

## Solid Tantalum Surface Mount Chip Capacitors, Molded Case, 0805 Size



### PERFORMANCE / ELECTRICAL CHARACTERISTICS

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

**Capacitance Range:** 0.1 µF to 47 µF

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

**Voltage Rating:** 2.5 V<sub>DC</sub> to 25 V<sub>DC</sub>

### FEATURES

- Small size, suitable for high-density packaging
- Terminations: 100 % matte tin
- Compatible with “high volume” automatic pick and place equipment
- Moisture sensitivity level 1
- 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

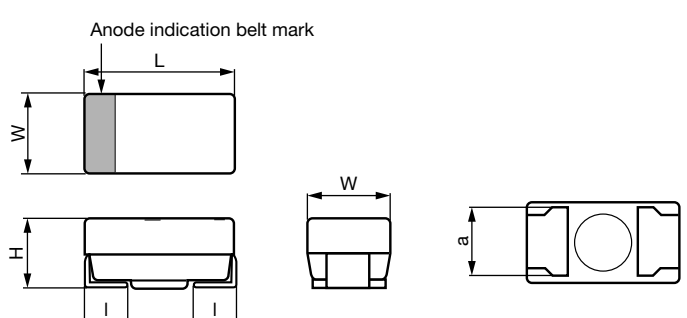
### APPLICATIONS

- Industrial
- Audio and visual equipment
- General purpose

### ORDERING INFORMATION

| TMC  | P                                 | 0J                                                                                         | 107                                                                                                                            | 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<br>1A = 10 V<br>1C = 16 V<br>1D = 20 V<br>1E = 25 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) | F = lead (Pb)-free terminations |

### DIMENSIONS in inches [millimeters]

|  |          |                              |                               |                          |                              |                              |
|--------------------------------------------------------------------------------------|----------|------------------------------|-------------------------------|--------------------------|------------------------------|------------------------------|
| CASE CODE                                                                            | EIA SIZE | L                            | W                             | H                        | I                            | a                            |
| P                                                                                    | 2012-12  | 0.080 ± 0.008<br>[2.0 ± 0.2] | 0.049 ± 0.008<br>[1.25 ± 0.2] | 0.047 max.<br>[1.2 max.] | 0.020 ± 0.008<br>[0.5 ± 0.2] | 0.035 ± 0.004<br>[0.9 ± 0.1] |

**RATINGS AND CASE CODES**

| $\mu\text{F}$ | 2.5 V | 4.0 V | 6.3 V | 10 V | 16 V | 20 V | 25 V |
|---------------|-------|-------|-------|------|------|------|------|
| 0.10          |       |       |       |      |      | P    | P    |
| 0.15          |       |       |       |      |      | P    |      |
| 0.22          |       |       |       |      |      | P    |      |
| 0.33          |       |       |       |      |      | P    |      |
| 0.47          |       |       |       |      |      | P    | P    |
| 0.68          |       |       |       |      |      | P    |      |
| 1.0           |       |       |       |      | P    | P    | P    |
| 1.5           |       |       |       | P    | P    | P    |      |
| 2.2           |       |       |       | P    | P    | P    |      |
| 3.3           |       |       |       | P    | P    |      |      |
| 4.7           |       |       | P     | P    | P    |      |      |
| 6.8           |       |       | P     | P    |      |      |      |
| 10            |       |       | P     | P    |      |      |      |
| 15            | P     | P     | P     |      |      |      |      |
| 22            | P     | P     | P     |      |      |      |      |
| 33            | P     | P     |       |      |      |      |      |
| 47            | P     | P     |       |      |      |      |      |

**MARKING**

Anode indication belt mark



Simplified code of rated voltage (D: 20 V)

Simplified code of nominal capacitance (A: 0.1  $\mu\text{F}$ )

**SIMPLIFIED VOLTAGE AND CAP CODES**

| $\mu\text{F}$ | 2.5         | 4.0         | 6.3 | 10 | 16 | 20          | 25 |
|---------------|-------------|-------------|-----|----|----|-------------|----|
| 0.10          |             |             |     |    |    | DA          | EA |
| 0.15          |             |             |     |    |    | DE          |    |
| 0.22          |             |             |     |    |    | DJ          |    |
| 0.33          |             |             |     |    |    | DN          |    |
| 0.47          |             |             |     |    |    | DS          | ES |
| 0.68          |             |             |     |    |    | DW          |    |
| 1.0           |             |             |     |    | CA | D $\bar{A}$ | EA |
| 1.5           |             |             |     | AE | CE | D $\bar{E}$ |    |
| 2.2           |             |             |     | AJ | CJ | D $\bar{J}$ |    |
| 3.3           |             |             |     | AN | CN |             |    |
| 4.7           |             |             | JS  | AS | CS |             |    |
| 6.8           |             |             | JW  | AW |    |             |    |
| 10            |             |             | JA  | aA |    |             |    |
| 15            | eE          | GE          | jE  |    |    |             |    |
| 22            | eJ          | gJ          | jJ  |    |    |             |    |
| 33            | e $\bar{N}$ | gN          |     |    |    |             |    |
| 47            | e $\bar{S}$ | G $\bar{S}$ |     |    |    |             |    |



| STANDARD RATINGS                                              |           |                 |                                    |                                    |                                                |                                          |
|---------------------------------------------------------------|-----------|-----------------|------------------------------------|------------------------------------|------------------------------------------------|------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)                                     | CASE 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 $I_{RMS}$<br>(A) |
| 2.5 V <sub>DC</sub> AT +85 °C; 1.6 V <sub>DC</sub> AT +125 °C |           |                 |                                    |                                    |                                                |                                          |
| 15                                                            | P         | TMCP0E156(1)TRF | 0.5                                | 8                                  | 4.0                                            | 0.126                                    |
| 22                                                            | P         | TMCP0E226(1)TRF | 0.6                                | 10                                 | 4.0                                            | 0.126                                    |
| 33                                                            | P         | TMCP0E336(1)TRF | 0.8                                | 20                                 | 4.0                                            | 0.126                                    |
| 47                                                            | P         | TMCP0E476MTRF   | 11.8                               | 30                                 | 6.0                                            | 0.103                                    |
| 4 V <sub>DC</sub> AT +85 °C; 2.5 V <sub>DC</sub> AT +125 °C   |           |                 |                                    |                                    |                                                |                                          |
| 15                                                            | P         | TMCP0G156(1)TRF | 0.6                                | 8                                  | 4.0                                            | 0.126                                    |
| 22                                                            | P         | TMCP0G226(1)TRF | 0.9                                | 10                                 | 4.0                                            | 0.126                                    |
| 33                                                            | P         | TMCP0G336(1)TRF | 13.2                               | 30                                 | 5.9                                            | 0.104                                    |
| 47                                                            | P         | TMCP0G476MTRF   | 18.8                               | 30                                 | 6.0                                            | 0.103                                    |
| 6.3 V <sub>DC</sub> AT +85 °C; 4 V <sub>DC</sub> AT +125 °C   |           |                 |                                    |                                    |                                                |                                          |
| 4.7                                                           | P         | TMCP0J475(1)TRF | 0.5                                | 8                                  | 4.0                                            | 0.126                                    |
| 6.8                                                           | P         | TMCP0J685(1)TRF | 0.5                                | 8                                  | 4.0                                            | 0.126                                    |
| 10                                                            | P         | TMCP0J106(1)TRF | 0.7                                | 8                                  | 5.3                                            | 0.110                                    |
| 15                                                            | P         | TMCP0J156(1)TRF | 1.0                                | 12                                 | 5.9                                            | 0.104                                    |
| 22                                                            | P         | TMCP0J226MTRF   | 13.9                               | 30                                 | 5.9                                            | 0.104                                    |
| 10 V <sub>DC</sub> AT +85 °C; 6.3 V <sub>DC</sub> AT +125 °C  |           |                 |                                    |                                    |                                                |                                          |
| 1.5                                                           | P         | TMCP1A155(1)TRF | 0.5                                | 8                                  | 11.0                                           | 0.076                                    |
| 2.2                                                           | P         | TMCP1A225(1)TRF | 0.5                                | 8                                  | 8.8                                            | 0.085                                    |
| 3.3                                                           | P         | TMCP1A335(1)TRF | 0.5                                | 8                                  | 7.7                                            | 0.091                                    |
| 4.7                                                           | P         | TMCP1A475(1)TRF | 0.5                                | 8                                  | 4.0                                            | 0.126                                    |
| 6.8                                                           | P         | TMCP1A685(1)TRF | 0.7                                | 20                                 | 4.0                                            | 0.126                                    |
| 10                                                            | P         | TMCP1A106(1)TRF | 10.0                               | 20                                 | 5.9                                            | 0.104                                    |
| 16 V <sub>DC</sub> AT +85 °C; 10 V <sub>DC</sub> AT +125 °C   |           |                 |                                    |                                    |                                                |                                          |
| 1.0                                                           | P         | TMCP1C105(1)TRF | 0.5                                | 6                                  | 9.9                                            | 0.080                                    |
| 1.5                                                           | P         | TMCP1C155(1)TRF | 0.5                                | 8                                  | 11.0                                           | 0.076                                    |
| 2.2                                                           | P         | TMCP1C225(1)TRF | 0.5                                | 8                                  | 8.8                                            | 0.085                                    |
| 3.3                                                           | P         | TMCP1C335(1)TRF | 0.6                                | 8                                  | 8.8                                            | 0.085                                    |
| 4.7                                                           | P         | TMCP1C475MTRF   | 0.8                                | 8                                  | 8.8                                            | 0.085                                    |
| 20 V <sub>DC</sub> AT +85 °C; 13 V <sub>DC</sub> AT +125 °C   |           |                 |                                    |                                    |                                                |                                          |
| 0.10                                                          | P         | TMCP1D104(1)TRF | 0.5                                | 6                                  | 33.0                                           | 0.044                                    |
| 0.15                                                          | P         | TMCP1D154(1)TRF | 0.5                                | 6                                  | 27.5                                           | 0.048                                    |
| 0.22                                                          | P         | TMCP1D224(1)TRF | 0.5                                | 6                                  | 27.5                                           | 0.048                                    |
| 0.33                                                          | P         | TMCP1D334(1)TRF | 0.5                                | 6                                  | 22.0                                           | 0.054                                    |
| 0.47                                                          | P         | TMCP1D474(1)TRF | 0.5                                | 6                                  | 22.0                                           | 0.054                                    |
| 0.68                                                          | P         | TMCP1D684(1)TRF | 0.5                                | 6                                  | 16.5                                           | 0.062                                    |
| 1.0                                                           | P         | TMCP1D105(1)TRF | 0.5                                | 6                                  | 11.0                                           | 0.076                                    |
| 1.5                                                           | P         | TMCP1D155(1)TRF | 0.5                                | 8                                  | 11.0                                           | 0.076                                    |
| 2.2                                                           | P         | TMCP1D225MTRF   | 0.5                                | 8                                  | 8.8                                            | 0.085                                    |
| 25 V <sub>DC</sub> AT +85 °C; 16 V <sub>DC</sub> AT +125 °C   |           |                 |                                    |                                    |                                                |                                          |
| 0.10                                                          | P         | TMCP1E104(1)TRF | 0.5                                | 6                                  | 33.0                                           | 0.044                                    |
| 0.47                                                          | P         | TMCP1E474(1)TRF | 0.5                                | 6                                  | 22.0                                           | 0.054                                    |
| 1.0                                                           | P         | TMCP1E105(1)TRF | 0.5                                | 6                                  | 11.0                                           | 0.076                                    |

**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                                                                    | 3.1               |
| 10                                                                     | 5.0               |
| 16                                                                     | 8.0               |
| 20                                                                     | 10.0              |
| 25                                                                     | 12.5              |

**POWER DISSIPATION**

| CASE CODE | MAXIMUM PERMISSIBLE POWER DISSIPATION AT +25 °C (W) IN FREE AIR |
|-----------|-----------------------------------------------------------------|
| P         | 0.064                                                           |

**STANDARD PACKAGING QUANTITY**

| CASE CODE | UNITS PER 7" REEL |
|-----------|-------------------|
| P         | 3000              |

**PERFORMANCE CHARACTERISTICS**

| ITEM                        | CONDITION                                                                                                                                       | POST TEST PERFORMANCE  |                                        |                                                   |              |              |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------|---------------------------------------------------|--------------|--------------|
| Temperature characteristics | Measure the specified characteristics in each stage                                                                                             |                        | Specified initial value                | -55 °C                                            | +85 °C       | +125 °C      |
|                             |                                                                                                                                                 | Capacitance change     | -                                      | -20 % to 0 %                                      | 0 % to +20 % | 0 % to +20 % |
|                             |                                                                                                                                                 | Dissipation factor (%) | 6                                      | 10                                                | 8            | 10           |
|                             |                                                                                                                                                 |                        | 8                                      | 12                                                | 10           | 12           |
|                             |                                                                                                                                                 |                        | 10                                     | 14                                                | 12           | 14           |
|                             |                                                                                                                                                 |                        | 12                                     | 16                                                | 14           | 16           |
|                             |                                                                                                                                                 |                        | 20                                     | 24                                                | 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:<br>260 °C ± 5 °C 10 s ± 1 s<br>Reflow:<br>260 °C 10 s ± 1 s                                                                         | Capacitance change     |                                        | Within ± 20 % of initial value                    |              |              |
|                             |                                                                                                                                                 | Dissipation factor     |                                        | Initial specified value or less                   |              |              |
|                             |                                                                                                                                                 | Leakage current        |                                        | Initial specified value or less                   |              |              |
| Moisture resistance no load | Leave at 40 °C and 90 % to 95 % RH for 500 h                                                                                                    | Capacitance change     |                                        | Within ± 20 % of initial value                    |              |              |
|                             |                                                                                                                                                 | Dissipation factor     |                                        | Shall not exceed 150 % of initial specified value |              |              |
|                             |                                                                                                                                                 | Leakage current        |                                        | Initial specified value or less                   |              |              |
| High temperature load       | 85 °C. The rated voltage is applied for 2000 h                                                                                                  | Capacitance change     |                                        | Within ± 20 % of initial value                    |              |              |
|                             |                                                                                                                                                 | Dissipation factor     |                                        | Initial specified value or less                   |              |              |
|                             |                                                                                                                                                 | Leakage current        |                                        | Shall not exceed 200 % 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 ± 20 % of initial value                    |              |              |
|                             |                                                                                                                                                 | Dissipation factor     |                                        | Initial specified value or less                   |              |              |
|                             |                                                                                                                                                 | Leakage current        |                                        | Initial specified value or less                   |              |              |
| Moisture resistance load    | Leave at 40 °C and 90 % to 95 % RH<br>The rated voltage is applied for 500 h                                                                    | Capacitance change     |                                        | Within ± 20 % of initial value or less            |              |              |
|                             |                                                                                                                                                 | 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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