

## Solid Tantalum Surface Mount Chip Capacitors, Molded Case, Extended Range



### PERFORMANCE / ELECTRICAL CHARACTERISTICS

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

**Capacitance Range:** 0.47 μF to 470 μF

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

**Voltage Rating:** 2.5 V<sub>DC</sub> to 35 V<sub>DC</sub>

### FEATURES

- Small size, suitable for high density packaging
- Terminations: 100 % matte tin
- MSL level: 1
- Compatible with “high volume” automatic pick and place equipment
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS COMPLIANT**

**HALOGEN FREE**  
Available

**GREEN**  
(5-2008)  
Available

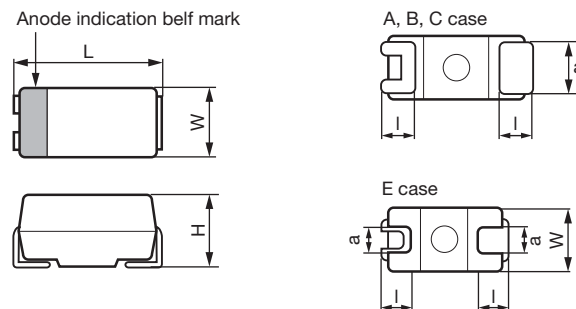
### APPLICATIONS

- Industrial
- AV equipment
- General purpose

### ORDERING INFORMATION

| TMCM TYPE | A CASE CODE                      | OJ DC VOLTAGE RATING AT +85 °C  | 106 CAPACITANCE (μF)   | M CAPACITANCE TOLERANCE  | TR PACKAGING POLARITY                            | (2) (OPTIONAL)  | F TERMINAL CODE                 |
|-----------|----------------------------------|---|--|--------------------------|--|---|---------------------------------|
|           | See Ratings and Case Codes table | 0E = 2.5 V<br>0G = 4.0 V<br>0J = 6.3 V (7 V)<br>1A = 10 V<br>1C = 16 V<br>1D = 20 V<br>1E = 25 V<br>1V = 35 V | This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow. | K = ± 10 %<br>M = ± 20 % | TR = 7" reel, cathodes close to perforation side | Halogen-free (special order), not applicable for E case | F = lead (Pb)-free terminations |

### DIMENSIONS in inches [millimeters]



| CASE CODE | EIA SIZE | L                            | W                            | H                            | l                            | a                            |
|-----------|----------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| A         | 3216-18  | 0.126 ± 0.008<br>[3.2 ± 0.2] | 0.063 ± 0.008<br>[1.6 ± 0.2] | 0.063 ± 0.008<br>[1.6 ± 0.2] | 0.028 ± 0.012<br>[0.7 ± 0.3] | 0.047 ± 0.008<br>[1.2 ± 0.2] |
| B         | 3528-21  | 0.138 ± 0.008<br>[3.5 ± 0.2] | 0.110 ± 0.008<br>[2.8 ± 0.2] | 0.075 ± 0.008<br>[1.9 ± 0.2] | 0.030 ± 0.012<br>[0.8 ± 0.3] | 0.087 ± 0.008<br>[2.2 ± 0.2] |
| C         | 5832-27  | 0.228 ± 0.008<br>[5.8 ± 0.2] | 0.126 ± 0.008<br>[3.2 ± 0.2] | 0.100 ± 0.008<br>[2.5 ± 0.2] | 0.051 ± 0.012<br>[1.3 ± 0.3] | 0.087 ± 0.008<br>[2.2 ± 0.2] |
| E         | 7343-30  | 0.287 ± 0.008<br>[7.3 ± 0.2] | 0.169 ± 0.012<br>[4.3 ± 0.3] | 0.112 ± 0.008<br>[2.8 ± 0.2] | 0.051 ± 0.012<br>[1.3 ± 0.3] | 0.094 ± 0.008<br>[2.4 ± 0.2] |

| RATINGS AND CASE CODES |         |         |             |         |       |       |      |      |
|------------------------|---------|---------|-------------|---------|-------|-------|------|------|
| μF                     | 2.5 V   | 4.0 V   | 6.3 V (7 V) | 10 V    | 16 V  | 20 V  | 25 V | 35 V |
| 0.47                   |         |         |             |         |       |       |      | A    |
| 0.68                   |         |         |             |         |       |       | A    | A    |
| 1.0                    |         |         |             |         |       | A     | A    | A    |
| 1.5                    |         |         |             |         | A     | A     | A    | A/B  |
| 2.2                    |         |         |             | A       | A     | A     | A/B  | A/B  |
| 3.3                    |         |         | A           | A       | A     | A/B   | A/B  | B    |
| 4.7                    |         | A       | A           | A       | A/B   | A/B   | A/B  | C    |
| 6.8                    | A       | A       | A           | A/B     | A/B   | A/B   | B/C  | C    |
| 10                     | A       | A       | A/B         | A/B     | A/B   | B/C   | C    | C/E  |
| 15                     | A       | A/B     | A/B         | A/B     | A/B/C | B/C   | C/E  | E    |
| 22                     | A/B     | A/B     | A/B         | A/B/C   | A/B/C | B/C/E | C/E  | E    |
| 33                     | A/B     | A/B     | A/B/C       | A/B/C   | B/C/E | C/E   | E    |      |
| 47                     | A/B     | A/B/C   | A/B/C       | A/B/C/E | B/C/E | E     | E    |      |
| 68                     | A/B/C   | A/B/C   | A/B/C/E     | B/C/E   | C/E   | E     |      |      |
| 100                    | A/B/C   | A/B/C/E | A/B/C/E     | B/C/E   | C/E   |       |      |      |
| 150                    | A/B/C/E | A/B/C/E | B/C/E       | C/E     |       |       |      |      |
| 220                    | A/B/C/E | A/B/C/E | B/C/E       | E       |       |       |      |      |
| 330                    | B/C/E   | B/C/E   | C/E         | E       |       |       |      |      |
| 470                    | B/C/E   | E       | E           |         |       |       |      |      |

### MARKING



| SIMPLIFIED VOLTAGE CODES, CASES A, B |      |                   |      |
|--------------------------------------|------|-------------------|------|
| VOLTAGE CODE<br>V                    | CODE | VOLTAGE CODE<br>V | CODE |
| 2.5                                  | e    | 16                | C    |
| 4.0                                  | G    | 20                | D    |
| 6.3 (7)                              | J    | 25                | E    |
| 10                                   | A    | 35                | V    |

| SIMPLIFIED CAP CODES, CASES A, B |      |                        |      |
|----------------------------------|------|------------------------|------|
| CAPACITANCE CODE<br>μF           | CODE | CAPACITANCE CODE<br>μF | CODE |
| 0.47                             | S5   | 22                     | J7   |
| 0.68                             | W5   | 33                     | N7   |
| 1.0                              | A6   | 47                     | S7   |
| 1.5                              | E6   | 68                     | W7   |
| 2.2                              | J6   | 100                    | A8   |
| 3.3                              | N6   | 150                    | E8   |
| 4.7                              | S6   | 220                    | J8   |
| 6.8                              | W6   | 330                    | N8   |
| 10                               | A7   | 470                    | S8   |
| 15                               | E7   |                        |      |

### DATE CODE

| YEAR | MONTH |   |   |   |   |   |   |   |   |    |    |    |
|------|-------|---|---|---|---|---|---|---|---|----|----|----|
|      | 1     | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 2013 | A     | B | C | D | E | F | G | H | J | K  | L  | M  |
| 2014 | N     | P | Q | R | S | T | U | V | W | X  | Y  | Z  |
| 2015 | a     | b | c | d | e | f | g | h | j | k  | l  | m  |
| 2016 | n     | p | q | r | s | t | u | v | w | x  | y  | z  |



| STANDARD RATINGS   |              |                  |                                     |                                     |  |   |
|--|--------------|------------------|-------------------------------------|-------------------------------------|--|---|
| CAPACITANCE<br>( $\mu$ F)  | CASE<br>CODE | PART NUMBER      | MAX. DCL<br>AT +25 °C<br>( $\mu$ A) | MAX. DF<br>AT +25 °C, 120 Hz<br>(%) | MAX. ESR<br>AT +25 °C, 100 kHz<br>( $\Omega$ ) | MAX. RIPPLE,<br>100 kHz I <sub>RMS</sub><br>(A) |
| <b>2.5 V<sub>DC</sub> AT +85 °C, 1.6 V<sub>DC</sub> AT +125 °C</b> |              |                  |                                     |                                     |  |   |
| 6.8  | A            | TMCMA0E685(1)TRF | 0.5                                 | 6                                   | 4.0  | 0.140   |
| 10   | A            | TMCMA0E106(1)TRF | 0.5                                 | 8                                   | 2.0  | 0.197   |
| 15   | A            | TMCMA0E156(1)TRF | 0.5                                 | 8                                   | 2.9  | 0.164   |
| 22   | A            | TMCMA0E226(1)TRF | 0.6                                 | 8                                   | 2.0  | 0.197   |
| 22   | B            | TMCMB0E226(1)TRF | 0.6                                 | 8                                   | 1.1  | 0.295   |
| 33   | A            | TMCMA0E336(1)TRF | 0.8                                 | 8                                   | 2.0  | 0.197   |
| 33   | B            | TMCMB0E336(1)TRF | 0.8                                 | 8                                   | 1.1  | 0.295   |
| 47   | A            | TMCMA0E476(1)TRF | 1.2                                 | 12                                  | 2.0  | 0.197   |
| 47   | B            | TMCMB0E476(1)TRF | 1.2                                 | 8                                   | 1.1  | 0.295   |
| 68   | A            | TMCMA0E686(1)TRF | 1.7                                 | 18                                  | 2.0  | 0.197   |
| 68   | B            | TMCMB0E686(1)TRF | 1.7                                 | 8                                   | 1.1  | 0.295   |
| 68   | C            | TMCMC0E686(1)TRF | 1.7                                 | 8                                   | 1.1  | 0.302   |
| 100  | A            | TMCMA0E107(1)TRF | 5.0                                 | 18                                  | 1.1  | 0.266   |
| 100  | B            | TMCMB0E107(1)TRF | 2.5                                 | 12                                  | 1.1  | 0.295   |
| 100  | C            | TMCMC0E107(1)TRF | 2.5                                 | 8                                   | 1.1  | 0.302   |
| 150  | A            | TMCMA0E157(1)TRF | 7.5                                 | 30                                  | 1.8  | 0.208   |
| 150  | B            | TMCMB0E157(1)TRF | 3.8                                 | 18                                  | 1.1  | 0.295   |
| 150  | C            | TMCMC0E157(1)TRF | 3.8                                 | 8                                   | 1.1  | 0.302   |
| 150  | E            | TMCME0E157(1)TRF | 3.8                                 | 8                                   | 0.3  | 0.632   |
| 220  | A            | TMCMA0E227(1)TRF | 27.5                                | 30                                  | 1.8  | 0.208   |
| 220  | B            | TMCMB0E227(1)TRF | 5.5                                 | 18                                  | 1.1  | 0.295   |
| 220  | C            | TMCMC0E227(1)TRF | 5.5                                 | 8                                   | 1.1  | 0.302   |
| 220  | E            | TMCME0E227(1)TRF | 5.5                                 | 8                                   | 0.3  | 0.632   |
| 330  | B            | TMCMB0E337(1)TRF | 16.5                                | 30                                  | 1.1  | 0.295   |
| 330  | C            | TMCMC0E337(1)TRF | 8.3                                 | 18                                  | 1.1  | 0.302   |
| 330  | E            | TMCME0E337(1)TRF | 8.3                                 | 10                                  | 0.3  | 0.632   |
| 470  | B            | TMCMB0E477MTRF   | 58.8                                | 30                                  | 1.1  | 0.295   |
| 470  | C            | TMCMC0E477(1)TRF | 11.8                                | 18                                  | 1.1  | 0.302   |
| 470  | E            | TMCME0E477(1)TRF | 11.8                                | 10                                  | 0.2  | 0.775   |
| <b>4 V<sub>DC</sub> AT + 85 °C, 2.5 V<sub>DC</sub> AT +125 °C</b>  |              |                  |                                     |                                     |  |   |
| 4.7  | A            | TMCMA0G475(1)TRF | 0.5                                 | 6                                   | 4.0  | 0.140   |
| 6.8  | A            | TMCMA0G685(1)TRF | 0.5                                 | 6                                   | 4.0  | 0.140   |
| 10   | A            | TMCMA0G106(1)TRF | 0.5                                 | 8                                   | 2.0  | 0.197   |
| 15   | A            | TMCMA0G156(1)TRF | 0.6                                 | 8                                   | 2.9  | 0.164   |
| 15   | B            | TMCMB0G156(1)TRF | 0.6                                 | 8                                   | 1.7  | 0.238   |
| 22   | A            | TMCMA0G226(1)TRF | 0.9                                 | 8                                   | 1.8  | 0.208   |
| 22   | B            | TMCMB0G226(1)TRF | 0.9                                 | 8                                   | 1.1  | 0.295   |
| 33   | A            | TMCMA0G336(1)TRF | 1.3                                 | 8                                   | 2.0  | 0.197   |
| 33   | B            | TMCMB0G336(1)TRF | 1.3                                 | 8                                   | 1.1  | 0.295   |
| 47   | A            | TMCMA0G476(1)TRF | 1.9                                 | 12                                  | 2.0  | 0.197   |
| 47   | B            | TMCMB0G476(1)TRF | 1.9                                 | 8                                   | 1.1  | 0.295   |
| 47   | C            | TMCMC0G476(1)TRF | 1.9                                 | 8                                   | 1.1  | 0.302   |
| 68   | A            | TMCMA0G686(1)TRF | 5.4                                 | 12                                  | 2.0  | 0.197   |
| 68   | B            | TMCMB0G686(1)TRF | 2.7                                 | 8                                   | 1.1  | 0.295   |
| 68   | C            | TMCMC0G686(1)TRF | 2.7                                 | 8                                   | 1.1  | 0.302   |
| 100  | A            | TMCMA0G107(1)TRF | 8.0                                 | 30                                  | 1.1  | 0.266   |
| 100  | B            | TMCMB0G107(1)TRF | 4.0                                 | 12                                  | 1.1  | 0.295   |
| 100  | C            | TMCMC0G107(1)TRF | 4.0                                 | 8                                   | 1.1  | 0.302   |
| 100  | E            | TMCME0G107(1)TRF | 4.0                                 | 8                                   | 0.6  | 0.447   |
| 150  | A            | TMCMA0G157(1)TRF | 60.0                                | 30                                  | 1.8  | 0.208   |
| 150  | B            | TMCMB0G157(1)TRF | 6.0                                 | 18                                  | 1.1  | 0.295   |
| 150  | C            | TMCMC0G157(1)TRF | 6.0                                 | 8                                   | 1.1  | 0.302   |
| 150  | E            | TMCME0G157(1)TRF | 6.0                                 | 8                                   | 0.3  | 0.632   |

Note

- Part number definition:
  - (1) Tolerance: For 10 % tolerance, specify "K"; for 20 % tolerance, change to "M"



| STANDARD RATINGS   |           |                  |                         |                               |                                 |   |
|--|-----------|------------------|-------------------------|-------------------------------|---------------------------------|---|
| CAPACITANCE (μF)   | CASE CODE | PART NUMBER      | MAX. DCL AT +25 °C (μA) | MAX. DF AT +25 °C, 120 Hz (%) | MAX. ESR AT +25 °C, 100 kHz (Ω) | MAX. RIPPLE, 100 kHz I <sub>RMS</sub> (A) |
| <b>4 V<sub>DC</sub> AT + 85 °C, 2.5 V<sub>DC</sub> AT +125 °C</b>                    |           |                  |                         |                               |                                 |   |
| 220  | A         | TMCMA0G227MTRF   | 88.0                    | 30                            | 1.8                             | 0.208                                     |
| 220  | B         | TMCMB0G227(1)TRF | 17.6                    | 18                            | 1.1                             | 0.295                                     |
| 220  | C         | TMCMC0G227(1)TRF | 8.8                     | 12                            | 1.1                             | 0.302                                     |
| 220  | E         | TMCME0G227(1)TRF | 8.8                     | 8                             | 0.3                             | 0.632                                     |
| 330  | B         | TMCMB0G337MTRF   | 26.4                    | 30                            | 1.1                             | 0.295                                     |
| 330  | C         | TMCMC0G337(1)TRF | 13.2                    | 18                            | 1.1                             | 0.302                                     |
| 330  | E         | TMCME0G337(1)TRF | 13.2                    | 10                            | 0.3                             | 0.632                                     |
| 470  | E         | TMCME0G477(1)TRF | 18.8                    | 16                            | 0.2                             | 0.775                                     |
| <b>6.3 V<sub>DC</sub> (7 V<sub>DC</sub>) AT + 85 °C, 4 V<sub>DC</sub> AT +125 °C</b> |           |                  |                         |                               |                                 |   |
| 3.3  | A         | TMCMA0J335(1)TRF | 0.5                     | 6                             | 4.0                             | 0.140                                     |
| 4.7  | A         | TMCMA0J475(1)TRF | 0.5                     | 6                             | 4.0                             | 0.140                                     |
| 6.8  | A         | TMCMA0J685(1)TRF | 0.5                     | 6                             | 4.0                             | 0.140                                     |
| 10   | A         | TMCMA0J106(1)TRF | 0.7                     | 8                             | 2.9                             | 0.164                                     |
| 10   | B         | TMCMB0J106(1)TRF | 0.7                     | 8                             | 1.7                             | 0.238                                     |
| 15   | A         | TMCMA0J156(1)TRF | 1.1                     | 8                             | 4.0                             | 0.140                                     |
| 15   | B         | TMCMB0J156(1)TRF | 1.1                     | 8                             | 1.7                             | 0.238                                     |
| 22   | A         | TMCMA0J226(1)TRF | 1.5                     | 8                             | 1.8                             | 0.208                                     |
| 22   | B         | TMCMB0J226(1)TRF | 1.5                     | 8                             | 1.1                             | 0.295                                     |
| 33   | A         | TMCMA0J336(1)TRF | 2.3                     | 10                            | 2.0                             | 0.197                                     |
| 33   | B         | TMCMB0J336(1)TRF | 2.3                     | 8                             | 1.1                             | 0.295                                     |
| 33   | C         | TMCMC0J336(1)TRF | 2.3                     | 8                             | 1.1                             | 0.302                                     |
| 47   | A         | TMCMA0J476(1)TRF | 5.9                     | 12                            | 1.8                             | 0.208                                     |
| 47   | B         | TMCMB0J476(1)TRF | 3.3                     | 8                             | 1.1                             | 0.295                                     |
| 47   | C         | TMCMC0J476(1)TRF | 3.3                     | 8                             | 1.1                             | 0.302                                     |
| 68   | A         | TMCMA0J686(1)TRF | 8.6                     | 20                            | 2.0                             | 0.197                                     |
| 68   | B         | TMCMB0J686(1)TRF | 4.8                     | 10                            | 1.1                             | 0.295                                     |
| 68   | C         | TMCMC0J686(1)TRF | 4.8                     | 8                             | 1.1                             | 0.302                                     |
| 68   | E         | TMCME0J686(1)TRF | 4.8                     | 8                             | 0.6                             | 0.447                                     |
| 100  | A         | TMCMA0J107MTRF   | 31.5                    | 30                            | 1.8                             | 0.208                                     |
| 100  | B         | TMCMB0J107(1)TRF | 7.0                     | 12                            | 1.1                             | 0.295                                     |
| 100  | C         | TMCMC0J107(1)TRF | 7.0                     | 8                             | 1.1                             | 0.302                                     |
| 100  | E         | TMCME0J107(1)TRF | 7.0                     | 8                             | 0.6                             | 0.447                                     |
| 150  | B         | TMCMB0J157(1)TRF | 18.9                    | 20                            | 1.1                             | 0.295                                     |
| 150  | C         | TMCMC0J157(1)TRF | 10.5                    | 10                            | 1.1                             | 0.302                                     |
| 150  | E         | TMCME0J157(1)TRF | 10.5                    | 8                             | 0.3                             | 0.632                                     |
| 220  | B         | TMCMB0J227MTRF   | 27.7                    | 30                            | 1.1                             | 0.295                                     |
| 220  | C         | TMCMC0J227(1)TRF | 15.4                    | 18                            | 1.1                             | 0.302                                     |
| 220  | E         | TMCME0J227(1)TRF | 15.4                    | 10                            | 0.3                             | 0.632                                     |
| 330  | C         | TMCMC0J337MTRF   | 23.1                    | 30                            | 1.1                             | 0.302                                     |
| 330  | E         | TMCME0J337(1)TRF | 23.1                    | 16                            | 0.2                             | 0.775                                     |
| 470  | E         | TMCME0J477(1)TRF | 32.9                    | 20                            | 0.3                             | 0.632                                     |
| <b>10 V<sub>DC</sub> AT + 85 °C, 6.3 V<sub>DC</sub> AT +125 °C</b>                   |           |                  |                         |                               |                                 |   |
| 2.2  | A         | TMCMA1A225(1)TRF | 0.5                     | 6                             | 4.4                             | 0.133                                     |
| 3.3  | A         | TMCMA1A335(1)TRF | 0.5                     | 6                             | 4.0                             | 0.140                                     |
| 4.7  | A         | TMCMA1A475(1)TRF | 0.5                     | 6                             | 4.0                             | 0.140                                     |
| 6.8  | A         | TMCMA1A685(1)TRF | 0.7                     | 6                             | 4.0                             | 0.140                                     |
| 6.8  | B         | TMCMB1A685(1)TRF | 0.7                     | 6                             | 2.8                             | 0.185                                     |
| 6.8  | A         | TMCMA1A106(1)TRF | 1.0                     | 8                             | 2.9                             | 0.164                                     |
| 6.8  | B         | TMCMB1A106(1)TRF | 1.0                     | 8                             | 1.7                             | 0.238                                     |
| 15   | A         | TMCMA1A156(1)TRF | 1.5                     | 8                             | 2.9                             | 0.164                                     |
| 15   | B         | TMCMB1A156(1)TRF | 1.5                     | 8                             | 1.7                             | 0.238                                     |
| 22   | A         | TMCMA1A226(1)TRF | 4.4                     | 12                            | 2.4                             | 0.180                                     |
| 22   | B         | TMCMB1A226(1)TRF | 2.2                     | 8                             | 1.1                             | 0.295                                     |
| 22   | C         | TMCMC1A226(1)TRF | 2.2                     | 8                             | 1.7                             | 0.243                                     |

Note

- Part number definition:
  - (1) Tolerance: For 10 % tolerance, specify "K"; for 20 % tolerance, change to "M"



| STANDARD RATINGS   |           |                  |                         |                               |                                 |   |
|--|-----------|------------------|-------------------------|-------------------------------|---------------------------------|---|
| CAPACITANCE (µF)   | CASE CODE | PART NUMBER      | MAX. DCL AT +25 °C (µA) | MAX. DF AT +25 °C, 120 Hz (%) | MAX. ESR AT +25 °C, 100 kHz (Ω) | MAX. RIPPLE, 100 kHz I <sub>RMS</sub> (A) |
| <b>10 V<sub>DC</sub> AT + 85 °C, 6.3 V<sub>DC</sub> AT +125 °C</b> |           |                  |                         |                               |                                 |   |
| 33   | A         | TMCMA1A336(1)TRF | 6.6                     | 18                            | 2.0                             | 0.197                                     |
| 33   | B         | TMCMB1A336(1)TRF | 3.3                     | 8                             | 1.1                             | 0.295                                     |
| 33   | C         | TMCMC1A336(1)TRF | 3.3                     | 8                             | 1.1                             | 0.302                                     |
| 47   | A         | TMCMA1A476MTRF   | 9.4                     | 20                            | 2.6                             | 0.173                                     |
| 47   | B         | TMCMB1A476(1)TRF | 4.7                     | 10                            | 1.1                             | 0.295                                     |
| 47   | C         | TMCMC1A476(1)TRF | 4.7                     | 8                             | 1.1                             | 0.302                                     |
| 47   | E         | TMCME1A476(1)TRF | 4.7                     | 8                             | 0.9                             | 0.365                                     |
| 68   | B         | TMCMB1A686(1)TRF | 6.8                     | 18                            | 1.1                             | 0.295                                     |
| 68   | C         | TMCMC1A686(1)TRF | 6.8                     | 8                             | 1.1                             | 0.302                                     |
| 68   | E         | TMCME1A686(1)TRF | 6.8                     | 8                             | 0.6                             | 0.447                                     |
| 100  | B         | TMCMB1A107MTRF   | 20.0                    | 30                            | 1.7                             | 0.238                                     |
| 100  | C         | TMCMC1A107(1)TRF | 10.0                    | 10                            | 1.1                             | 0.302                                     |
| 100  | E         | TMCME1A107(1)TRF | 10.0                    | 8                             | 0.6                             | 0.447                                     |
| 150  | C         | TMCMC1A157MTRF   | 15.0                    | 18                            | 1.1                             | 0.302                                     |
| 150  | E         | TMCME1A157(1)TRF | 15.0                    | 8                             | 0.3                             | 0.632                                     |
| 220  | E         | TMCME1A227(1)TRF | 22.0                    | 12                            | 0.2                             | 0.775                                     |
| 330  | E         | TMCME1A337(1)TRF | 33.0                    | 30                            | 0.3                             | 0.632                                     |
| <b>16 V<sub>DC</sub> AT + 85 °C, 10 V<sub>DC</sub> AT +125 °C</b>  |           |                  |                         |                               |                                 |   |
| 1.5  | A         | TMCMA1C155(1)TRF | 0.5                     | 6                             | 6.6                             | 0.109                                     |
| 2.2  | A         | TMCMA1C225(1)TRF | 0.5                     | 6                             | 6.6                             | 0.109                                     |
| 3.3  | A         | TMCMA1C335(1)TRF | 0.5                     | 6                             | 4.0                             | 0.140                                     |
| 4.7  | A         | TMCMA1C475(1)TRF | 0.8                     | 6                             | 4.0                             | 0.140                                     |
| 4.7  | B         | TMCMB1C475(1)TRF | 0.8                     | 6                             | 2.8                             | 0.185                                     |
| 6.8  | A         | TMCMA1C685(1)TRF | 1.1                     | 6                             | 4.0                             | 0.140                                     |
| 6.8  | B         | TMCMB1C685(1)TRF | 1.1                     | 6                             | 2.8                             | 0.185                                     |
| 10   | A         | TMCMA1C106(1)TRF | 1.6                     | 8                             | 2.9                             | 0.164                                     |
| 10   | B         | TMCMB1C106(1)TRF | 1.6                     | 8                             | 1.7                             | 0.238                                     |
| 15   | A         | TMCMA1C156(1)TRF | 2.4                     | 12                            | 2.9                             | 0.164                                     |
| 15   | B         | TMCMB1C156(1)TRF | 2.4                     | 8                             | 1.7                             | 0.238                                     |
| 15   | C         | TMCMC1C156(1)TRF | 2.4                     | 8                             | 1.7                             | 0.243                                     |
| 22   | A         | TMCMA1C226MTRF   | 7.0                     | 16                            | 2.9                             | 0.164                                     |
| 22   | B         | TMCMB1C226(1)TRF | 3.5                     | 8                             | 1.7                             | 0.238                                     |
| 22   | C         | TMCMC1C226(1)TRF | 3.5                     | 8                             | 1.1                             | 0.302                                     |
| 33   | B         | TMCMB1C336(1)TRF | 5.3                     | 12                            | 1.1                             | 0.295                                     |
| 33   | C         | TMCMC1C336(1)TRF | 5.3                     | 8                             | 1.1                             | 0.302                                     |
| 33   | E         | TMCME1C336(1)TRF | 5.3                     | 8                             | 0.9                             | 0.365                                     |
| 47   | B         | TMCMB1C476MTRF   | 7.5                     | 20                            | 1.7                             | 0.238                                     |
| 47   | C         | TMCMC1C476(1)TRF | 7.5                     | 8                             | 2.2                             | 0.213                                     |
| 47   | E         | TMCME1C476(1)TRF | 7.5                     | 8                             | 0.9                             | 0.365                                     |
| 68   | C         | TMCMC1C686(1)TRF | 10.9                    | 20                            | 1.1                             | 0.302                                     |
| 68   | E         | TMCME1C686(1)TRF | 10.9                    | 8                             | 0.6                             | 0.447                                     |
| 100  | C         | TMCMC1C107MTRF   | 16.0                    | 20                            | 1.7                             | 0.243                                     |
| 100  | E         | TMCME1C107(1)TRF | 16.0                    | 8                             | 0.6                             | 0.447                                     |
| <b>20 V<sub>DC</sub> AT + 85 °C, 13 V<sub>DC</sub> AT +125 °C</b>  |           |                  |                         |                               |                                 |   |
| 1.0  | A         | TMCMA1D105(1)TRF | 0.5                     | 4                             | 6.6                             | 0.109                                     |
| 1.5  | A         | TMCMA1D155(1)TRF | 0.5                     | 6                             | 4.4                             | 0.133                                     |
| 2.2  | A         | TMCMA1D225(1)TRF | 0.5                     | 6                             | 4.4                             | 0.133                                     |
| 3.3  | A         | TMCMA1D335(1)TRF | 0.7                     | 6                             | 4.0                             | 0.140                                     |
| 3.3  | B         | TMCMB1D335(1)TRF | 0.7                     | 6                             | 3.9                             | 0.157                                     |
| 4.7  | A         | TMCMA1D475(1)TRF | 0.9                     | 6                             | 4.0                             | 0.140                                     |
| 4.7  | B         | TMCMB1D475(1)TRF | 0.9                     | 6                             | 2.8                             | 0.185                                     |
| 6.8  | A         | TMCMA1D685MTRF   | 1.4                     | 6                             | 4.0                             | 0.140                                     |
| 6.8  | B         | TMCMB1D685(1)TRF | 1.4                     | 6                             | 2.2                             | 0.209                                     |
| 10   | B         | TMCMB1D106(1)TRF | 2.0                     | 8                             | 2.2                             | 0.209                                     |
| 10   | C         | TMCMC1D106(1)TRF | 2.0                     | 8                             | 1.7                             | 0.243                                     |

Note

- Part number definition:
  - (1) Tolerance: For 10 % tolerance, specify "K"; for 20 % tolerance, change to "M"



| STANDARD RATINGS  |           |                  |                         |                               |                                 |   |
|---|-----------|------------------|-------------------------|-------------------------------|---------------------------------|---|
| CAPACITANCE (μF)  | CASE CODE | PART NUMBER      | MAX. DCL AT +25 °C (μA) | MAX. DF AT +25 °C, 120 Hz (%) | MAX. ESR AT +25 °C, 100 kHz (Ω) | MAX. RIPPLE, 100 kHz I <sub>RMS</sub> (A) |
| <b>20 V<sub>DC</sub> AT + 85 °C, 13 V<sub>DC</sub> AT +125 °C</b> |           |                  |                         |                               |                                 |   |
| 15  | B         | TMCMB1D156(1)TRF | 3.0                     | 8                             | 1.1                             | 0.295                                     |
| 15  | C         | TMCMC1D156(1)TRF | 3.0                     | 8                             | 1.7                             | 0.243                                     |
| 22  | B         | TMCMB1D226(1)TRF | 4.4                     | 8                             | 1.7                             | 0.238                                     |
| 22  | C         | TMCMC1D226(1)TRF | 4.4                     | 8                             | 1.7                             | 0.243                                     |
| 22  | E         | TMCME1D226(1)TRF | 4.4                     | 8                             | 0.9                             | 0.365                                     |
| 33  | C         | TMCMC1D336(1)TRF | 6.6                     | 8                             | 1.0                             | 0.316                                     |
| 33  | E         | TMCME1D336(1)TRF | 6.6                     | 8                             | 0.9                             | 0.365                                     |
| 47  | E         | TMCME1D476(1)TRF | 9.4                     | 8                             | 0.9                             | 0.365                                     |
| 68  | E         | TMCME1D686(1)TRF | 13.6                    | 8                             | 0.5                             | 0.490                                     |
| <b>25 V<sub>DC</sub> AT + 85 °C, 16 V<sub>DC</sub> AT +125 °C</b> |           |                  |                         |                               |                                 |   |
| 0.68  | A         | TMCMA1E684(1)TRF | 0.5                     | 4                             | 9.7                             | 0.090                                     |
| 1.0   | A         | TMCMA1E105(1)TRF | 0.5                     | 4                             | 6.6                             | 0.109                                     |
| 1.5   | A         | TMCMA1E155(1)TRF | 0.5                     | 6                             | 4.4                             | 0.133                                     |
| 2.2   | A         | TMCMA1E225(1)TRF | 0.6                     | 6                             | 4.4                             | 0.133                                     |
| 2.2   | B         | TMCMB1E225(1)TRF | 0.6                     | 6                             | 3.9                             | 0.157                                     |
| 3.3   | A         | TMCMA1E335(1)TRF | 0.8                     | 6                             | 2.8                             | 0.167                                     |
| 3.3   | B         | TMCMB1E335(1)TRF | 0.8                     | 6                             | 3.9                             | 0.157                                     |
| 4.7   | A         | TMCMA1E475MTRF   | 1.2                     | 6                             | 6.6                             | 0.109                                     |
| 4.7   | B         | TMCMB1E475(1)TRF | 1.2                     | 6                             | 2.8                             | 0.185                                     |
| 6.8   | B         | TMCMB1E685(1)TRF | 1.7                     | 8                             | 2.8                             | 0.185                                     |
| 6.8   | C         | TMCMC1E685(1)TRF | 1.7                     | 8                             | 1.7                             | 0.243                                     |
| 10  | C         | TMCMC1E106(1)TRF | 2.5                     | 8                             | 1.7                             | 0.243                                     |
| 15  | C         | TMCMC1E156(1)TRF | 3.8                     | 8                             | 1.7                             | 0.243                                     |
| 15  | E         | TMCME1E156(1)TRF | 3.8                     | 8                             | 0.9                             | 0.365                                     |
| 22  | C         | TMCMC1E226(1)TRF | 5.5                     | 8                             | 1.1                             | 0.302                                     |
| 22  | E         | TMCME1E226(1)TRF | 5.5                     | 8                             | 0.9                             | 0.365                                     |
| 33  | E         | TMCME1E336(1)TRF | 8.3                     | 8                             | 0.9                             | 0.365                                     |
| 47  | E         | TMCME1E476(1)TRF | 11.8                    | 8                             | 0.9                             | 0.365                                     |
| <b>35 V<sub>DC</sub> AT + 85 °C, 22 V<sub>DC</sub> AT +125 °C</b> |           |                  |                         |                               |                                 |   |
| 0.47  | A         | TMCMA1V474(1)TRF | 0.5                     | 4                             | 16.5                            | 0.069                                     |
| 0.68  | A         | TMCMA1V684(1)TRF | 0.5                     | 4                             | 9.7                             | 0.090                                     |
| 1.0   | A         | TMCMA1V105(1)TRF | 0.5                     | 4                             | 6.6                             | 0.109                                     |
| 1.5   | A         | TMCMA1V155(1)TRF | 0.5                     | 6                             | 4.4                             | 0.133                                     |
| 1.5   | B         | TMCMB1V155(1)TRF | 0.5                     | 6                             | 3.9                             | 0.157                                     |
| 2.2   | A         | TMCMA1V225MTRF   | 0.8                     | 8                             | 4.4                             | 0.133                                     |
| 2.2   | B         | TMCMB1V225(1)TRF | 0.8                     | 6                             | 5.5                             | 0.132                                     |
| 3.3   | B         | TMCMB1V335(1)TRF | 1.2                     | 6                             | 3.9                             | 0.157                                     |
| 4.7   | C         | TMCMC1V475(1)TRF | 1.6                     | 6                             | 2.8                             | 0.189                                     |
| 6.8   | C         | TMCMC1V685(1)TRF | 2.4                     | 6                             | 1.7                             | 0.243                                     |
| 10  | C         | TMCMC1V106(1)TRF | 3.5                     | 8                             | 1.7                             | 0.243                                     |
| 10  | E         | TMCME1V106(1)TRF | 3.5                     | 8                             | 1.1                             | 0.330                                     |
| 15  | E         | TMCME1V156(1)TRF | 5.3                     | 8                             | 0.9                             | 0.365                                     |
| 22  | E         | TMCME1V226(1)TRF | 7.7                     | 8                             | 0.9                             | 0.365                                     |

Note

- Part number definition:
  - (1) Tolerance: For 10 % tolerance, specify "K"; for 20 % tolerance, change to "M"

| RECOMMENDED VOLTAGE DERATING GUIDELINES (for temperature below +85 °C) |                   |
|--|-------------------|
| CAPACITOR VOLTAGE RATING   | OPERATING VOLTAGE |
| 2.5  | 1.2               |
| 4.0  | 2.0               |
| 6.3 (7.0)  | 3.1 (3.5)         |
| 10   | 5.0               |
| 16   | 8.0               |
| 20   | 10.0              |
| 25   | 12.5              |
| 35   | 17.5              |



| POWER DISSIPATION |   |
|-------------------|---|
| CASE CODE         | MAXIMUM PERMISSIBLE POWER DISSIPATION AT +25 °C (W) IN FREE AIR |
| A                 | 0.078   |
| B                 | 0.096   |
| C                 | 0.100   |
| E                 | 0.120   |

| STANDARD PACKAGING QUANTITY |                   |
|-----------------------------|-------------------|
| CASE CODE                   | UNITS PER 7" REEL |
| A                           | 2000              |
| B                           | 2000              |
| C                           | 500               |
| E                           | 500               |

| PERFORMANCE CHARACTERISTICS |   |                        |   |  |              |              |
|-----------------------------|---|------------------------|---|--|--------------|--------------|
| ITEM                        | CONDITION   | POST TEST PERFORMANCE  |   |  |              |              |
|                             |   |                        | Specified initial value                           | -55 °C                                 | +85 °C       | +125 °C      |
| Temperature characteristics | Measure the specified characteristics in each stage   | Capacitance change     | -   | -10 % to 0 %                           | 0 % to +10 % | 0 % to +12 % |
|                             |   | Dissipation factor (%) | 4   | 9                                      | 7            | 9            |
|                             |   |                        | 6   | 10                                     | 8            | 10           |
|                             |   |                        | 8   | 12                                     | 10           | 12           |
|                             |   |                        | 10  | 14                                     | 12           | 14           |
|                             |   |                        | 12  | 16                                     | 14           | 16           |
|                             |   |                        | 16  | 20                                     | 18           | 20           |
|                             |   |                        | 18  | 34                                     | 20           | 22           |
|                             |   |                        | 20  | 36                                     | 22           | 24           |
|                             |   | 30                     | 60  | 30                                     | 40           |              |
| Leakage current             | Refer to Standard Ratings table   | -                      | 1000 % specified initial value or less            | 1250 % specified initial value or less |              |              |
| Solder heat resistance      | Solder dip: 260 °C ± 5 °C<br>A, B case: 10 s ± 1 s<br>C, E case: 5 s ± 0.5 s<br>Reflow 260 °C, 10 s ± 1 s                                       | Capacitance change     | Within ± 5 % of initial value                     |  |              |              |
|                             |   | Dissipation factor     | Shall not exceed initial specified value          |  |              |              |
|                             |   | Leakage current        | Shall not exceed initial specified value          |  |              |              |
| Moisture resistance no load | Leave at 40 °C and 90 % to 95 % RH for 500 h  | Capacitance change     | Within ± 10 % of initial value                    |  |              |              |
|                             |   | Dissipation factor     | Shall not exceed initial specified value          |  |              |              |
|                             |   | Leakage current        | Shall not exceed initial specified value          |  |              |              |
| High temperature load       | 85 °C. The rated voltage is applied for 2000 h  | Capacitance change     | Within ± 10 % of initial value                    |  |              |              |
|                             |   | Dissipation factor     | Shall not exceed initial specified value          |  |              |              |
|                             |   | Leakage current        | Shall not exceed 125 % of initial specified value |  |              |              |
| Thermal shock               | Leave at -55 °C, normal temperature, 125 °C, and normal temperature for 30 min, 3 min, 30 min, and 3 min. Repeat this operation 5 times running | Capacitance change     | Within ± 10 % of initial value                    |  |              |              |
|                             |   | Dissipation factor     | Shall not exceed initial specified value          |  |              |              |
|                             |   | Leakage current        | Shall not exceed initial specified value          |  |              |              |
| Moisture resistance load    | Leave at 40 °C and 90 % to 95 % RH. The rated voltage applied for 500 h   | Capacitance change     | Within ± 10 % of initial value                    |  |              |              |
|                             |   | Dissipation factor     | Shall not exceed 150 % of initial specified value |  |              |              |
|                             |   | Leakage current        | Shall not exceed 200 % of initial specified value |  |              |              |
| Failure rate                | 85 °C. The rated voltage is applied through a protective resistor of 1 Ω/V  | 1 %/1000 h             |   |  |              |              |

**Note**

- Test conditions per JIS C5101-1



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.