

## 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

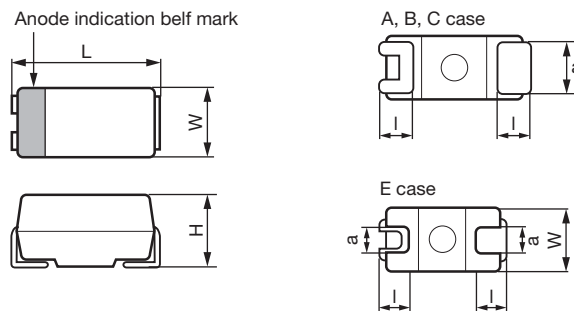
### APPLICATIONS

- Industrial
- AV equipment
- General purpose

### ORDERING INFORMATION

| TMCM | A                                | OJ  | 106  | M                        | TR   | (2)   | F                               |
|------|----------------------------------|---|--|--------------------------|--|---|---------------------------------|
| TYPE | CASE CODE                        | DC VOLTAGE RATING AT +85 °C   | CAPACITANCE (μF)   | CAPACITANCE TOLERANCE    | PACKAGING POLARITY                               | (OPTIONAL)  | 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<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>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



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**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.**

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- Поставка более 17-ти миллионов наименований электронных компонентов;
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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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