

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_{DC} to 35 V_{DC}

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



RoHS
COMPLIANT

HALOGEN
FREE
Available

GREEN
(5-2008)
Available

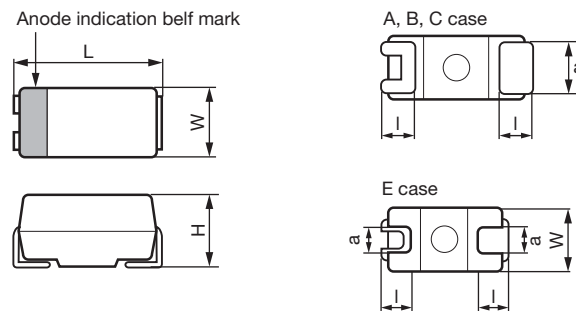
APPLICATIONS

- 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 0G = 4.0 V 0J = 6.3 V (7 V) 1A = 10 V 1C = 16 V 1D = 20 V 1E = 25 V 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 % M = ± 20 % | TR = 7" reel, cathodes close to perforation side | Halogen-free (special order), not applicable for E case | F = lead (Pb)-free terminations |

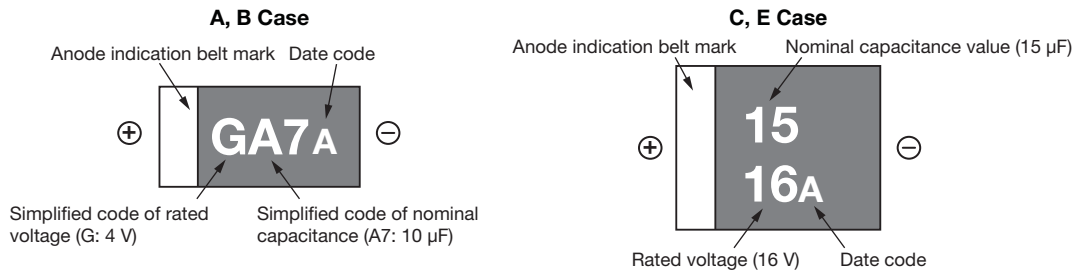
DIMENSIONS in inches [millimeters]



| CASE CODE | EIA SIZE | L | W | H | l | a |
|-----------|----------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| A | 3216-18 | 0.126 ± 0.008 [3.2 ± 0.2] | 0.063 ± 0.008 [1.6 ± 0.2] | 0.063 ± 0.008 [1.6 ± 0.2] | 0.028 ± 0.012 [0.7 ± 0.3] | 0.047 ± 0.008 [1.2 ± 0.2] |
| B | 3528-21 | 0.138 ± 0.008 [3.5 ± 0.2] | 0.110 ± 0.008 [2.8 ± 0.2] | 0.075 ± 0.008 [1.9 ± 0.2] | 0.030 ± 0.012 [0.8 ± 0.3] | 0.087 ± 0.008 [2.2 ± 0.2] |
| C | 5832-27 | 0.228 ± 0.008 [5.8 ± 0.2] | 0.126 ± 0.008 [3.2 ± 0.2] | 0.100 ± 0.008 [2.5 ± 0.2] | 0.051 ± 0.012 [1.3 ± 0.3] | 0.087 ± 0.008 [2.2 ± 0.2] |
| E | 7343-30 | 0.287 ± 0.008 [7.3 ± 0.2] | 0.169 ± 0.012 [4.3 ± 0.3] | 0.112 ± 0.008 [2.8 ± 0.2] | 0.051 ± 0.012 [1.3 ± 0.3] | 0.094 ± 0.008 [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 V | CODE | VOLTAGE CODE 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 μF | CODE | CAPACITANCE CODE 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 (μ F) | CASE CODE | PART NUMBER | MAX. DCL AT +25 °C (μ A) | MAX. DF AT +25 °C, 120 Hz (%) | MAX. ESR AT +25 °C, 100 kHz (Ω) | MAX. RIPPLE, 100 kHz I _{RMS} (A) |
| 2.5 V_{DC} AT +85 °C, 1.6 V_{DC} AT +125 °C | | | | | | |
| 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 |
| 4 V_{DC} AT + 85 °C, 2.5 V_{DC} AT +125 °C | | | | | | |
| 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 _{RMS} (A) |
| 4 V_{DC} AT + 85 °C, 2.5 V_{DC} AT +125 °C | | | | | | |
| 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 |
| 6.3 V_{DC} (7 V_{DC}) AT + 85 °C, 4 V_{DC} AT +125 °C | | | | | | |
| 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 |
| 10 V_{DC} AT + 85 °C, 6.3 V_{DC} AT +125 °C | | | | | | |
| 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 _{RMS} (A) |
| 10 V_{DC} AT + 85 °C, 6.3 V_{DC} AT +125 °C | | | | | | |
| 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 |
| 16 V_{DC} AT + 85 °C, 10 V_{DC} AT +125 °C | | | | | | |
| 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 |
| 20 V_{DC} AT + 85 °C, 13 V_{DC} AT +125 °C | | | | | | |
| 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 (μ F) | CASE CODE | PART NUMBER | MAX. DCL AT +25 °C (μ A) | MAX. DF AT +25 °C, 120 Hz (%) | MAX. ESR AT +25 °C, 100 kHz (Ω) | MAX. RIPPLE, 100 kHz I _{RMS} (A) |
| 20 V_{DC} AT + 85 °C, 13 V_{DC} AT +125 °C | | | | | | |
| 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 |
| 25 V_{DC} AT + 85 °C, 16 V_{DC} AT +125 °C | | | | | | |
| 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 |
| 35 V_{DC} AT + 85 °C, 22 V_{DC} AT +125 °C | | | | | | |
| 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 A, B case: 10 s ± 1 s C, E case: 5 s ± 0.5 s 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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- Поставка более 17-ти миллионов наименований электронных компонентов;
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- Поставка образцов и прототипов;
- Техническая поддержка проекта;
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