

# Aluminum Capacitors

## 105 °C, Miniature, Radial Lead



### FEATURES

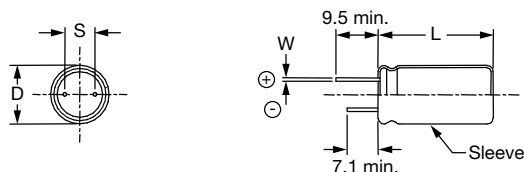
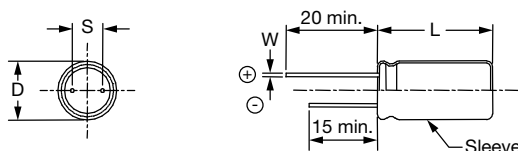
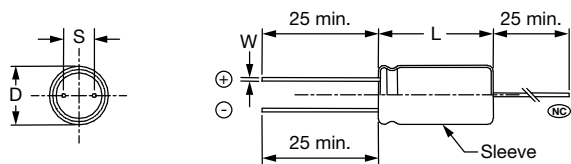
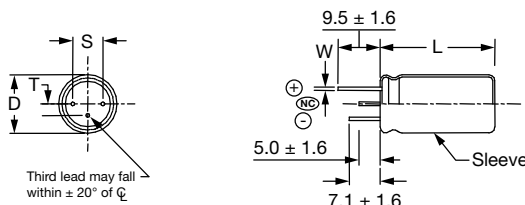
- Improved SMPS output capacitors
- Highest ripple current ratings per case size
- High CV
- Material categorization: for definitions of compliance please see [www.vishay.com/doc299912](http://www.vishay.com/doc299912)



| QUICK REFERENCE DATA                        |                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DESCRIPTION                                 | VALUE                                                                                                                                                                                                                                                                                                         |
| Nominal case size<br>Ø D x L in inches [mm] | 0.394 x 0.472 [10.0 x 12.0]<br>to 0.709 x 1.575 [18.0 x 40.0]                                                                                                                                                                                                                                                 |
| Operating temperature                       | -55 °C to +105 °C                                                                                                                                                                                                                                                                                             |
| Rated capacitance range, C <sub>R</sub>     | 33 µF to 6800 µF                                                                                                                                                                                                                                                                                              |
| Tolerance on C <sub>R</sub>                 | ± 20 %                                                                                                                                                                                                                                                                                                        |
| Rated voltage range, U <sub>R</sub>         | 6.3 WV <sub>DC</sub> to 63 WV <sub>DC</sub>                                                                                                                                                                                                                                                                   |
| Termination                                 | 2 and 3 radial leads and axial mount.                                                                                                                                                                                                                                                                         |
| Life validation test at 105 °C              | 4000 h (≥ 0.512" [13.0] diameter):<br>3000 h (0.394" [10.0] diameter):<br>ΔCAP ≤ 20 % (6.3 WV <sub>DC</sub> to 25 WV <sub>DC</sub> ),<br>≤ 15 % (40 WV <sub>DC</sub> to 63 WV <sub>DC</sub> )<br>from initial measurement.<br>ΔESR ≤ 1.3 x initial<br>specified limit.<br>ΔDCL ≤ 2 x initial specified limit. |
| Shelf life at 105 °C                        | 1000 h: ΔCAP ≤ 20 %<br>(6.3 WV <sub>DC</sub> to 25 WV <sub>DC</sub> ),<br>≤ 15 % (40 WV <sub>DC</sub> to 63 WV <sub>DC</sub> )<br>from initial measurements.<br>ΔESR ≤ 1.3 x initial<br>specified limit.                                                                                                      |
| DC leakage current                          | I = 0.01 CV (2 min charge time)<br>I = 0.03 CV (1 min charge time)<br>I in µA, C in µF, V in Volts                                                                                                                                                                                                            |

| RIPPLE CURRENT MULTIPLIERS |          |            |             |           |             |
|----------------------------|----------|------------|-------------|-----------|-------------|
| TEMPERATURE                |          |            |             |           |             |
| AMBIENT TEMPERATURE        |          |            | MULTIPLIERS |           |             |
| +105 °C                    |          |            | 1.0         |           |             |
| +85 °C                     |          |            | 2.2         |           |             |
| +75 °C                     |          |            | 2.7         |           |             |
| ≤ +65 °C                   |          |            | 3.0         |           |             |
| FREQUENCY (Hz)             |          |            |             |           |             |
| WV <sub>DC</sub>           | 50 TO 60 | 100 TO 120 | 300 TO 400  | 1K TO 19K | 20K TO 200K |
| 6.3 to 63                  | 0.60     | 0.70       | 0.75        | 0.82      | 1.0         |

| LOW TEMPERATURE PERFORMANCE                                                   |                 |                 |                 |                 |
|-------------------------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|
| CAPACITANCE RATIO C <sup>-55 °C</sup> / C <sup>+25 °C</sup> MINIMUM AT 120 Hz |                 |                 |                 |                 |
| MAXIMUM CAPACITANCE CHANGE                                                    | VOLTAGE         |                 | MULTIPLIER      |                 |
|                                                                               | 6.3 V to 16 V   |                 | 0.75            |                 |
|                                                                               | 25 V to 63 V    |                 | 0.85            |                 |
| MAXIMUM IMPEDANCE CHANGE                                                      | VOLTAGE         |                 | MULTIPLIER      |                 |
|                                                                               | 6.3 V to 16 V   |                 | 2.0             |                 |
|                                                                               | 25 V to 63 V    |                 | 1.5             |                 |
| ESL (TYPICAL VALUES AT 1 MHz TO 10 MHz)                                       |                 |                 |                 |                 |
| NOMINAL DIAMETER                                                              | 0.394<br>[10.0] | 0.512<br>[13.0] | 0.630<br>[16.0] | 0.709<br>[18.0] |
| TYPICAL ESL (nH)                                                              | 4.0             | 7.0             | 10.0            | 12.0            |

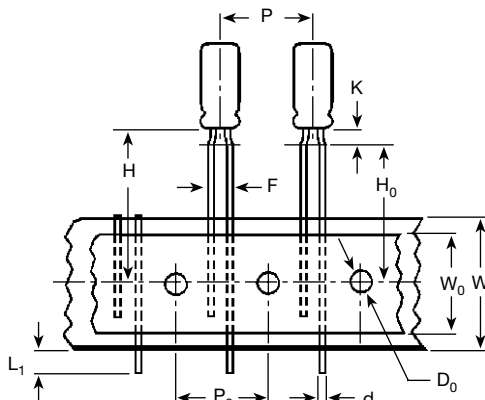
**BULK SPECIFICATIONS** in millimeters**TERMINAL CODE C****TERMINAL CODE D****TERMINAL CODE J <sup>(1)</sup>****TERMINAL CODE O <sup>(2)</sup>****Notes**

- ⊕ Positive terminal
- ⊖ Negative terminal
- NC No charge potential
- <sup>(1)</sup> Available for 12.5 mm, 16 mm, and 18 mm diameter units
- <sup>(2)</sup> Available for 12.5 mm, 16 mm, and 18 mm diameter units with epoxy end-seal

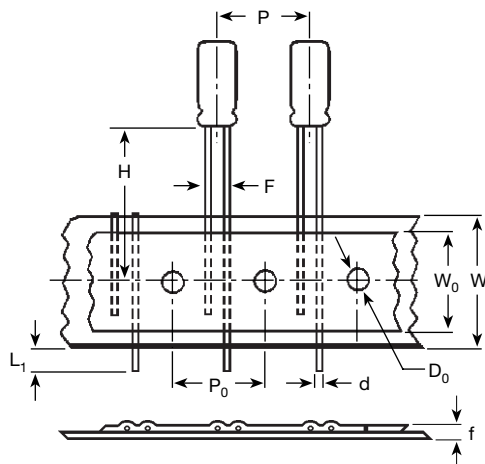
**DIMENSIONS** in inches [millimeters]

| CASE CODE | NOMINAL      |              | STYLES 2 AND 4 |              | STYLES 3 AND 5 |              | LEAD SPACING            |                         | LEAD DIAMETER |     |
|-----------|--------------|--------------|----------------|--------------|----------------|--------------|-------------------------|-------------------------|---------------|-----|
|           | D            | L            | D (max.)       | L (max.)     | D (max.)       | L (max.)     | $S \pm 0.024$<br>[0.60] | $T \pm 0.020$<br>[0.50] | NOMINAL       | AWG |
| CC        | 0.394 [10.0] | 0.512 [13.0] | 0.413 [10.5]   | 0.563 [14.3] | 0.413 [10.5]   | 0.630 [16.0] | 0.197 [5.0]             | n/a                     | 0.025 [0.63]  | 22  |
| CD        | 0.394 [10.0] | 0.630 [16.0] | 0.413 [10.5]   | 0.669 [17.0] | 0.413 [10.5]   | 0.740 [18.8] | 0.197 [5.0]             | n/a                     | 0.025 [0.63]  | 22  |
| CG        | 0.394 [10.0] | 0.787 [20.0] | 0.413 [10.5]   | 0.846 [21.5] | 0.413 [10.5]   | 0.906 [23.0] | 0.197 [5.0]             | n/a                     | 0.025 [0.63]  | 22  |
| DG        | 0.492 [12.5] | 0.787 [20.0] | 0.512 [13.0]   | 0.846 [21.5] | 0.512 [13.0]   | 0.906 [23.0] | 0.197 [5.0]             | 0.098 [2.5]             | 0.032 [0.81]  | 20  |
| DK        | 0.492 [12.5] | 0.984 [25.0] | 0.512 [13.0]   | 1.043 [26.5] | 0.512 [13.0]   | 1.142 [29.0] | 0.197 [5.0]             | 0.098 [2.5]             | 0.032 [0.81]  | 20  |
| DM        | 0.492 [12.5] | 1.043 [26.5] | 0.512 [13.0]   | 1.102 [28.0] | 0.512 [13.0]   | 1.161 [29.5] | 0.197 [5.0]             | 0.098 [2.5]             | 0.032 [0.81]  | 20  |
| DT        | 0.492 [12.5] | 1.319 [33.5] | 0.512 [13.0]   | 1.346 [34.2] | 0.512 [13.0]   | 1.417 [36.0] | 0.197 [5.0]             | 0.098 [2.5]             | 0.032 [0.81]  | 20  |
| DS        | 0.492 [12.5] | 1.673 [42.5] | 0.512 [13.0]   | 1.720 [43.7] | 0.512 [13.0]   | 1.791 [45.5] | 0.197 [5.0]             | 0.098 [2.5]             | 0.032 [0.81]  | 20  |
| EK        | 0.630 [16.0] | 0.984 [25.0] | 0.650 [16.5]   | 1.031 [26.2] | 0.650 [16.5]   | 1.098 [27.9] | 0.295 [7.5]             | 0.150 [3.8]             | 0.032 [0.81]  | 20  |
| EN        | 0.630 [16.0] | 1.260 [32.0] | 0.650 [16.5]   | 1.319 [33.5] | 0.650 [16.5]   | 1.417 [36.0] | 0.295 [7.5]             | 0.150 [3.8]             | 0.032 [0.81]  | 20  |
| ER        | 0.630 [16.0] | 1.417 [36.0] | 0.650 [16.5]   | 1.476 [37.5] | 0.650 [16.5]   | 1.575 [40.0] | 0.295 [7.5]             | 0.150 [3.8]             | 0.032 [0.81]  | 20  |
| EU        | 0.630 [16.0] | 1.575 [40.0] | 0.650 [16.5]   | 1.642 [41.7] | 0.650 [16.5]   | 1.669 [42.4] | 0.295 [7.5]             | 0.150 [3.8]             | 0.032 [0.81]  | 20  |
| FR        | 0.709 [18.0] | 1.417 [36.0] | 0.728 [18.5]   | 1.476 [37.5] | 0.728 [18.5]   | 1.575 [40.0] | 0.295 [7.5]             | 0.150 [3.8]             | 0.032 [0.81]  | 20  |
| FV        | 0.709 [18.0] | 1.575 [40.0] | 0.728 [18.5]   | 1.653 [42.0] | 0.728 [18.5]   | 1.693 [43.0] | 0.295 [7.5]             | 0.150 [3.8]             | 0.032 [0.81]  | 20  |

**TAPE AND REEL, SPECIFICATIONS TO EIA-468D** in inches [millimeters]

**Formed Leads**


| <b>DIMENSIONS</b> in inches [millimeters] <b>AND PACKAGING QUANTITIES</b> |                       |                      |
|---------------------------------------------------------------------------|-----------------------|----------------------|
| <b>CASE SIZE</b>                                                          | <b>F LEAD SPACING</b> | <b>STD. QTY/REEL</b> |
| 0.236 x 0.453 [6.0 x 11.0]                                                | 0.197 [5.0]           | 800                  |
| 0.315 x 0.472 [8.0 x 12.0]                                                | 0.197 [5.0]           | 700                  |

**Unformed (Straight) Leads**


| <b>DIMENSIONS</b> in inches [millimeters] <b>AND PACKAGING QUANTITIES</b> |                            |                      |
|---------------------------------------------------------------------------|----------------------------|----------------------|
| <b>CASE SIZE</b>                                                          | <b>F LEAD SPACING</b>      | <b>STD. QTY/REEL</b> |
| 0.236 x 0.453 [6.0 x 11.0]                                                | 0.098 [2.5]                | 800                  |
| 0.315 x 0.472 [8.0 x 12.0]                                                | 0.140 <sup>(1)</sup> [3.5] | 700                  |
| 0.394 x 0.512 [10.0 x 13.0]                                               | 0.197 [5.0]                | 500                  |
| 0.394 x 0.630 [10.0 x 16.0]                                               | 0.197 [5.0]                | 500                  |
| 0.394 x 0.787 [10.0 x 20.0]                                               | 0.197 [5.0]                | 500                  |

**Note**
<sup>(3)</sup> Available as special order.



| DIMENSIONS in inches [millimeters]       |                               |                               |                                |                                |                                |
|------------------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|
| ITEM                                     | CASE SIZE (DIAMETER x LENGTH) |                               |                                |                                |                                |
|                                          | 0.236 x 0.433<br>[6.0 x 11.0] | 0.315 x 0.472<br>[8.0 x 12.0] | 0.394 x 0.512<br>[10.0 x 13.0] | 0.394 x 0.630<br>[10.0 x 16.0] | 0.394 x 0.787<br>[10.0 x 20.0] |
| d - Lead-wire diameter                   | 0.025 [0.63]                  | 0.025 [0.63]                  | 0.025 [0.63]                   | 0.025 [0.63]                   | 0.025 [0.63]                   |
| P - Pitch of component                   | 0.500 [12.7]                  | 0.500 [12.7]                  | 0.500 [12.7]                   | 0.500 [12.7]                   | 0.500 [12.7]                   |
| P <sub>0</sub> - Feed hole pitch         | 0.500 [12.7]                  | 0.500 [12.7]                  | 0.500 [12.7]                   | 0.500 [12.7]                   | 0.500 [12.7]                   |
| F - Lead-to-lead distance                | 0.197 [5.0]                   | 0.197 [5.0]                   | 0.197 [5.0]                    | 0.197 [5.0]                    | 0.197 [5.0]                    |
| K - Clinch height                        | 0.098 [2.5]                   | 0.157 [4.0]                   | n/a                            | n/a                            | n/a                            |
| H - Height of component from tape center | 0.728 [18.5]                  | 0.787 [20.0]                  | 0.906 [23.0]                   | 0.906 [23.0]                   | 0.906 [23.0]                   |
| H <sub>0</sub> - Lead-wire clinch height | 0.630 [16.0]                  | 0.630 [16.0]                  | n/a                            | n/a                            | n/a                            |
| W - Tape width                           | 0.709 [18.0]                  | 0.709 [18.0]                  | 0.709 [18.0]                   | 0.709 [18.0]                   | 0.709 [18.0]                   |
| W <sub>0</sub> - Hold down tape width    | 0.591 [15.0]                  | 0.591 [15.0]                  | 0.591 [15.0]                   | 0.591 [15.0]                   | 0.591 [15.0]                   |
| D <sub>0</sub> - Feed hole diameter      | 0.157 [4.0]                   | 0.157 [4.0]                   | 0.157 [4.0]                    | 0.157 [4.0]                    | 0.157 [4.0]                    |
| t - Total tape thickness                 | 0.028 [0.7]                   | 0.028 [0.7]                   | 0.028 [0.7]                    | 0.028 [0.7]                    | 0.028 [0.7]                    |
| L <sub>1</sub> - Maximum lead protrusion | 0.118 [3.0]                   | 0.118 [3.0]                   | 0.118 [3.0]                    | 0.118 [3.0]                    | 0.118 [3.0]                    |

**Note**

- Terminal code "I" = tape and reel. Terminal code "+" = tape and ammo.  
Positive leader is standard. Negative leader is available by special order.

**ORDERING EXAMPLE**

Electrolytic capacitor 678D series: 678D 108 M 6R3 DG 3 D

| DESCRIPTION |                                                         |
|-------------|---------------------------------------------------------|
| CODE        | EXPLANATION                                             |
| 678D        | Product type                                            |
| 108         | Capacitance value (1000 $\mu$ F)                        |
| M           | Tolerance (M = $\pm 20$ %)                              |
| 6R3         | Voltage rating at 105 °C (6R3 = 6.3 V)                  |
| DG          | Can size (see Dimensions table)                         |
| 3           | Sleeve and sealing (3 = P.V.C. sleeve w/epoxy end seal) |
| D           | Terminal code / packaging (D = bulk; straight leads)    |

**Note**

- For lead (Pb)-free / RoHS compliant products add suffix "E3" to part number.  
Example: 678D108M6R3DG3DE3

| ELECTRICAL DATA AND ORDERING INFORMATION    |                 |                             |                           |        |                               |                                    |
|---------------------------------------------|-----------------|-----------------------------|---------------------------|--------|-------------------------------|------------------------------------|
| CAPACITANCE<br>(μF)                         | PART NUMBER     | NOMINAL CASE SIZE<br>D x L  | MAX. ESR<br>AT +25 °C (Ω) |        | MAX. RIPPLE<br>AT +105 °C (A) | MAX.<br>IMPEDANCE<br>AT +25 °C (Ω) |
|                                             |                 |                             | 20 Hz                     | 20 kHz | 20 kHz to 100 kHz             | 100 kHz                            |
| 6.3 WV <sub>DC</sub> at 105 °C, SURGE = 9 V |                 |                             |                           |        |                               |                                    |
| 330.0                                       | 678D337M6R3CC3D | 0.394 x 0.512 [10.0 x 13.0] | 0.540                     | 0.213  | 0.36                          | 0.213                              |
| 470.0                                       | 678D477M6R3CD3D | 0.394 x 0.630 [10.0 x 16.0] | 0.340                     | 0.133  | 0.49                          | 0.132                              |
| 1000.0                                      | 678D108M6R3DG3D | 0.492 x 0.787 [12.5 x 20.0] | 0.200                     | 0.071  | 0.83                          | 0.070                              |
| 2200.0                                      | 678D228M6R3EK3D | 0.630 x 0.984 [16.0 x 25.0] | 0.110                     | 0.041  | 1.36                          | 0.045                              |
| 3300.0                                      | 678D338M6R3DS3D | 0.492 x 1.673 [12.5 x 42.5] | 0.067                     | 0.031  | 1.67                          | 0.032                              |
| 4700.0                                      | 678D478M6R3FR3D | 0.709 x 1.417 [18.0 x 36.0] | 0.066                     | 0.029  | 2.02                          | 0.031                              |
| 10 WV <sub>DC</sub> AT 105 °C, SURGE = 13 V |                 |                             |                           |        |                               |                                    |
| 330.0                                       | 678D337M010CD3D | 0.394 x 0.630 [10.0 x 16.0] | 0.350                     | 0.135  | 0.46                          | 0.134                              |
| 470.0                                       | 678D477M010CG3D | 0.394 x 0.787 [10.0 x 20.0] | 0.235                     | 0.092  | 0.63                          | 0.090                              |
| 1000.0                                      | 678D108M010DM3D | 0.492 x 1.043 [12.5 x 26.5] | 0.120                     | 0.062  | 0.98                          | 0.061                              |
| 2200.0                                      | 678D228M010EK3D | 0.630 x 0.984 [16.0 x 25.0] | 0.115                     | 0.042  | 1.52                          | 0.046                              |
| 3300.0                                      | 678D338M010EN3D | 0.630 x 1.260 [16.0 x 32.0] | 0.085                     | 0.038  | 1.56                          | 0.041                              |
| 4700.0                                      | 678D487M010FR3D | 0.709 x 1.417 [18.0 x 36.0] | 0.070                     | 0.031  | 1.97                          | 0.033                              |

**ELECTRICAL DATA AND ORDERING INFORMATION**

| CAPACITANCE<br>(μF)                         | PART NUMBER     | NOMINAL CASE SIZE<br>D x L  | MAX. ESR<br>AT +25 °C (Ω) |        | MAX. RIPPLE<br>AT +105 °C (A) | MAX. IMPEDANCE<br>AT +25 °C (Ω) |
|---------------------------------------------|-----------------|-----------------------------|---------------------------|--------|-------------------------------|---------------------------------|
|                                             |                 |                             | 20 Hz                     | 20 kHz | 20 kHz to 100 kHz             | 100 kHz                         |
| 16 WV <sub>DC</sub> AT 105 °C, SURGE = 20 V |                 |                             |                           |        |                               |                                 |
| 220.0                                       | 678D227M016CC3D | 0.394 x 0.512 [10.0 x 13.0] | 0.585                     | 0.217  | 0.40                          | 0.217                           |
| 330.0                                       | 678D337M016CD3D | 0.394 x 0.630 [10.0 x 16.0] | 0.370                     | 0.137  | 0.52                          | 0.136                           |
| 470.0                                       | 678D477M016CG3D | 0.394 x 0.787 [10.0 x 20.0] | 0.250                     | 0.098  | 0.70                          | 0.094                           |
| 1000.0                                      | 678D108M016DM3D | 0.492 x 1.043 [12.5 x 26.5] | 0.130                     | 0.066  | 1.00                          | 0.065                           |
| 2200.0                                      | 678D228M016ER3D | 0.630 x 1.417 [16.0 x 36.0] | 0.074                     | 0.032  | 1.78                          | 0.034                           |
| 3300.0                                      | 678D338M016FR3D | 0.709 x 1.417 [18.0 x 36.0] | 0.074                     | 0.032  | 1.94                          | 0.034                           |
| 20 WV <sub>DC</sub> AT 105 °C, SURGE = 30 V |                 |                             |                           |        |                               |                                 |
| 220.0                                       | 678D227M020CD3D | 0.394 x 0.630 [10.0 x 16.0] | 0.380                     | 0.150  | 0.41                          | 0.148                           |
| 330.0                                       | 678D337M020CG3D | 0.394 x 0.787 [10.0 x 20.0] | 0.270                     | 0.100  | 0.61                          | 0.098                           |
| 470.0                                       | 678D477M020DG3D | 0.492 x 0.787 [12.5 x 20.0] | 0.250                     | 0.077  | 0.45                          | 0.075                           |
| 1000.0                                      | 678D108M020DT3D | 0.492 x 1.280 [12.5 x 33.5] | 0.115                     | 0.048  | 0.78                          | 0.045                           |
| 2200.0                                      | 678D228M020ER3D | 0.630 x 1.417 [16.0 x 36.0] | 0.077                     | 0.032  | 1.80                          | 0.034                           |
| 3300.0                                      | 678D338M020FV3D | 0.709 x 1.575 [18.0 x 40.0] | 0.061                     | 0.026  | 2.25                          | 0.028                           |
| 25 WV <sub>DC</sub> AT 105 °C, SURGE = 35 V |                 |                             |                           |        |                               |                                 |
| 100.0                                       | 678D107M025CC3D | 0.394 x 0.512 [10.0 x 13.0] | 0.700                     | 0.250  | 0.32                          | 0.250                           |
| 220.0                                       | 678D227M025CG3D | 0.394 x 0.787 [10.0 x 20.0] | 0.300                     | 0.105  | 0.59                          | 0.100                           |
| 330.0                                       | 678D337M025DG3D | 0.492 x 0.787 [12.5 x 20.0] | 0.270                     | 0.078  | 0.79                          | 0.076                           |
| 470.0                                       | 678D477M025DM3D | 0.492 x 1.043 [12.5 x 26.5] | 0.160                     | 0.067  | 0.97                          | 0.068                           |
| 1000.0                                      | 678D108M025DS3D | 0.492 x 1.673 [12.5 x 42.5] | 0.090                     | 0.034  | 1.60                          | 0.036                           |
| 2200.0                                      | 678D228M025FV3D | 0.709 x 1.575 [18.0 x 40.0] | 0.062                     | 0.026  | 2.22                          | 0.028                           |
| 40 WV <sub>DC</sub> AT 105 °C, SURGE = 55 V |                 |                             |                           |        |                               |                                 |
| 47.0                                        | 678D476M040CC3D | 0.394 x 0.512 [10.0 x 13.0] | 0.950                     | 0.265  | 0.28                          | 0.265                           |
| 100.0                                       | 678D107M040CD3D | 0.394 x 0.630 [10.0 x 16.0] | 0.580                     | 0.165  | 0.38                          | 0.165                           |
| 330.0                                       | 678D337M040DM3D | 0.492 x 1.043 [12.5 x 26.5] | 0.200                     | 0.068  | 0.93                          | 0.070                           |
| 470.0                                       | 678D477M040EK3D | 0.630 x 0.984 [16.0 x 25.0] | 0.133                     | 0.046  | 1.28                          | 0.050                           |
| 1000.0                                      | 678D108M040ER3D | 0.630 x 1.417 [16.0 x 36.0] | 0.080                     | 0.033  | 1.76                          | 0.035                           |
| 50 WV <sub>DC</sub> AT 105 °C, SURGE = 75 V |                 |                             |                           |        |                               |                                 |
| 47.0                                        | 678D476M050CC3D | 0.394 x 0.512 [10.0 x 13.0] | 1.250                     | 0.275  | 0.28                          | 0.275                           |
| 100.0                                       | 678D107M050CG3D | 0.394 x 0.787 [10.0 x 20.0] | 0.520                     | 0.115  | 0.57                          | 0.112                           |
| 220.0                                       | 678D227M050DM3D | 0.472 x 1.043 [12.5 x 26.5] | 0.240                     | 0.069  | 0.93                          | 0.071                           |
| 330.0                                       | 678D337M050EK3D | 0.630 x 0.984 [16.0 x 25.0] | 0.150                     | 0.048  | 1.26                          | 0.052                           |
| 470.0                                       | 678D477M050DS3D | 0.492 x 1.673 [12.5 x 42.5] | 0.110                     | 0.036  | 1.55                          | 0.039                           |
| 1000.0                                      | 678D108M050FV3D | 0.709 x 1.575 [18.0 x 40.0] | 0.077                     | 0.028  | 2.15                          | 0.032                           |
| 63 WV <sub>DC</sub> AT 105 °C, SURGE = 80 V |                 |                             |                           |        |                               |                                 |
| 33.0                                        | 678D336M063CC3D | 0.394 x 0.512 [10.0 x 13.0] | 1.600                     | 0.288  | 0.27                          | 0.288                           |
| 47.0                                        | 678D476M063CD3D | 0.394 x 0.630 [10.0 x 16.0] | 1.000                     | 0.180  | 0.37                          | 0.180                           |
| 100.0                                       | 678D107M063DG3D | 0.492 x 0.787 [12.5 x 20.0] | 0.450                     | 0.093  | 0.72                          | 0.090                           |
| 220.0                                       | 678D227M063DT3D | 0.492 x 1.280 [12.5 x 33.5] | 0.160                     | 0.055  | 1.10                          | 0.054                           |
| 220.0                                       | 678D227M063EK3D | 0.630 x 0.984 [16.0 x 25.0] | 0.170                     | 0.050  | 1.23                          | 0.054                           |
| 330.0                                       | 678D337M063DS3D | 0.492 x 1.673 [12.5 x 42.5] | 0.130                     | 0.038  | 1.51                          | 0.040                           |
| 470.0                                       | 678D477M063ER3D | 0.630 x 1.417 [16.0 x 36.0] | 0.120                     | 0.035  | 1.70                          | 0.038                           |

Statements about product lifetime are based on calculations and internal testing. They should only be interpreted as estimations. Also due to external factors, the lifetime in the field application may deviate from the calculated lifetime. In general, nothing stated herein shall be construed as a guarantee of durability.



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