    | T1 |    |    |    |    | T2  |     |
| 25  |    | T1 |    |    |    |    | T2 |    |    |     | T3  |
| 30  | T1 |    |    |    |    |    |    |    |    | T3  |     |
| 33  |    |    |    | T1 |    |    |    |    | T2 |     |     |
| 39  |    |    |    |    |    |    |    | T2 |    |     |     |
| 40  |    |    |    |    |    | T2 |    |    | T3 |     |     |
| 43  |    |    |    |    |    |    |    |    |    | T3  |     |
| 47  |    |    | T1 |    |    |    | T2 |    |    |     |     |
| 50  |    |    |    |    | T2 |    |    | T3 |    |     |     |
| 56  |    | T1 |    |    |    |    |    |    | T3 |     | T4  |
| 60  |    |    |    |    |    |    | T3 |    |    |     |     |
| 68  | T1 |    |    |    |    | T2 |    | T3 |    |     |     |
| 70  |    |    |    | T2 |    |    |    |    |    |     |     |
| 82  |    |    |    |    |    |    | T3 |    |    |     |     |



| RATINGS AND CASE CODES - M39006/22 |    |    |    |    |    |    |    |    |    |     |     |
|------------------------------------|----|----|----|----|----|----|----|----|----|-----|-----|
| μF                                 | 6  | 8  | 10 | 15 | 25 | 30 | 50 | 60 | 75 | 100 | 125 |
| 86                                 |    |    |    |    |    |    |    |    |    | T4  |     |
| 100                                |    |    | T2 |    | T2 | T3 |    |    |    |     |     |
| 110                                |    |    |    |    |    |    |    |    | T4 |     |     |
| 120                                |    | T2 |    | T2 | T3 |    |    |    |    |     |     |
| 140                                | T2 |    |    |    |    |    |    | T4 |    |     |     |
| 150                                |    |    |    |    |    | T3 |    |    |    |     |     |
| 160                                |    |    |    |    |    |    | T4 |    |    |     |     |
| 170                                |    |    |    | T3 |    |    |    |    |    |     |     |
| 180                                |    |    | T2 |    | T3 |    |    |    |    |     |     |
| 220                                |    | T2 |    |    |    |    |    |    |    |     |     |
| 250                                |    |    | T3 |    |    |    |    |    |    |     |     |
| 270                                | T2 |    |    | T3 |    |    |    |    |    |     |     |
| 290                                |    | T3 |    |    |    |    |    |    |    |     |     |
| 300                                |    |    |    |    |    | T4 |    |    |    |     |     |
| 330                                | T3 |    |    |    |    |    |    |    |    |     |     |
| 350                                |    |    |    |    | T4 |    |    |    |    |     |     |
| 390                                |    |    | T3 |    |    |    |    |    |    |     |     |
| 430                                |    | T3 |    |    |    |    |    |    |    |     |     |
| 540                                |    |    |    | T4 |    |    |    |    |    |     |     |
| 560                                | T3 |    |    |    |    |    |    |    |    |     |     |
| 750                                |    |    | T4 |    |    |    |    |    |    |     |     |
| 850                                |    | T4 |    |    |    |    |    |    |    |     |     |
| 1200                               | T4 |    |    |    |    |    |    |    |    |     |     |

| RATINGS AND CASE CODES - M39006/25 |    |    |    |    |    |    |    |    |    |     |     |
|------------------------------------|----|----|----|----|----|----|----|----|----|-----|-----|
| μF                                 | 6  | 8  | 10 | 15 | 25 | 30 | 50 | 60 | 75 | 100 | 125 |
| 6.8                                |    |    |    |    |    |    |    |    |    |     | T1  |
| 10                                 |    |    |    |    |    |    |    |    |    | T1  |     |
| 22                                 |    |    |    |    |    |    |    |    | T1 |     |     |
| 27                                 |    |    |    |    |    |    |    | T1 |    |     | T2  |
| 33                                 |    |    |    |    |    |    | T1 |    |    |     |     |
| 39                                 |    |    |    |    |    |    |    |    |    | T2  |     |
| 47                                 |    |    |    |    |    |    |    |    |    |     | T3  |
| 56                                 |    |    |    |    |    | T1 |    |    |    |     |     |
| 68                                 |    |    |    |    | T1 |    |    |    |    | T3  |     |
| 82                                 |    |    |    |    |    |    |    |    | T2 |     | T4  |
| 100                                |    |    |    | T1 |    |    |    | T2 |    |     |     |
| 120                                |    |    |    |    |    |    | T2 |    |    | T4  |     |
| 150                                |    |    | T1 |    |    |    |    |    |    |     |     |
| 180                                |    | T1 |    |    |    |    |    |    | T3 |     |     |
| 220                                | T1 |    |    |    |    | T2 |    | T3 | T4 |     |     |
| 270                                |    |    |    |    | T2 |    | T3 | T4 |    |     |     |
| 330                                |    |    |    |    |    |    | T4 |    |    |     |     |
| 390                                |    |    |    | T2 |    |    |    |    |    |     |     |
| 470                                |    |    |    |    |    | T3 |    |    |    |     |     |
| 560                                |    |    | T2 |    | T3 | T4 |    |    |    |     |     |
| 680                                |    | T2 |    |    | T4 |    |    |    |    |     |     |
| 820                                | T2 |    |    | T3 |    |    |    |    |    |     |     |
| 1000                               |    |    |    | T4 |    |    |    |    |    |     |     |
| 1200                               |    |    | T3 |    |    |    |    |    |    |     |     |
| 1500                               | T3 | T3 | T4 |    |    |    |    |    |    |     |     |
| 1800                               |    | T4 |    |    |    |    |    |    |    |     |     |
| 2200                               | T4 |    |    |    |    |    |    |    |    |     |     |



| STANDARD RATINGS/EXTENDED RATINGS: CLR79, M39006/22-XXXX          |              |                            |                                    |          |           |                           |                     |                  |                    |                                   |         |         |  |
|---|--------------|----------------------------|------------------------------------|----------|-----------|---------------------------|---------------------|------------------|--------------------|-----------------------------------|---------|---------|--|
| CAPACITANCE<br>( $\mu$ F)   | CASE<br>CODE | CAP.<br>TOL.<br>( $\pm$ %) | PART NO. M39006/22- <sup>(1)</sup> |          |           | MAX. DCL ( $\mu$ A)<br>AT |                     | MAX.<br>DF<br>AT | MAX.<br>IMP.<br>AT | MAX. CAPACITANCE<br>CHANGE (%) AT |         |         | MAX. <sup>(2)</sup><br>RIPPLE<br>CURRENT<br>AT + 85 °C<br>40 kHz<br>(mA) |
|   |              |                            | FAILURE RATE LEVEL<br>(%/1000 h)   |          |           | + 25 °C                   | + 85 °C<br>+ 125 °C |                  |                    | + 25 °C<br>(%)                    | - 55 °C | - 55 °C |  |
|   |              |                            | M<br>1.0                           | P<br>0.1 | R<br>0.01 |                           |                     |                  |                    |                                   |         |         |  |
| <b>6 V<sub>DC</sub> AT + 85 °C; 4 V<sub>DC</sub> AT + 125 °C</b>  |              |                            |                                    |          |           |                           |                     |                  |                    |                                   |         |         |  |
| 30  | T1           | 20                         | 0001                               | 0221     | 0441      | 1.0                       | 2.0                 | 9                | 100                | - 40                              | + 10.5  | + 12    | 820  |
| 30  | T1           | 10                         | 0002                               | 0222     | 0442      | 1.0                       | 2.0                 | 9                | 100                | - 40                              | + 10.5  | + 12    | 820  |
| 30  | T1           | 5                          | 0003                               | 0223     | 0443      | 1.0                       | 2.0                 | 9                | 100                | - 40                              | + 10.5  | + 12    | 820  |
| 68  | T1           | 20                         | 0004                               | 0224     | 0444      | 1.0                       | 2.0                 | 15               | 60                 | - 40                              | + 14    | + 16    | 960  |
| 68  | T1           | 10                         | 0005                               | 0225     | 0445      | 1.0                       | 2.0                 | 15               | 60                 | - 40                              | + 14    | + 16    | 960  |
| 68  | T1           | 5                          | 0006                               | 0226     | 0446      | 1.0                       | 2.0                 | 15               | 60                 | - 40                              | + 14    | + 16    | 960  |
| 140   | T2           | 20                         | 0007                               | 0227     | 0447      | 1.0                       | 3.0                 | 21               | 40                 | - 40                              | + 14    | + 16    | 1200   |
| 140   | T2           | 10                         | 0008                               | 0228     | 0448      | 1.0                       | 3.0                 | 21               | 40                 | - 40                              | + 14    | + 16    | 1200   |
| 140   | T2           | 5                          | 0009                               | 0229     | 0449      | 1.0                       | 3.0                 | 21               | 40                 | - 40                              | + 14    | + 16    | 1200   |
| 270   | T2           | 20                         | 0010                               | 0230     | 0450      | 1.0                       | 6.5                 | 45               | 25                 | - 44                              | + 17.5  | + 20    | 1375   |
| 270   | T2           | 10                         | 0011                               | 0231     | 0451      | 1.0                       | 6.5                 | 45               | 25                 | - 44                              | + 17.5  | + 20    | 1375   |
| 270   | T2           | 5                          | 0012                               | 0232     | 0452      | 1.0                       | 6.5                 | 45               | 25                 | - 44                              | + 17.5  | + 20    | 1375   |
| 330   | T3           | 20                         | 0013                               | 0233     | 0453      | 2.0                       | 7.9                 | 36               | 20                 | - 44                              | + 14    | + 16    | 1800   |
| 330   | T3           | 10                         | 0014                               | 0234     | 0454      | 2.0                       | 7.9                 | 36               | 20                 | - 44                              | + 14    | + 16    | 1800   |
| 330   | T3           | 5                          | 0015                               | 0235     | 0455      | 2.0                       | 7.9                 | 36               | 20                 | - 44                              | + 14    | + 16    | 1800   |
| 560   | T3           | 20                         | 0016                               | 0236     | 0456      | 2.0                       | 13.0                | 55               | 25                 | - 64                              | + 17.5  | + 20    | 1900   |
| 560   | T3           | 10                         | 0017                               | 0237     | 0457      | 2.0                       | 13.0                | 55               | 25                 | - 64                              | + 17.5  | + 20    | 1900   |
| 560   | T3           | 5                          | 0018                               | 0238     | 0458      | 2.0                       | 13.0                | 55               | 25                 | - 64                              | + 17.5  | + 20    | 1900   |
| 1200  | T4           | 20                         | 0019                               | 0239     | 0459      | 3.0                       | 14.0                | 90               | 20                 | - 80                              | + 25    | + 25    | 2265   |
| 1200  | T4           | 10                         | 0020                               | 0240     | 0460      | 3.0                       | 14.0                | 90               | 20                 | - 80                              | + 25    | + 25    | 2265   |
| <b>8 V<sub>DC</sub> AT + 85 °C; 5 V<sub>DC</sub> AT + 125 °C</b>  |              |                            |                                    |          |           |                           |                     |                  |                    |                                   |         |         |  |
| 25  | T1           | 20                         | 0021                               | 0241     | 0461      | 1.0                       | 2.0                 | 7.5              | 100                | - 40                              | + 10.5  | + 12    | 820  |
| 25  | T1           | 10                         | 0022                               | 0242     | 0462      | 1.0                       | 2.0                 | 7.5              | 100                | - 40                              | + 10.5  | + 12    | 820  |
| 25  | T1           | 5                          | 0023                               | 0243     | 0463      | 1.0                       | 2.0                 | 7.5              | 100                | - 40                              | + 10.5  | + 12    | 820  |
| 56  | T1           | 20                         | 0024                               | 0244     | 0464      | 1.0                       | 2.0                 | 14               | 59                 | - 40                              | + 14    | + 16    | 900  |
| 56  | T1           | 10                         | 0025                               | 0245     | 0465      | 1.0                       | 2.0                 | 14               | 59                 | - 40                              | + 14    | + 16    | 900  |
| 56  | T1           | 5                          | 0026                               | 0246     | 0466      | 1.0                       | 2.0                 | 14               | 59                 | - 40                              | + 14    | + 16    | 900  |
| 120   | T2           | 20                         | 0027                               | 0247     | 0467      | 1.0                       | 2.0                 | 20               | 50                 | - 44                              | + 17.5  | + 20    | 1220   |
| 120   | T2           | 10                         | 0028                               | 0248     | 0468      | 1.0                       | 2.0                 | 20               | 50                 | - 44                              | + 17.5  | + 20    | 1220   |
| 120   | T2           | 5                          | 0029                               | 0249     | 0469      | 1.0                       | 2.0                 | 20               | 50                 | - 44                              | + 17.5  | + 20    | 1220   |
| 220   | T2           | 20                         | 0030                               | 0250     | 0470      | 1.0                       | 7.0                 | 37               | 30                 | - 44                              | + 17.5  | + 20    | 1370   |
| 220   | T2           | 10                         | 0031                               | 0251     | 0471      | 1.0                       | 7.0                 | 37               | 30                 | - 44                              | + 17.5  | + 20    | 1370   |
| 220   | T2           | 5                          | 0032                               | 0252     | 0472      | 1.0                       | 7.0                 | 37               | 30                 | - 44                              | + 17.5  | + 20    | 1370   |
| 290   | T3           | 20                         | 0033                               | 0253     | 0473      | 2.0                       | 6.0                 | 34               | 25                 | - 64                              | + 17.5  | + 20    | 1770   |
| 290   | T3           | 10                         | 0034                               | 0254     | 0474      | 2.0                       | 6.0                 | 34               | 25                 | - 64                              | + 17.5  | + 20    | 1770   |
| 290   | T3           | 5                          | 0035                               | 0255     | 0475      | 2.0                       | 6.0                 | 34               | 25                 | - 64                              | + 17.5  | + 20    | 1770   |
| 430   | T3           | 20                         | 0036                               | 0256     | 0476      | 2.0                       | 14.0                | 46               | 25                 | - 64                              | + 17.5  | + 20    | 1825   |
| 430   | T3           | 10                         | 0037                               | 0257     | 0477      | 2.0                       | 14.0                | 46               | 25                 | - 64                              | + 17.5  | + 20    | 1825   |
| 430   | T3           | 5                          | 0038                               | 0258     | 0478      | 2.0                       | 14.0                | 46               | 25                 | - 64                              | + 17.5  | + 20    | 1825   |
| 850   | T4           | 20                         | 0039                               | 0259     | 0479      | 4.0                       | 16.0                | 60               | 22                 | - 80                              | + 25    | + 25    | 2330   |
| 850   | T4           | 10                         | 0040                               | 0260     | 0480      | 4.0                       | 16.0                | 60               | 22                 | - 80                              | + 25    | + 25    | 2330   |
| <b>10 V<sub>DC</sub> AT + 85 °C; 7 V<sub>DC</sub> AT + 125 °C</b> |              |                            |                                    |          |           |                           |                     |                  |                    |                                   |         |         |  |
| 20  | T1           | 20                         | 0041                               | 0261     | 0481      | 1.0                       | 2.0                 | 6                | 175                | - 32                              | + 10.5  | + 12    | 820  |
| 20  | T1           | 10                         | 0042                               | 0262     | 0482      | 1.0                       | 2.0                 | 6                | 175                | - 32                              | + 10.5  | + 12    | 820  |
| 20  | T1           | 5                          | 0043                               | 0263     | 0483      | 1.0                       | 2.0                 | 6                | 175                | - 32                              | + 10.5  | + 12    | 820  |
| 47  | T1           | 20                         | 0044                               | 0264     | 0484      | 1.0                       | 2.0                 | 13               | 100                | - 36                              | + 14    | + 16    | 855  |
| 47  | T1           | 10                         | 0045                               | 0265     | 0485      | 1.0                       | 2.0                 | 13               | 100                | - 36                              | + 14    | + 16    | 855  |
| 47  | T1           | 5                          | 0046                               | 0266     | 0486      | 1.0                       | 2.0                 | 13               | 100                | - 36                              | + 14    | + 16    | 855  |
| 100   | T2           | 20                         | 0047                               | 0267     | 0487      | 1.0                       | 4.0                 | 15               | 60                 | - 36                              | + 14    | + 16    | 1200   |
| 100   | T2           | 10                         | 0048                               | 0268     | 0488      | 1.0                       | 4.0                 | 15               | 60                 | - 36                              | + 14    | + 16    | 1200   |
| 100   | T2           | 5                          | 0049                               | 0269     | 0489      | 1.0                       | 4.0                 | 15               | 60                 | - 36                              | + 14    | + 16    | 1200   |
| 180   | T2           | 20                         | 0050                               | 0270     | 0490      | 1.0                       | 7.0                 | 30               | 40                 | - 36                              | + 14    | + 16    | 1365   |

Notes

- (1) Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current table.



| STANDARD RATINGS/EXTENDED RATINGS: CLR79, M39006/22-XXXX           |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
|--|--------------|----------------------------|--|------|------|---------------------------|---------------------|------------------|-------------------------|-----------------------------------|---------|----------|--|
| CAPACITANCE<br>( $\mu$ F)  | CASE<br>CODE | CAP.<br>TOL.<br>( $\pm$ %) | PART NO. M39006/22- <sup>(1)</sup><br>FAILURE RATE LEVEL<br>(%/1000 h) |      |      | MAX. DCL ( $\mu$ A)<br>AT |                     | MAX.<br>DF<br>AT | MAX.<br>IMP.<br>AT      | MAX. CAPACITANCE<br>CHANGE (%) AT |         |          | MAX. <sup>(2)</sup><br>RIPPLE<br>CURRENT<br>AT + 85 °C |
|  |              |                            | M  | P    | R    | + 25 °C                   | + 85 °C<br>+ 125 °C | + 25 °C<br>(%)   | - 55 °C<br>( $\Omega$ ) | - 55 °C                           | + 85 °C | + 125 °C | 40 kHz<br>(mA)   |
|  |              |                            | 1.0  | 0.1  | 0.01 |                           |                     |                  |                         |                                   |         |          |  |
| <b>10 V<sub>DC</sub> AT + 85 °C; 7 V<sub>DC</sub> AT + 125 °C</b>  |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
| 180  | T2           | 10                         | 0051   | 0271 | 0491 | 1.0                       | 7.0                 | 30               | 40                      | - 36                              | + 14    | + 16     | 1365   |
| 180  | T2           | 5                          | 0052   | 0272 | 0492 | 1.0                       | 7.0                 | 30               | 40                      | - 36                              | + 14    | + 16     | 1365   |
| 250  | T3           | 20                         | 0053   | 0273 | 0493 | 2.0                       | 10.0                | 30               | 30                      | - 40                              | + 14    | + 16     | 1720   |
| 250  | T3           | 10                         | 0054   | 0274 | 0494 | 2.0                       | 10.0                | 30               | 30                      | - 40                              | + 14    | + 16     | 1720   |
| 250  | T3           | 5                          | 0055   | 0275 | 0495 | 2.0                       | 10.0                | 30               | 30                      | - 40                              | + 14    | + 16     | 1720   |
| 390  | T3           | 20                         | 0056   | 0276 | 0496 | 2.0                       | 16.0                | 44               | 25                      | - 64                              | + 17.5  | + 20     | 1800   |
| 390  | T3           | 10                         | 0057   | 0277 | 0497 | 2.0                       | 16.0                | 44               | 25                      | - 64                              | + 17.5  | + 20     | 1800   |
| 390  | T3           | 5                          | 0058   | 0278 | 0498 | 2.0                       | 16.0                | 44               | 25                      | - 64                              | + 17.5  | + 20     | 1800   |
| 750  | T4           | 20                         | 0059   | 0279 | 0499 | 4.0                       | 16.0                | 50               | 23                      | - 80                              | + 25    | + 25     | 2360   |
| 750  | T4           | 10                         | 0060   | 0280 | 0500 | 4.0                       | 16.0                | 50               | 23                      | - 80                              | + 25    | + 25     | 2360   |
| <b>15 V<sub>DC</sub> AT + 85 °C; 10 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
| 15   | T1           | 20                         | 0061   | 0281 | 0501 | 1.0                       | 2.0                 | 5                | 155                     | - 24                              | + 10.5  | + 12     | 780  |
| 15   | T1           | 10                         | 0062   | 0282 | 0502 | 1.0                       | 2.0                 | 5                | 155                     | - 24                              | + 10.5  | + 12     | 780  |
| 15   | T1           | 5                          | 0063   | 0283 | 0503 | 1.0                       | 2.0                 | 5                | 155                     | - 24                              | + 10.5  | + 12     | 780  |
| 33   | T1           | 20                         | 0064   | 0284 | 0504 | 1.0                       | 2.0                 | 10               | 90                      | - 28                              | + 14    | + 16     | 820  |
| 33   | T1           | 10                         | 0065   | 0285 | 0505 | 1.0                       | 2.0                 | 10               | 90                      | - 28                              | + 14    | + 16     | 820  |
| 33   | T1           | 5                          | 0066   | 0286 | 0506 | 1.0                       | 2.0                 | 10               | 90                      | - 28                              | + 14    | + 16     | 820  |
| 70   | T2           | 20                         | 0067   | 0287 | 0507 | 1.0                       | 4.0                 | 13               | 75                      | - 28                              | + 14    | + 16     | 1150   |
| 70   | T2           | 10                         | 0068   | 0288 | 0508 | 1.0                       | 4.0                 | 13               | 75                      | - 28                              | + 14    | + 16     | 1150   |
| 70   | T2           | 5                          | 0069   | 0289 | 0509 | 1.0                       | 4.0                 | 13               | 75                      | - 28                              | + 14    | + 16     | 1150   |
| 120  | T2           | 20                         | 0070   | 0290 | 0510 | 1.0                       | 7.0                 | 18               | 50                      | - 28                              | + 17.5  | + 20     | 1450   |
| 120  | T2           | 10                         | 0071   | 0291 | 0511 | 1.0                       | 7.0                 | 18               | 50                      | - 28                              | + 17.5  | + 20     | 1450   |
| 120  | T2           | 5                          | 0072   | 0292 | 0512 | 1.0                       | 7.0                 | 18               | 50                      | - 28                              | + 17.5  | + 20     | 1450   |
| 170  | T3           | 20                         | 0073   | 0293 | 0513 | 2.0                       | 10.0                | 25               | 35                      | - 32                              | + 14    | + 16     | 1480   |
| 170  | T3           | 10                         | 0074   | 0294 | 0514 | 2.0                       | 10.0                | 25               | 35                      | - 32                              | + 14    | + 16     | 1480   |
| 170  | T3           | 5                          | 0075   | 0295 | 0515 | 2.0                       | 10.0                | 25               | 35                      | - 32                              | + 14    | + 16     | 1480   |
| 270  | T3           | 20                         | 0076   | 0296 | 0516 | 2.0                       | 16.0                | 32               | 30                      | - 56                              | + 17.5  | + 20     | 1740   |
| 270  | T3           | 10                         | 0077   | 0297 | 0517 | 2.0                       | 16.0                | 32               | 30                      | - 56                              | + 17.5  | + 20     | 1740   |
| 270  | T3           | 5                          | 0078   | 0298 | 0518 | 2.0                       | 16.0                | 32               | 30                      | - 56                              | + 17.5  | + 20     | 1740   |
| 540  | T4           | 20                         | 0079   | 0299 | 0519 | 6.0                       | 24.0                | 40               | 23                      | - 80                              | + 25    | + 25     | 2330   |
| 540  | T4           | 10                         | 0080   | 0300 | 0520 | 6.0                       | 24.0                | 40               | 23                      | - 80                              | + 25    | + 25     | 2330   |
| <b>25 V<sub>DC</sub> AT + 85 °C; 15 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
| 10   | T1           | 20                         | 0081   | 0301 | 0521 | 1.0                       | 2.0                 | 4                | 220                     | - 16                              | + 8     | + 9      | 715  |
| 10   | T1           | 10                         | 0082   | 0302 | 0522 | 1.0                       | 2.0                 | 4                | 220                     | - 16                              | + 8     | + 9      | 715  |
| 10   | T1           | 5                          | 0083   | 0303 | 0523 | 1.0                       | 2.0                 | 4                | 220                     | - 16                              | + 8     | + 9      | 715  |
| 22   | T1           | 20                         | 0084   | 0304 | 0524 | 1.0                       | 2.0 6.6             |                  | 140                     | - 20                              | + 10.5  | + 12     | 825  |
| 22   | T1           | 10                         | 0085   | 0305 | 0525 | 1.0                       | 2.0 6.6             |                  | 140                     | - 20                              | + 10.5  | + 12     | 825  |
| 22   | T1           | 5                          | 0086   | 0306 | 0526 | 1.0                       | 2.0 6.6             |                  | 140                     | - 20                              | + 10.5  | + 12     | 825  |
| 50   | T2           | 20                         | 0087   | 0307 | 0527 | 1.0                       | 2.0                 | 11.0             | 70                      | - 28                              | + 13    | + 15     | 1130   |
| 50   | T2           | 10                         | 0088   | 0308 | 0528 | 1.0                       | 2.0                 | 11.0             | 70                      | - 28                              | + 13    | + 15     | 1130   |
| 50   | T2           | 5                          | 0089   | 0309 | 0529 | 1.0                       | 2.0                 | 11.0             | 70                      | - 28                              | + 13    | + 15     | 1130   |
| 100  | T2           | 20                         | 0090   | 0310 | 0530 | 1.0                       | 10.0                | 15               | 50                      | - 28                              | + 13    | + 15     | 1435   |
| 100  | T2           | 10                         | 0091   | 0311 | 0531 | 1.0                       | 10.0                | 15               | 50                      | - 28                              | + 13    | + 15     | 1435   |
| 100  | T2           | 5                          | 0092   | 0312 | 0532 | 1.0                       | 10.0                | 15               | 50                      | - 28                              | + 13    | + 15     | 1435   |
| 120  | T3           | 20                         | 0093   | 0313 | 0533 | 2.0                       | 6.0                 | 21               | 38                      | - 32                              | + 13    | + 15     | 1450   |
| 120  | T3           | 10                         | 0094   | 0314 | 0534 | 2.0                       | 6.0                 | 21               | 38                      | - 32                              | + 13    | + 15     | 1450   |
| 120  | T3           | 5                          | 0095   | 0315 | 0535 | 2.0                       | 6.0                 | 21               | 38                      | - 32                              | + 13    | + 15     | 1450   |
| 180  | T3           | 20                         | 0096   | 0316 | 0536 | 2.0                       | 18.0                | 26               | 32                      | - 48                              | + 13    | + 15     | 1525   |
| 180  | T3           | 10                         | 0097   | 0317 | 0537 | 2.0                       | 18.0                | 26               | 32                      | - 48                              | + 13    | + 15     | 1525   |
| 180  | T3           | 5                          | 0098   | 0318 | 0538 | 2.0                       | 18.0                | 26               | 32                      | - 48                              | + 13    | + 15     | 1525   |
| 350  | T4           | 20                         | 0099   | 0319 | 0539 | 7.0                       | 28.0                | 35               | 24                      | - 70                              | + 25    | + 25     | 1970   |
| 350  | T4           | 10                         | 0100   | 0320 | 0540 | 7.0                       | 28.0                | 35               | 24                      | - 70                              | + 25    | + 25     | 1970   |

**Notes**

- (1) Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current table.



| STANDARD RATINGS/EXTENDED RATINGS: CLR79, M39006/22-XXXX           |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
|--|--------------|----------------------------|--|------|------|---------------------------|---------------------|------------------|-------------------------|-----------------------------------|---------|----------|---|
| CAPACITANCE<br>( $\mu$ F)  | CASE<br>CODE | CAP.<br>TOL.<br>( $\pm$ %) | PART NO. M39006/22- <sup>(1)</sup><br>FAILURE RATE LEVEL<br>(%/1000 h) |      |      | MAX. DCL ( $\mu$ A)<br>AT |                     | MAX.<br>DF<br>AT | MAX.<br>IMP.<br>AT      | MAX. CAPACITANCE<br>CHANGE (%) AT |         |          | MAX. <sup>(2)</sup><br>RIPPLE<br>CURRENT<br>AT +85 °C |
|  |              |                            | M  | P    | R    | + 25 °C                   | + 85 °C<br>+ 125 °C | + 25 °C<br>(%)   | - 55 °C<br>( $\Omega$ ) | - 55 °C                           | + 85 °C | + 125 °C | 40 kHz  |
|  |              |                            | 1.0  | 0.1  | 0.01 |                           |                     |                  |                         |                                   |         |          |   |
| <b>30 V<sub>DC</sub> AT + 85 °C; 20 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
| 8.0  | T1           | 20                         | 0101   | 0321 | 0541 | 1.0                       | 2.0                 | 4                | 275                     | - 16                              | + 8     | + 12     | 640   |
| 8.0  | T1           | 10                         | 0102   | 0322 | 0542 | 1.0                       | 2.0                 | 4                | 275                     | - 16                              | + 8     | + 12     | 640   |
| 8.0  | T1           | 5                          | 0103   | 0323 | 0543 | 1.0                       | 2.0                 | 4                | 275                     | - 16                              | + 8     | + 12     | 640   |
| 15   | T1           | 20                         | 0104   | 0324 | 0544 | 1.0                       | 2.0                 | 5                | 175                     | - 20                              | + 10.5  | + 12     | 780   |
| 15   | T1           | 10                         | 0105   | 0325 | 0545 | 1.0                       | 2.0                 | 5                | 175                     | - 20                              | + 10.5  | + 12     | 780   |
| 15   | T1           | 5                          | 0106   | 0326 | 0546 | 1.0                       | 2.0                 | 5                | 175                     | - 20                              | + 10.5  | + 12     | 780   |
| 40   | T2           | 20                         | 0107   | 0327 | 0547 | 1.0                       | 5.0                 | 10               | 65                      | - 24                              | + 10.5  | + 12     | 1120  |
| 40   | T2           | 10                         | 0108   | 0328 | 0548 | 1.0                       | 5.0                 | 10               | 65                      | - 24                              | + 10.5  | + 12     | 1120  |
| 40   | T2           | 5                          | 0109   | 0329 | 0549 | 1.0                       | 5.0                 | 10               | 65                      | - 24                              | + 10.5  | + 12     | 1120  |
| 68   | T2           | 20                         | 0110   | 0330 | 0550 | 1.0                       | 8.0                 | 13               | 60                      | - 24                              | + 13    | + 15     | 1285  |
| 68   | T2           | 10                         | 0111   | 0331 | 0551 | 1.0                       | 8.0                 | 13               | 60                      | - 24                              | + 13    | + 15     | 1285  |
| 68   | T2           | 5                          | 0112   | 0332 | 0552 | 1.0                       | 8.0                 | 13               | 60                      | - 24                              | + 13    | + 15     | 1285  |
| 100  | T3           | 20                         | 0113   | 0333 | 0553 | 2.0                       | 12.0                | 17               | 40                      | - 28                              | + 10.5  | + 12     | 1450  |
| 100  | T3           | 10                         | 0114   | 0334 | 0554 | 2.0                       | 12.0                | 17               | 40                      | - 28                              | + 10.5  | + 12     | 1450  |
| 100  | T3           | 5                          | 0115   | 0335 | 0555 | 2.0                       | 12.0                | 17               | 40                      | - 28                              | + 10.5  | + 12     | 1450  |
| 150  | T3           | 20                         | 0116   | 0336 | 0556 | 2.0                       | 18.0                | 23               | 35                      | - 48                              | + 13    | + 15     | 1525  |
| 150  | T3           | 10                         | 0117   | 0337 | 0557 | 2.0                       | 18.0                | 23               | 35                      | - 48                              | + 13    | + 15     | 1525  |
| 150  | T3           | 5                          | 0118   | 0338 | 0558 | 2.0                       | 18.0                | 23               | 35                      | - 48                              | + 13    | + 15     | 1525  |
| 300  | T4           | 20                         | 0119   | 0339 | 0559 | 8.0                       | 32.0                | 31               | 25                      | - 60                              | + 25    | + 25     | 1950  |
| 300  | T4           | 10                         | 0120   | 0340 | 0560 | 8.0                       | 32.0                | 31               | 25                      | - 60                              | + 25    | + 25     | 1950  |
| <b>50 V<sub>DC</sub> AT + 85 °C; 30 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
| 5.0  | T1           | 20                         | 0121   | 0341 | 0561 | 1.0                       | 2.0                 | 3                | 400                     | - 16                              | + 5     | + 6      | 580   |
| 5.0  | T1           | 10                         | 0122   | 0342 | 0562 | 1.0                       | 2.0                 | 3                | 400                     | - 16                              | + 5     | + 6      | 580   |
| 5.0  | T1           | 5                          | 0123   | 0343 | 0563 | 1.0                       | 2.0                 | 3                | 400                     | - 16                              | + 5     | + 6      | 580   |
| 10   | T1           | 20                         | 0124   | 0344 | 0564 | 1.0                       | 2.0                 | 4                | 250                     | - 24                              | + 8     | + 9      | 715   |
| 10   | T1           | 10                         | 0125   | 0345 | 0565 | 1.0                       | 2.0                 | 4                | 250                     | - 24                              | + 8     | + 9      | 715   |
| 10   | T1           | 5                          | 0126   | 0346 | 0566 | 1.0                       | 2.0                 | 4                | 250                     | - 24                              | + 8     | + 9      | 715   |
| 25   | T2           | 20                         | 0127   | 0347 | 0567 | 1.0                       | 5.0                 | 8                | 95                      | - 20                              | + 10.5  | + 12     | 1005  |
| 25   | T2           | 10                         | 0128   | 0348 | 0568 | 1.0                       | 5.0                 | 8                | 95                      | - 20                              | + 10.5  | + 12     | 1005  |
| 25   | T2           | 5                          | 0129   | 0349 | 0569 | 1.0                       | 5.0                 | 8                | 95                      | - 20                              | + 10.5  | + 12     | 1005  |
| 47   | T2           | 20                         | 0130   | 0350 | 0570 | 1.0                       | 9.0                 | 11               | 70                      | - 28                              | + 13    | + 15     | 1155  |
| 47   | T2           | 10                         | 0131   | 0351 | 0571 | 1.0                       | 9.0                 | 11               | 70                      | - 28                              | + 13    | + 15     | 1155  |
| 47   | T2           | 5                          | 0132   | 0352 | 0572 | 1.0                       | 9.0                 | 11               | 70                      | - 28                              | + 13    | + 15     | 1155  |
| 60   | T3           | 20                         | 0133   | 0353 | 0573 | 2.0                       | 12.0                | 12               | 45                      | - 16                              | + 10.5  | + 12     | 1335  |
| 60   | T3           | 10                         | 0134   | 0354 | 0574 | 2.0                       | 12.0                | 12               | 45                      | - 16                              | + 10.5  | + 12     | 1335  |
| 60   | T3           | 5                          | 0135   | 0355 | 0575 | 2.0                       | 12.0                | 12               | 45                      | - 16                              | + 10.5  | + 12     | 1335  |
| 82   | T3           | 20                         | 0136   | 0356 | 0576 | 2.0                       | 16.0                | 15               | 45                      | - 32                              | + 13    | + 15     | 1400  |
| 82   | T3           | 10                         | 0137   | 0357 | 0577 | 2.0                       | 16.0                | 15               | 45                      | - 32                              | + 13    | + 15     | 1400  |
| 82   | T3           | 5                          | 0138   | 0358 | 0578 | 2.0                       | 16.0                | 15               | 45                      | - 32                              | + 13    | + 15     | 1400  |
| 160  | T4           | 20                         | 0139   | 0359 | 0579 | 8.0                       | 32.0                | 17               | 27                      | - 50                              | + 25    | + 25     | 1900  |
| 160  | T4           | 10                         | 0140   | 0360 | 0580 | 8.0                       | 32.0                | 17               | 27                      | - 50                              | + 25    | + 25     | 1900  |
| <b>60 V<sub>DC</sub> AT + 85 °C; 40 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
| 4.0  | T1           | 20                         | 0141   | 0361 | 0581 | 1.0                       | 2.0                 | 2.8              | 550                     | - 16                              | + 5     | + 6      | 525   |
| 4.0  | T1           | 10                         | 0142   | 0362 | 0582 | 1.0                       | 2.0                 | 2.8              | 550                     | - 16                              | + 5     | + 6      | 525   |
| 4.0  | T1           | 5                          | 0143   | 0363 | 0583 | 1.0                       | 2.0                 | 2.8              | 550                     | - 16                              | + 5     | + 6      | 525   |
| 8.2  | T1           | 20                         | 0144   | 0364 | 0584 | 1.0                       | 2.0                 | 4                | 275                     | - 24                              | + 8     | + 9      | 625   |
| 8.2  | T1           | 10                         | 0145   | 0365 | 0585 | 1.0                       | 2.0                 | 4                | 275                     | - 24                              | + 8     | + 9      | 625   |
| 8.2  | T1           | 5                          | 0146   | 0366 | 0586 | 1.0                       | 2.0                 | 4                | 275                     | - 24                              | + 8     | + 9      | 625   |
| 20   | T2           | 20                         | 0147   | 0367 | 0587 | 1.0                       | 5.0                 | 7                | 105                     | - 16                              | + 10.5  | + 12     | 930   |
| 20   | T2           | 10                         | 0148   | 0368 | 0588 | 1.0                       | 5.0                 | 7                | 105                     | - 16                              | + 10.5  | + 12     | 930   |
| 20   | T2           | 5                          | 0149   | 0369 | 0589 | 1.0                       | 5.0                 | 7                | 105                     | - 16                              | + 10.5  | + 12     | 930   |
| 39   | T2           | 20                         | 0150   | 0370 | 0590 | 1.0                       | 9.0                 | 10               | 90                      | - 28                              | + 10.5  | + 12     | 1110  |

**Notes**

- (1) Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current table.



| STANDARD RATINGS/EXTENDED RATINGS: CLR79, M39006/22-XXXX            |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
|---|--------------|----------------------------|--|------|------|---------------------------|---------------------|------------------|-------------------------|-----------------------------------|---------|----------|---|
| CAPACITANCE<br>( $\mu$ F)   | CASE<br>CODE | CAP.<br>TOL.<br>( $\pm$ %) | PART NO. M39006/22- <sup>(1)</sup><br>FAILURE RATE LEVEL<br>(%/1000 h) |      |      | MAX. DCL ( $\mu$ A)<br>AT |                     | MAX.<br>DF<br>AT | MAX.<br>IMP.<br>AT      | MAX. CAPACITANCE<br>CHANGE (%) AT |         |          | MAX. <sup>(2)</sup><br>RIPPLE<br>CURRENT<br>AT +85 °C |
|   |              |                            | M  | P    | R    | + 25 °C                   | + 85 °C<br>+ 125 °C | + 25 °C<br>(%)   | - 55 °C<br>( $\Omega$ ) | - 55 °C                           | + 85 °C | + 125 °C | 40 kHz<br>(mA)  |
|   |              |                            | 1.0  | 0.1  | 0.01 |                           |                     |                  |                         |                                   |         |          |   |
| <b>60 V<sub>DC</sub> AT + 85 °C; 40 V<sub>DC</sub> AT + 125 °C</b>  |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
| 39  | T2           | 10                         | 0151   | 0371 | 0591 | 1.0                       | 9.0                 | 10               | 90                      | - 28                              | + 10.5  | + 12     | 1110  |
| 39  | T2           | 5                          | 0152   | 0372 | 0592 | 1.0                       | 9.0                 | 10               | 90                      | - 28                              | + 10.5  | + 12     | 1110  |
| 50  | T3           | 20                         | 0153   | 0373 | 0593 | 2.0                       | 12.0                | 10               | 50                      | - 16                              | + 10.5  | + 12     | 1330  |
| 50  | T3           | 10                         | 0154   | 0374 | 0594 | 2.0                       | 12.0                | 10               | 50                      | - 16                              | + 10.5  | + 12     | 1330  |
| 50  | T3           | 5                          | 0155   | 0375 | 0595 | 2.0                       | 12.0                | 10               | 50                      | - 16                              | + 10.5  | + 12     | 1330  |
| 68  | T3           | 20                         | 0156   | 0376 | 0596 | 2.0                       | 16.0                | 13               | 50                      | - 32                              | + 10.5  | + 12     | 1365  |
| 68  | T3           | 10                         | 0157   | 0377 | 0597 | 2.0                       | 16.0                | 13               | 50                      | - 32                              | + 10.5  | + 12     | 1365  |
| 68  | T3           | 5                          | 0158   | 0378 | 0598 | 2.0                       | 16.0                | 13               | 50                      | - 32                              | + 10.5  | + 12     | 1365  |
| 140   | T4           | 20                         | 0159   | 0379 | 0599 | 8.0                       | 32.0                | 16               | 28                      | - 40                              | + 20    | + 20     | 1850  |
| 140   | T4           | 10                         | 0160   | 0380 | 0600 | 8.0                       | 32.0                | 16               | 28                      | - 40                              | + 20    | + 20     | 1850  |
| <b>75 V<sub>DC</sub> AT + 85 °C; 50 V<sub>DC</sub> AT + 125 °C</b>  |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
| 3.5   | T1           | 20                         | 0161   | 0381 | 0601 | 1.0                       | 2.0                 | 2.5              | 650                     | - 16                              | + 5     | + 6      | 525   |
| 3.5   | T1           | 10                         | 0162   | 0382 | 0602 | 1.0                       | 2.0                 | 2.5              | 650                     | - 16                              | + 5     | + 6      | 525   |
| 3.5   | T1           | 5                          | 0163   | 0383 | 0603 | 1.0                       | 2.0                 | 2.5              | 650                     | - 16                              | + 5     | + 6      | 525   |
| 6.8   | T1           | 20                         | 0164   | 0384 | 0604 | 1.0                       | 2.0                 | 3.5              | 300                     | - 20                              | + 8     | + 9      | 610   |
| 6.8   | T1           | 10                         | 0165   | 0385 | 0605 | 1.0                       | 2.0                 | 3.5              | 300                     | - 20                              | + 8     | + 9      | 610   |
| 6.8   | T1           | 5                          | 0166   | 0386 | 0606 | 1.0                       | 2.0                 | 3.5              | 300                     | - 20                              | + 8     | + 9      | 610   |
| 15  | T2           | 20                         | 0167   | 0387 | 0607 | 1.0                       | 5.0                 | 6                | 150                     | - 16                              | + 8     | + 9      | 890   |
| 15  | T2           | 10                         | 0168   | 0388 | 0608 | 1.0                       | 5.0                 | 6                | 150                     | - 16                              | + 8     | + 9      | 890   |
| 15  | T2           | 5                          | 0169   | 0389 | 0609 | 1.0                       | 5.0                 | 6                | 150                     | - 16                              | + 8     | + 9      | 890   |
| 33  | T2           | 20                         | 0170   | 0390 | 0610 | 1.0                       | 10.0                | 10               | 90                      | - 24                              | + 10.5  | + 15     | 1000  |
| 33  | T2           | 10                         | 0171   | 0391 | 0611 | 1.0                       | 10.0                | 10               | 90                      | - 24                              | + 10.5  | + 15     | 1000  |
| 33  | T2           | 5                          | 0172   | 0392 | 0612 | 1.0                       | 10.0                | 10               | 90                      | - 24                              | + 10.5  | + 15     | 1000  |
| 40  | T3           | 20                         | 0173   | 0393 | 0613 | 2.0                       | 12.0                | 9                | 60                      | - 16                              | + 10.5  | + 12     | 1250  |
| 40  | T3           | 10                         | 0174   | 0394 | 0614 | 2.0                       | 12.0                | 9                | 60                      | - 16                              | + 10.5  | + 12     | 1250  |
| 40  | T3           | 5                          | 0175   | 0395 | 0615 | 2.0                       | 12.0                | 9                | 60                      | - 16                              | + 10.5  | + 12     | 1250  |
| 56  | T3           | 20                         | 0176   | 0396 | 0616 | 2.0                       | 17.0                | 11               | 60                      | - 28                              | + 10.5  | + 15     | 1335  |
| 56  | T3           | 10                         | 0177   | 0397 | 0617 | 2.0                       | 17.0                | 11               | 60                      | - 28                              | + 10.5  | + 15     | 1335  |
| 56  | T3           | 5                          | 0178   | 0398 | 0618 | 2.0                       | 17.0                | 11               | 60                      | - 28                              | + 10.5  | + 15     | 1335  |
| 110   | T4           | 20                         | 0179   | 0399 | 0619 | 9.0                       | 36.0                | 12               | 29                      | - 35                              | + 20    | + 20     | 1850  |
| 110   | T4           | 10                         | 0180   | 0400 | 0620 | 9.0                       | 36.0                | 12               | 29                      | - 35                              | + 20    | + 20     | 1850  |
| <b>100 V<sub>DC</sub> AT + 85 °C; 65 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
| 2.5   | T1           | 20                         | 0181   | 0401 | 0621 | 1.0                       | 2.0                 | 2                | 950                     | - 16                              | + 7     | + 8      | 505   |
| 2.5   | T1           | 10                         | 0182   | 0402 | 0622 | 1.0                       | 2.0                 | 2                | 950                     | - 16                              | + 7     | + 8      | 505   |
| 2.5   | T1           | 5                          | 0183   | 0403 | 0623 | 1.0                       | 2.0                 | 2                | 950                     | - 16                              | + 7     | + 8      | 505   |
| 4.7   | T1           | 20                         | 0184   | 0404 | 0624 | 1.0                       | 2.0                 | 3                | 500                     | - 16                              | + 7     | + 8      | 565   |
| 4.7   | T1           | 10                         | 0185   | 0405 | 0625 | 1.0                       | 2.0                 | 3                | 500                     | - 16                              | + 7     | + 8      | 565   |
| 4.7   | T1           | 5                          | 0186   | 0406 | 0626 | 1.0                       | 2.0                 | 3                | 500                     | - 16                              | + 7     | + 8      | 565   |
| 11  | T2           | 20                         | 0187   | 0407 | 0627 | 1.0                       | 4.0                 | 5                | 200                     | - 16                              | + 8     | + 8      | 835   |
| 11  | T2           | 10                         | 0188   | 0408 | 0628 | 1.0                       | 4.0                 | 5                | 200                     | - 16                              | + 8     | + 8      | 835   |
| 11  | T2           | 5                          | 0189   | 0409 | 0629 | 1.0                       | 4.0                 | 5                | 200                     | - 16                              | + 8     | + 8      | 835   |
| 22  | T2           | 20                         | 0190   | 0410 | 0630 | 1.0                       | 9.0                 | 7.5              | 100                     | - 16                              | + 8     | + 8      | 965   |
| 22  | T2           | 10                         | 0191   | 0411 | 0631 | 1.0                       | 9.0                 | 7.5              | 100                     | - 16                              | + 8     | + 8      | 965   |
| 22  | T2           | 5                          | 0192   | 0412 | 0632 | 1.0                       | 9.0                 | 7.5              | 100                     | - 16                              | + 8     | + 8      | 965   |
| 30  | T3           | 20                         | 0193   | 0413 | 0633 | 2.0                       | 12.0                | 7                | 80                      | - 16                              | + 8     | + 8      | 1240  |
| 30  | T3           | 10                         | 0194   | 0414 | 0634 | 2.0                       | 12.0                | 7                | 80                      | - 16                              | + 8     | + 8      | 1240  |
| 30  | T3           | 5                          | 0195   | 0415 | 0635 | 2.0                       | 12.0                | 7                | 80                      | - 16                              | + 8     | + 8      | 1240  |
| 43  | T3           | 20                         | 0196   | 0416 | 0636 | 2.0                       | 17.0                | 8.5              | 70                      | - 20                              | + 8     | + 8      | 1335  |
| 43  | T3           | 10                         | 0197   | 0417 | 0637 | 2.0                       | 17.0                | 8.5              | 70                      | - 20                              | + 8     | + 8      | 1335  |
| 43  | T3           | 5                          | 0198   | 0418 | 0638 | 2.0                       | 17.0                | 8.5              | 70                      | - 20                              | + 8     | + 8      | 1335  |
| 86  | T4           | 20                         | 0199   | 0419 | 0639 | 9.0                       | 36.0                | 10               | 30                      | - 25                              | + 15    | + 15     | 1800  |
| 86  | T4           | 10                         | 0200   | 0420 | 0640 | 9.0                       | 36.0                | 10               | 30                      | - 25                              | + 15    | + 15     | 1800  |

**Notes**

- (1) Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current table.



| STANDARD RATINGS/EXTENDED RATINGS: CLR79, M39006/22-XXXX       |              |                            |  |      |      |                           |                     |                                    |   |                                   |         |          |  |
|--|--------------|----------------------------|--|------|------|---------------------------|---------------------|------------------------------------|---|-----------------------------------|---------|----------|--|
| CAPACITANCE<br>( $\mu$ F)                                      | CASE<br>CODE | CAP.<br>TOL.<br>( $\pm$ %) | PART NO. M39006/22- <sup>(1)</sup><br>FAILURE RATE LEVEL<br>(%/1000 h) |      |      | MAX. DCL ( $\mu$ A)<br>AT |                     | MAX.<br>DF<br>AT<br>+ 25 °C<br>(%) | MAX.<br>IMP.<br>AT<br>- 55 °C<br>( $\Omega$ ) | MAX. CAPACITANCE<br>CHANGE (%) AT |         |          | MAX. <sup>(2)</sup><br>RIPPLE<br>CURRENT<br>AT + 85 °C<br>40 kHz<br>(mA) |
|  |              |                            | M  | P    | R    | + 25 °C                   | + 85 °C<br>+ 125 °C |                                    |   | - 55 °C                           | + 85 °C | + 125 °C |  |
|  |              |                            | 1.0  | 0.1  | 0.01 |                           |                     |                                    |   |                                   |         |          |  |
| 125 V <sub>DC</sub> AT + 85 °C; 85 V <sub>DC</sub> AT + 125 °C |              |                            |  |      |      |                           |                     |                                    |   |                                   |         |          |  |
| 1.7  | T1           | 20                         | 0201   | 0421 | 0641 | 1.0                       | 2.0                 | 2                                  | 1250  | - 16                              | + 7     | + 8      | 415  |
| 1.7  | T1           | 10                         | 0202   | 0422 | 0642 | 1.0                       | 2.0                 | 2                                  | 1250  | - 16                              | + 7     | + 8      | 415  |
| 1.7  | T1           | 5                          | 0203   | 0423 | 0643 | 1.0                       | 2.0                 | 2                                  | 1250  | - 16                              | + 7     | + 8      | 415  |
| 3.6  | T1           | 20                         | 0204   | 0424 | 0644 | 1.0                       | 2.0                 | 2.7                                | 600   | - 16                              | + 7     | + 8      | 520  |
| 3.6  | T1           | 10                         | 0205   | 0425 | 0645 | 1.0                       | 2.0                 | 2.7                                | 600   | - 16                              | + 7     | + 8      | 520  |
| 3.6  | T1           | 5                          | 0206   | 0426 | 0646 | 1.0                       | 2.0                 | 2.7                                | 600   | - 16                              | + 7     | + 8      | 520  |
| 9.0  | T2           | 20                         | 0207   | 0427 | 0647 | 1.0                       | 5.0                 | 5                                  | 240   | - 16                              | + 7     | + 8      | 755  |
| 9.0  | T2           | 10                         | 0208   | 0428 | 0648 | 1.0                       | 5.0                 | 5                                  | 240   | - 16                              | + 7     | + 8      | 755  |
| 9.0  | T2           | 5                          | 0209   | 0429 | 0649 | 1.0                       | 5.0                 | 5                                  | 240   | - 16                              | + 7     | + 8      | 755  |
| 14   | T2           | 20                         | 0210   | 0430 | 0650 | 1.0                       | 7.0                 | 6                                  | 167   | - 16                              | + 7     | + 8      | 860  |
| 14   | T2           | 10                         | 0211   | 0431 | 0651 | 1.0                       | 7.0                 | 6                                  | 167   | - 16                              | + 7     | + 8      | 860  |
| 14   | T2           | 5                          | 0212   | 0432 | 0652 | 1.0                       | 7.0                 | 6                                  | 167   | - 16                              | + 7     | + 8      | 860  |
| 18   | T3           | 20                         | 0213   | 0433 | 0653 | 2.0                       | 9.0                 | 5                                  | 129   | - 16                              | + 7     | + 8      | 1130   |
| 18   | T3           | 10                         | 0214   | 0434 | 0654 | 2.0                       | 9.0                 | 5                                  | 129   | - 16                              | + 7     | + 8      | 1130   |
| 18   | T3           | 5                          | 0215   | 0435 | 0655 | 2.0                       | 9.0                 | 5                                  | 129   | - 16                              | + 7     | + 8      | 1130   |
| 25   | T3           | 20                         | 0216   | 0436 | 0656 | 2.0                       | 13.0                | 6                                  | 93  | - 16                              | + 7     | + 8      | 1200   |
| 25   | T3           | 10                         | 0217   | 0437 | 0657 | 2.0                       | 13.0                | 6                                  | 93  | - 16                              | + 7     | + 8      | 1200   |
| 25   | T3           | 5                          | 0218   | 0438 | 0658 | 2.0                       | 13.0                | 6                                  | 93  | - 16                              | + 7     | + 8      | 1200   |
| 56   | T4           | 20                         | 0219   | 0439 | 0659 | 10.0                      | 40.0                | 6.5                                | 32  | - 25                              | + 15    | + 15     | 1800   |
| 56   | T4           | 10                         | 0220   | 0440 | 0660 | 10.0                      | 40.0                | 6.5                                | 32  | - 25                              | + 15    | + 15     | 1800   |

Notes

- (1) Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current table.

| STANDARD RATINGS/EXTENDED RATINGS: CLR81, M39006/25-XXXX    |              |                            |  |      |      |                           |                     |                                    |   |                                   |         |          |  |
|---|--------------|----------------------------|--|------|------|---------------------------|---------------------|------------------------------------|---|-----------------------------------|---------|----------|--|
| CAPACITANCE<br>( $\mu$ F)                                   | CASE<br>CODE | CAP.<br>TOL.<br>( $\pm$ %) | PART NO. M39006/25- <sup>(1)</sup><br>FAILURE RATE LEVEL<br>(%/1000 h) |      |      | MAX. DCL ( $\mu$ A)<br>AT |                     | MAX.<br>DF<br>AT<br>+ 25 °C<br>(%) | MAX.<br>IMP.<br>AT<br>- 55 °C<br>( $\Omega$ ) | MAX. CAPACITANCE<br>CHANGE (%) AT |         |          | MAX. <sup>(1)</sup><br>RIPPLE<br>CURRENT<br>AT + 85 °C<br>40 kHz<br>(mA) |
|   |              |                            | M  | P    | R    | + 25 °C                   | + 85 °C<br>+ 125 °C |                                    |   | - 55 °C                           | + 85 °C | + 125 °C |  |
|   |              |                            | 1.0  | 0.1  | 0.01 |                           |                     |                                    |   |                                   |         |          |  |
| 6 V <sub>DC</sub> AT + 85 °C; 4 V <sub>DC</sub> AT + 125 °C |              |                            |  |      |      |                           |                     |                                    |   |                                   |         |          |  |
| 220   | T1           | 20                         | 0001   | 0089 | 0177 | 2.0                       | 9.0                 | 50                                 | 36  | - 64                              | + 13    | + 16     | 1000   |
| 220   | T1           | 10                         | 0002   | 0090 | 0178 | 2.0                       | 9.0                 | 50                                 | 36  | - 64                              | + 13    | + 16     | 1000   |
| 820   | T2           | 20                         | 0003   | 0091 | 0179 | 3.0                       | 14.0                | 155                                | 18  | - 88                              | + 16    | + 20     | 1500   |
| 820   | T2           | 10                         | 0004   | 0092 | 0180 | 3.0                       | 14.0                | 155                                | 18  | - 88                              | + 16    | + 20     | 1500   |
| 1500  | T3           | 20                         | 0005   | 0093 | 0181 | 5.0                       | 20.0                | 172                                | 18  | - 90                              | + 20    | + 25     | 1900   |
| 1500  | T3           | 10                         | 0006   | 0094 | 0182 | 5.0                       | 20.0                | 172                                | 18  | - 90                              | + 20    | + 25     | 1900   |
| 2200  | T4           | 20                         | 0007   | 0095 | 0183 | 6.0                       | 24.0                | 170                                | 13  | - 90                              | + 25    | + 30     | 2300   |
| 2200  | T4           | 10                         | 0008   | 0096 | 0184 | 6.0                       | 24.0                | 170                                | 13  | - 90                              | + 25    | + 30     | 2300   |
| 8 V <sub>DC</sub> AT + 85 °C; 5 V <sub>DC</sub> AT + 125 °C |              |                            |  |      |      |                           |                     |                                    |   |                                   |         |          |  |
| 180   | T1           | 20                         | 0009   | 0097 | 0185 | 2.0                       | 9.0                 | 41                                 | 45  | - 60                              | + 13    | + 16     | 1000   |
| 180   | T1           | 10                         | 0010   | 0098 | 0186 | 2.0                       | 9.0                 | 41                                 | 45  | - 60                              | + 13    | + 16     | 1000   |
| 680   | T2           | 20                         | 0011   | 0099 | 0187 | 3.0                       | 14.0                | 130                                | 22  | - 83                              | + 16    | + 20     | 1500   |
| 680   | T2           | 10                         | 0012   | 0100 | 0188 | 3.0                       | 14.0                | 130                                | 22  | - 83                              | + 16    | + 20     | 1500   |
| 1500  | T3           | 20                         | 0013   | 0101 | 0189 | 5.0                       | 20.0                | 170                                | 18  | - 90                              | + 20    | + 25     | 1900   |
| 1500  | T3           | 10                         | 0014   | 0102 | 0190 | 5.0                       | 20.0                | 170                                | 18  | - 90                              | + 20    | + 25     | 1900   |
| 1800  | T4           | 20                         | 0015   | 0103 | 0191 | 7.0                       | 25.0                | 138                                | 14  | - 90                              | + 25    | + 30     | 2300   |
| 1800  | T4           | 10                         | 0016   | 0104 | 0192 | 7.0                       | 25.0                | 138                                | 14  | - 90                              | + 25    | + 30     | 2300   |

Notes

- (1) Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80 g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current table.





| STANDARD RATINGS/EXTENDED RATINGS: CLR81, M39006/25-XXXX           |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
|--|--------------|----------------------------|--|------|------|---------------------------|---------------------|------------------|-------------------------|-----------------------------------|---------|----------|--|
| CAPACITANCE<br>( $\mu$ F)  | CASE<br>CODE | CAP.<br>TOL.<br>( $\pm$ %) | PART NO. M39006/25- <sup>(1)</sup><br>FAILURE RATE LEVEL<br>(%/1000 h) |      |      | MAX. DCL ( $\mu$ A)<br>AT |                     | MAX.<br>DF<br>AT | MAX.<br>IMP.<br>AT      | MAX. CAPACITANCE<br>CHANGE (%) AT |         |          | MAX. <sup>(1)</sup><br>RIPPLE<br>CURRENT<br>AT + 85 °C |
|  |              |                            | M  | P    | R    | + 25 °C                   | + 85 °C<br>+ 125 °C | + 25 °C<br>(%)   | - 55 °C<br>( $\Omega$ ) | - 55 °C                           | + 85 °C | + 125 °C | 40 kHz<br>(mA)   |
|  |              |                            | 1.0  | 0.1  | 0.01 |                           |                     |                  |                         |                                   |         |          |  |
| <b>10 V<sub>DC</sub> AT + 85 °C; 7 V<sub>DC</sub> AT + 125 °C</b>  |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
| 150  | T1           | 20                         | 0017   | 0105 | 0193 | 2.0                       | 9.0                 | 34               | 54                      | - 55                              | + 13    | + 16     | 900  |
| 150  | T1           | 10                         | 0018   | 0106 | 0194 | 2.0                       | 9.0                 | 34               | 54                      | - 55                              | + 13    | + 16     | 900  |
| 560  | T2           | 20                         | 0019   | 0107 | 0195 | 3.0                       | 16.0                | 106              | 27                      | - 77                              | + 16    | + 20     | 1450   |
| 560  | T2           | 10                         | 0020   | 0108 | 0196 | 3.0                       | 16.0                | 106              | 27                      | - 77                              | + 16    | + 20     | 1450   |
| 1200   | T3           | 20                         | 0021   | 0109 | 0197 | 5.0                       | 20.0                | 137              | 18                      | - 88                              | + 20    | + 25     | 1850   |
| 1200   | T3           | 10                         | 0022   | 0110 | 0198 | 5.0                       | 20.0                | 137              | 18                      | - 88                              | + 20    | + 25     | 1850   |
| 1500   | T4           | 20                         | 0023   | 0111 | 0199 | 7.0                       | 25.0                | 114              | 15                      | - 88                              | + 25    | + 30     | 2300   |
| 1500   | T4           | 10                         | 0024   | 0112 | 0200 | 7.0                       | 25.0                | 114              | 15                      | - 88                              | + 25    | + 30     | 2300   |
| <b>15 V<sub>DC</sub> AT + 85 °C; 10 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
| 100  | T1           | 20                         | 0025   | 0113 | 0201 | 2.0                       | 9.0                 | 30               | 72                      | - 44                              | + 13    | + 16     | 900  |
| 100  | T1           | 10                         | 0026   | 0114 | 0202 | 2.0                       | 9.0                 | 30               | 72                      | - 44                              | + 13    | + 16     | 900  |
| 390  | T2           | 20                         | 0027   | 0115 | 0203 | 3.0                       | 16.0                | 74               | 31                      | - 66                              | + 16    | + 20     | 1450   |
| 390  | T2           | 10                         | 0028   | 0116 | 0204 | 3.0                       | 16.0                | 74               | 31                      | - 66                              | + 16    | + 20     | 1450   |
| 820  | T3           | 20                         | 0029   | 0117 | 0205 | 6.0                       | 24.0                | 111              | 22                      | - 77                              | + 20    | + 25     | 1800   |
| 820  | T3           | 10                         | 0030   | 0118 | 0206 | 6.0                       | 24.0                | 111              | 22                      | - 77                              | + 20    | + 25     | 1800   |
| 1000   | T4           | 20                         | 0031   | 0119 | 0207 | 8.0                       | 32.0                | 92               | 17                      | - 77                              | + 25    | + 30     | 2300   |
| 1000   | T4           | 10                         | 0032   | 0120 | 0208 | 8.0                       | 32.0                | 92               | 17                      | - 77                              | + 25    | + 30     | 2300   |
| <b>25 V<sub>DC</sub> AT + 85 °C; 15 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
| 68   | T1           | 20                         | 0033   | 0121 | 0209 | 2.0                       | 9.0                 | 22               | 90                      | - 40                              | + 12    | + 15     | 850  |
| 68   | T1           | 10                         | 0034   | 0122 | 0210 | 2.0                       | 9.0                 | 22               | 90                      | - 40                              | + 12    | + 15     | 850  |
| 270  | T2           | 20                         | 0035   | 0123 | 0211 | 3.0                       | 16.0                | 55               | 33                      | - 62                              | + 13    | + 16     | 1400   |
| 270  | T2           | 10                         | 0036   | 0124 | 0212 | 3.0                       | 16.0                | 55               | 33                      | - 62                              | + 13    | + 16     | 1400   |
| 560  | T3           | 20                         | 0037   | 0125 | 0213 | 7.0                       | 28.0                | 76               | 24                      | - 72                              | + 20    | + 25     | 1750   |
| 560  | T3           | 10                         | 0038   | 0126 | 0214 | 7.0                       | 28.0                | 76               | 24                      | - 72                              | + 20    | + 25     | 1750   |
| 680  | T4           | 20                         | 0039   | 0127 | 0215 | 8.0                       | 32.0                | 63               | 19                      | - 72                              | + 25    | + 30     | 2100   |
| 680  | T4           | 10                         | 0040   | 0128 | 0216 | 8.0                       | 32.0                | 63               | 19                      | - 72                              | + 25    | + 30     | 2100   |
| <b>30 V<sub>DC</sub> AT + 85 °C; 20 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
| 56   | T1           | 20                         | 0041   | 0129 | 0217 | 2.0                       | 9.0                 | 22               | 100                     | - 38                              | + 12    | + 15     | 800  |
| 56   | T1           | 10                         | 0042   | 0130 | 0218 | 2.0                       | 9.0                 | 22               | 100                     | - 38                              | + 12    | + 15     | 800  |
| 220  | T2           | 20                         | 0043   | 0131 | 0219 | 3.0                       | 16.0                | 42               | 36                      | - 60                              | + 13    | + 16     | 1200   |
| 220  | T2           | 10                         | 0044   | 0132 | 0220 | 3.0                       | 16.0                | 42               | 36                      | - 60                              | + 13    | + 16     | 1200   |
| 470  | T3           | 20                         | 0045   | 0133 | 0221 | 8.0                       | 32.0                | 64               | 25                      | - 65                              | + 20    | + 25     | 1500   |
| 470  | T3           | 10                         | 0046   | 0134 | 0222 | 8.0                       | 32.0                | 64               | 25                      | - 65                              | + 20    | + 25     | 1500   |
| 560  | T4           | 20                         | 0047   | 0135 | 0223 | 9.0                       | 36.0                | 55               | 20                      | - 65                              | + 25    | + 30     | 2000   |
| 560  | T4           | 10                         | 0048   | 0136 | 0224 | 9.0                       | 36.0                | 55               | 20                      | - 65                              | + 25    | + 30     | 2000   |
| <b>50 V<sub>DC</sub> AT + 85 °C; 30 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
| 33   | T1           | 20                         | 0049   | 0137 | 0225 | 2.0                       | 9.0                 | 12.3             | 135 -                   | 29                                | + 10    | + 12     | 700  |
| 33   | T1           | 10                         | 0050   | 0138 | 0226 | 2.0                       | 9.0                 | 12.3             | 135 -                   | 29                                | + 10    | + 12     | 700  |
| 120  | T2           | 20                         | 0051   | 0139 | 0227 | 4.0                       | 24.0                | 22.5             | 49 -                    | 42                                | + 12    | + 15     | 1200   |
| 120  | T2           | 10                         | 0052   | 0140 | 0228 | 4.0                       | 24.0                | 22.5             | 49 -                    | 42                                | + 12    | + 15     | 1200   |
| 270  | T3           | 20                         | 0053   | 0141 | 0229 | 8.0                       | 32.0                | 37               | 29                      | - 46                              | + 20    | + 25     | 1450   |
| 270  | T3           | 10                         | 0054   | 0142 | 0230 | 8.0                       | 32.0                | 37               | 29                      | - 46                              | + 20    | + 25     | 1450   |
| 330  | T4           | 20                         | 0055   | 0143 | 0231 | 9.0                       | 36.0                | 38               | 22                      | - 46                              | + 25    | + 30     | 1900   |
| 330  | T4           | 10                         | 0056   | 0144 | 0232 | 9.0                       | 36.0                | 38               | 22                      | - 46                              | + 25    | + 30     | 1900   |
| <b>60 V<sub>DC</sub> AT + 85 °C; 40 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |  |
| 27   | T1           | 20                         | 0057   | 0145 | 0233 | 3.0                       | 12.0                | 10.2             | 144 -                   | 24                                | + 10    | + 12     | 700  |
| 27   | T1           | 10                         | 0058   | 0146 | 0234 | 3.0                       | 12.0                | 10.2             | 144 -                   | 24                                | + 10    | + 12     | 700  |
| 100  | T2           | 20                         | 0059   | 0147 | 0235 | 4.0                       | 20.0                | 19               | 54                      | - 36                              | + 12    | + 15     | 1100   |
| 100  | T2           | 10                         | 0060   | 0148 | 0236 | 4.0                       | 20.0                | 19               | 54                      | - 36                              | + 12    | + 15     | 1100   |
| 220  | T3           | 20                         | 0061   | 0149 | 0237 | 8.0                       | 32.0                | 30               | 29                      | - 40                              | + 16    | + 20     | 1400   |
| 220  | T3           | 10                         | 0062   | 0150 | 0238 | 8.0                       | 32.0                | 30               | 29                      | - 40                              | + 16    | + 20     | 1400   |
| 270  | T4           | 20                         | 0063   | 0151 | 0239 | 9.0                       | 36.0                | 27               | 23                      | - 45                              | + 20    | + 25     | 1850   |
| 270  | T4           | 10                         | 0064   | 0152 | 0240 | 9.0                       | 36.0                | 27               | 23                      | - 45                              | + 20    | + 25     | 1850   |

**Notes**

- (1) Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51 g random vibration, 80g sinusoidal vibration and 500 g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current table.



| STANDARD RATINGS/EXTENDED RATINGS: CLR81, M39006/25-XXXX            |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
|---|--------------|----------------------------|--|------|------|---------------------------|---------------------|------------------|-------------------------|-----------------------------------|---------|----------|---|
| CAPACITANCE<br>( $\mu$ F)   | CASE<br>CODE | CAP.<br>TOL.<br>( $\pm$ %) | PART NO. M39006/25- <sup>(1)</sup><br>FAILURE RATE LEVEL<br>(%/1000 h) |      |      | MAX. DCL ( $\mu$ A)<br>AT |                     | MAX.<br>DF<br>AT | MAX.<br>IMP.<br>AT      | MAX. CAPACITANCE<br>CHANGE (%) AT |         |          | MAX. <sup>(1)</sup><br>RIPPLE<br>CURRENT<br>AT +85 °C<br>40 kHz<br>(mA) |
|   |              |                            | M  | P    | R    | + 25 °C                   | + 85 °C<br>+ 125 °C | + 25 °C<br>(%)   | - 55 °C<br>( $\Omega$ ) | - 55 °C                           | + 85 °C | + 125 °C |   |
|   |              |                            | 1.0  | 0.1  | 0.01 |                           |                     |                  |                         |                                   |         |          |   |
| <b>75 V<sub>DC</sub> AT + 85 °C; 50 V<sub>DC</sub> AT + 125 °C</b>  |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
| 22  | T1           | 20                         | 0065   | 0153 | 0241 | 3.0                       | 12.0                | 8.5              | 157                     | - 19                              | + 10    | + 12     | 600   |
| 22  | T1           | 10                         | 0066   | 0154 | 0242 | 3.0                       | 12.0                | 8.5              | 157                     | - 19                              | + 10    | + 12     | 600   |
| 82  | T2           | 20                         | 0067   | 0155 | 0243 | 4.0                       | 24.0                | 15.2             | 63 -                    | 30                                | + 12    | + 15     | 1000  |
| 82  | T2           | 10                         | 0068   | 0156 | 0244 | 4.0                       | 24.0                | 15.2             | 63 -                    | 30                                | + 12    | + 15     | 1000  |
| 180   | T3           | 20                         | 0069   | 0157 | 0245 | 9.0                       | 36.0                | 24.4             | 30 -                    | 35                                | + 16    | + 20     | 1300  |
| 180   | T3           | 10                         | 0070   | 0158 | 0246 | 9.0                       | 36.0                | 24.4             | 30 -                    | 35                                | + 16    | + 20     | 1300  |
| 220   | T4           | 20                         | 0071   | 0159 | 0247 | 10.0                      | 40.0                | 37.0             | 24 -                    | 40                                | + 20    | + 25     | 1800  |
| 220   | T4           | 10                         | 0072   | 0160 | 0248 | 10.0                      | 40.0                | 37.0             | 24 -                    | 40                                | + 20    | + 25     | 1800  |
| <b>100 V<sub>DC</sub> AT + 85 °C; 65 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
| 10  | T1           | 20                         | 0073   | 0161 | 0249 | 3.0                       | 12.0                | 4.5              | 200                     | - 17                              | + 10    | + 12     | 800   |
| 10  | T1           | 10                         | 0074   | 0162 | 0250 | 3.0                       | 12.0                | 4.5              | 200                     | - 17                              | + 10    | + 12     | 800   |
| 39  | T2           | 20                         | 0075   | 0163 | 0251 | 5.0                       | 24.0                | 10.4             | 80 -                    | 20                                | + 12    | + 15     | 1300  |
| 39  | T2           | 10                         | 0076   | 0164 | 0252 | 5.0                       | 24.0                | 10.4             | 80 -                    | 20                                | + 12    | + 15     | 1300  |
| 68  | T3           | 20                         | 0077   | 0165 | 0253 | 10.0                      | 40.0                | 11.3             | 40 -                    | 30                                | + 14    | + 16     | 1600  |
| 68  | T3           | 10                         | 0078   | 0166 | 0254 | 10.0                      | 40.0                | 11.3             | 40 -                    | 30                                | + 14    | + 16     | 1600  |
| 120   | T4           | 20                         | 0079   | 0167 | 0255 | 12.0                      | 48.0                | 25               | 30                      | - 35                              | + 15    | + 17     | 2000  |
| 120   | T4           | 10                         | 0080   | 0168 | 0256 | 12.0                      | 48.0                | 25               | 30                      | - 35                              | + 15    | + 17     | 2000  |
| <b>125 V<sub>DC</sub> AT + 85 °C; 85 V<sub>DC</sub> AT + 125 °C</b> |              |                            |  |      |      |                           |                     |                  |                         |                                   |         |          |   |
| 6.8   | T1           | 20                         | 0081   | 0169 | 0257 | 3.0                       | 12.0                | 6.0              | 300                     | - 14                              | + 10    | + 12     | 700   |
| 6.8   | T1           | 10                         | 0082   | 0170 | 0258 | 3.0                       | 12.0                | 6.0              | 300                     | - 14                              | + 10    | + 12     | 700   |
| 27  | T2           | 20                         | 0083   | 0171 | 0259 | 5.0                       | 24.0                | 7.2              | 90                      | - 18                              | + 12    | + 15     | 1200  |
| 27  | T2           | 10                         | 0084   | 0172 | 0260 | 5.0                       | 24.0                | 7.2              | 90                      | - 18                              | + 12    | + 15     | 1200  |
| 47  | T3           | 20                         | 0085   | 0173 | 0261 | 10.0                      | 40.0                | 7.9              | 50                      | - 26                              | + 14    | + 16     | 1500  |
| 47  | T3           | 10                         | 0086   | 0174 | 0262 | 10.0                      | 40.0                | 7.9              | 50                      | - 26                              | + 14    | + 16     | 1500  |
| 82  | T4           | 20                         | 0087   | 0175 | 0263 | 12.0                      | 48.0                | 17.4             | 32 -                    | 30                                | + 15    | + 17     | 1900  |
| 82  | T4           | 10                         | 0088   | 0176 | 0264 | 12.0                      | 48.0                | 17.4             | 32 -                    | 30                                | + 15    | + 17     | 1900  |

**Notes**

- (1) Dash number will include the letter "H" to indicate the optional vibration and shock requirements (i.e., 51g random vibration, 80g sinusoidal vibration and 500g shock).
- (2) For ripple current limits at various temperatures, voltages and frequencies, see Ripple Current table.

| CLR79, CLR81 RIPPLE CURRENT MULTIPLIERS VS. FREQUENCY, TEMPERATURE AND APPLIED PEAK VOLTAGE |          |         |      |      |      |         |      |      |      |         |      |      |      |         |      |      |      |         |      |      |      |         |      |      |      |
|---|----------|---------|------|------|------|---------|------|------|------|---------|------|------|------|---------|------|------|------|---------|------|------|------|---------|------|------|------|
| FREQUENCY OF APPLIED RIPPLE CURRENT   |          | 120 Hz  |      |      |      | 800 Hz  |      |      |      | 1 kHz   |      |      |      | 10 kHz  |      |      |      | 40 kHz  |      |      |      | 100 kHz |      |      |      |
|   |          | TEMP °C |      |      |      | TEMP °C |      |      |      | TEMP °C |      |      |      | TEMP °C |      |      |      | TEMP °C |      |      |      |         |      |      |      |
| AMBIENT STILL AIR   |          | ≤ 55    | 85   | 105  | 125  | ≤ 55    | 85   | 105  | 125  | ≤ 55    | 85   | 105  | 125  | ≤ 55    | 85   | 105  | 125  | ≤ 55    | 85   | 105  | 125  |         |      |      |      |
| % OF APPLIED VOLTAGE  | 100 %    | 0.60    | 0.39 | -    | -    | 0.71    | 0.43 | -    | -    | 0.72    | 0.46 | -    | -    | 0.88    | 0.55 | -    | -    | 1.0     | 0.63 | -    | -    | 1.1     | 0.69 | -    | -    |
|   | 90 %     | 0.60    | 0.46 | -    | -    | 0.71    | 0.55 | -    | -    | 0.72    | 0.55 | -    | -    | 0.88    | 0.67 | -    | -    | 1.0     | 0.77 | -    | -    | 1.1     | 0.85 | -    | -    |
|   | 80 %     | 0.60    | 0.52 | 0.35 | -    | 0.71    | 0.62 | 0.42 | -    | 0.72    | 0.62 | 0.42 | -    | 0.88    | 0.76 | 0.52 | -    | 1.0     | 0.87 | 0.59 | -    | 1.1     | 0.96 | 0.65 | -    |
|   | 70 %     | 0.60    | 0.58 | 0.44 | -    | 0.71    | 0.69 | 0.52 | -    | 0.72    | 0.70 | 0.52 | -    | 0.88    | 0.85 | 0.64 | -    | 1.0     | 0.97 | 0.73 | -    | 1.1     | 1.07 | 0.80 | -    |
|   | 66 2/3 % | 0.60    | 0.60 | 0.46 | 0.27 | 0.71    | 0.71 | 0.55 | 0.32 | 0.72    | 0.72 | 0.55 | 0.32 | 0.88    | 0.88 | 0.68 | 0.40 | 1.0     | 1.0  | 0.77 | 0.45 | 1.1     | 1.1  | 0.85 | 0.50 |

**Notes**

- 1. At + 125 °C the rated voltage of the capacitors decreases to 66 2/3 % of the + 85 °C rated voltage.
- 2. The peak of the applied AC ripple voltage plus the applied DC voltage must not exceed the DC voltage rating of the capacitor either forward or reverse.
- 3. The ripple current listed represents a rating calculated using a maximum internal temperature rise ( $\Delta$ T) of + 50 °C at 40 kHz at + 85 °C ambient with a maximum peak rated voltage of 66 2/3 % of the + 85 °C peak voltage rating.
- 4. The maximum allowable internal temperature rise ( $\Delta$ T) decreases linearly to a calculated + 10 °C rise at + 125 °C ambient.
- 5. The internal temperature rise is directly proportional to the equivalent series resistance of the capacitor and equivalent series resistance increases with decreasing frequency.



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