

Thick Film Chip Resistors multicomp^{PRO}

RoHS
Compliant



Scope: This specification for approval relates to Ultra - High Power Thick Film Chip Resistors

Ratings:

| Type | MPP10 (2010) | MPP12 (2512) | MPP17 (2817) | MPP20 (4320) | MPP27 (4527) |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Power Rating at 70°C | 2W | 3W | 4W | 5W | 6W |
| Max. Working Voltage | 200 V | 250 V | 250 V | 300 V | 300 V |
| Max. Overload Voltage | 500 V | 500 V | 500 V | 600 V | 600 V |
| Dielectric Withstanding Voltage | 500 V | 500 V | 500 V | 600 V | 600 V |
| Temperature Range | -55°C to +155°C | | | | |
| Ambient Temperature | 70°C | | | | |

Nominal Resistance

Effective figures of nominal resistance shall be in accordance :

E-24 values – these are preferred and will have standard MOQ

E-96 values – are available on case by case basis and availability and MOQ need to be confirmed with factory first

Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial line frequency and waveform corresponding to the power rating , as determined from the following formula :

$$RCWV = \sqrt{P \times R}$$

Note : Max. Working Voltage or $\sqrt{P \times R}$ whichever is lesser

Max. Overload Voltage or $2.5 \sqrt{P \times R}$ whichever is lesser

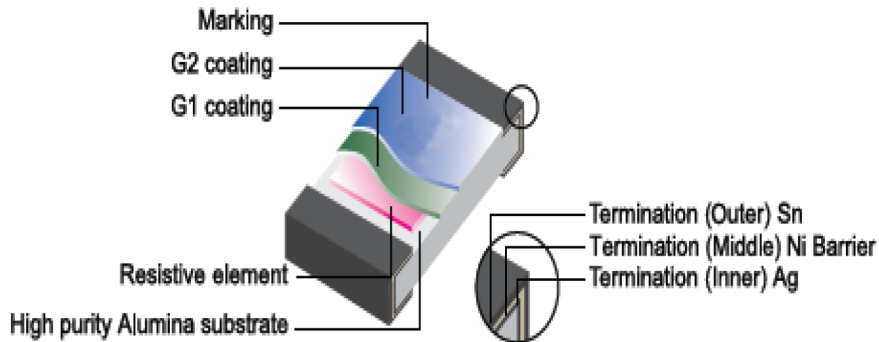
Where : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

R = Nominal Resistance (ohm)

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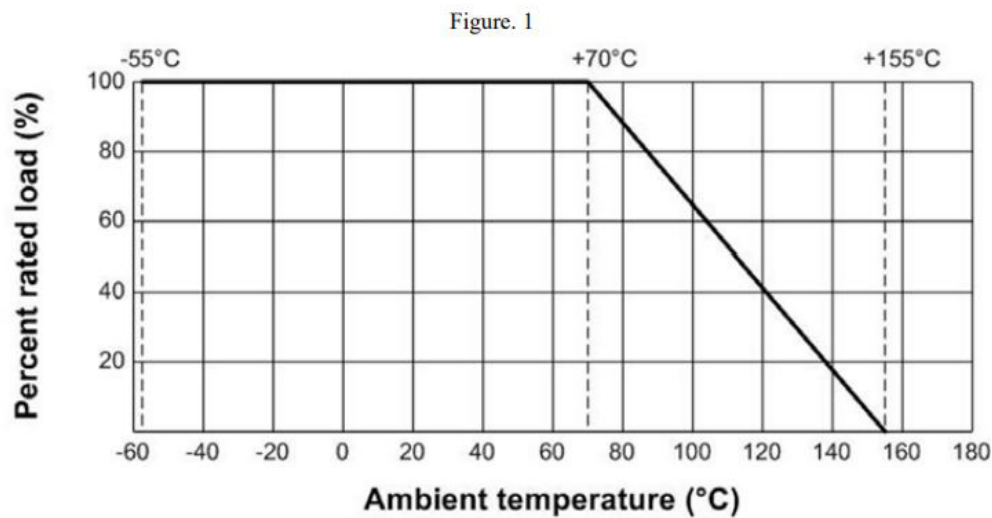
Construction



Power rating and dimensions

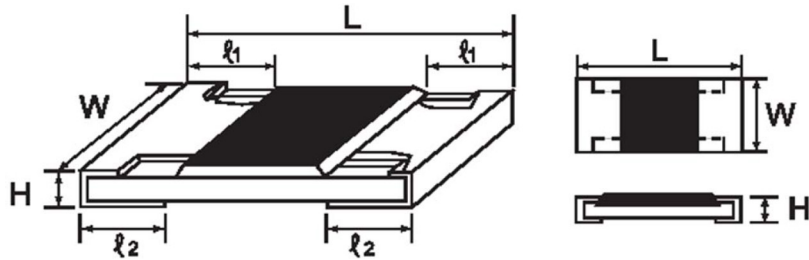
Power rating:

Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70°C. For temperature in excess of 70°C, The load shall be derate as shown in figure 1.



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Dimension



Dimensions : Millimetres

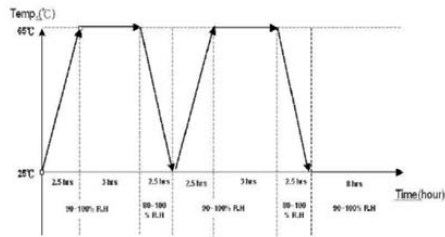
| Type | Dimension (mm) | | | | |
|--------------|----------------|-------------|-------------|-------------|-------------|
| | L | W | H | l1 | l2 |
| MPP10 (2010) | 5.00 ± 0.10 | 2.50 ± 0.15 | 1.10 ± 0.10 | 0.60 ± 0.25 | 0.50 ± 0.20 |
| MPP12 (2512) | 6.35 ± 0.10 | 3.20 ± 0.15 | | 0.60 ± 0.25 | 1.80 ± 0.20 |
| MPP17 (2817) | 7.10 ± 0.20 | 4.20 ± 0.20 | | 0.60 ± 0.20 | 1.80 ± 0.20 |
| MPP20 (4320) | 11.00 ± 0.30 | 5.00 ± 0.25 | | 0.80 ± 0.20 | 2.40 ± 0.20 |
| MPP27 (4527) | 11.60 ± 0.30 | 6.85 ± 0.25 | | 1.00 ± 0.20 | 2.50 ± 0.20 |

Power Rating

| Type | Power Rating at 70°C | Tolerance % | Resistance Range | Standard Series |
|--------------|----------------------|-------------|------------------|-----------------|
| MPP10 (2010) | 2W | ±1 | 1Ω to 10MΩ | E-96 |
| | | ±5 | | E-24 |
| MPP12 (2512) | 3W | ±1 | | E-96 |
| | | ±5 | | E-24 |
| MPP17 (2817) | 4W | ±1 | | E-96 |
| | | ±5 | | E-24 |
| MPP20 (4320) | 5W | ±1 | | E-96 |
| | | ±5 | | E-24 |
| MPP27 (4527) | 6W | ±1 | E-96 | |
| | | ±5 | E-24 | |

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Performance specification

| Characteristics | Limits | Test Methods (AEC - Q200) |
|-------------------------------------|--|--|
| Operational Life | Resistance change rate is ±1%: ±(1.0%+0.1Ω)max ±5%: ±(3.0%+0.1Ω)Max. | 125°C, at 35% of operating power, 1000H(1.5 hours "ON", 0.5 hour "OFF") (MIL-STD-202 Method 108) |
| Temperature Coefficient | Resistance change rate is 10Ω < R ≤ 10Ω : ±200PPM/°C 10Ω < R ≤ 10MΩ : ±100PPM/°C | 4.8 Natural resistance change per temp. degree centigrade. R2-R1 ----- R1(t2-t1) R1: Resistance value at room temperature (T1) R2: Resistance value at room temp. plus 100°C (T2) Test pattern: room temp. (T1), room temp. +100°C (T2) |
| Short Time Overload | Resistance change rate is ±1%: ±(1.0%+0.1Ω)Max ±5%: ±(2.0%+0.1Ω)Max | 2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance. |
| External Visual | No Mechanical Damage | Electrical test not required. Inspect device construction, marking and workmanship (MIL-STD-883 Method 2009) |
| Physical Dimension | Reference 2.0 Dimension Standards | Verify physical dimensions to the applicable device detail specification. Note: User(s) and Suppliers spec. Electrical test not required. (JESD22 MH Method JB-100) |
| Resistance to Solvent | Marking Unsmearred | Note: Add Aqueous wash chemical – OKEM Clean or equivalent. Do not use banned solvents. (MIL-STD-202 Method 215) |
| Terminal Strength | Not broken | Force of 1.8kg for 60 seconds. (JIS-C-6429) |
| High Temperature Exposure (Storage) | Resistance change rate is ±(1.0%+0.1Ω)max | 1000hrs. at T=155°C. Unpowered. Measurement at 24±2 hours after test conclusion. (MIL-STD-202 Method 108) |
| Temperature cycling | Resistance change rate is 1%: ± (0.5%+0.1Ω) Max. 5%: ± (1.0%+0.1Ω) Max. | 1000 Cycles (-55°C to +155°C). Measurement at 24±2 hours after test conclusion. (JESD22 Method JA-104) |
| Moisture Resistance | Resistance change rate is 1%: ± (0.5%+0.1Ω) Max. 5%: ± (3.0%+0.1Ω) Max. |  <p>The graph shows a temperature cycling test between 25°C and 65°C. The temperature rises from 25°C to 65°C over 2.5 hours, stays at 65°C for 3 hours, falls back to 25°C over 2.5 hours, and repeats this cycle. Below the x-axis, there are four segments labeled '90-100% RH' with a duration of 2.5 hrs for each segment. The total time for one cycle is 24 hours.</p> <p>T=24 hours /cycle. Unpowered. Measurement at 24±2 hours after test conclusion. (MIL-STD-202 Method 106)</p> |

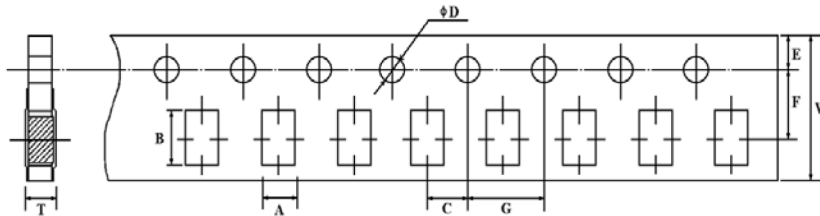
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| Characteristics | Limits | Test Methods (AEC - Q200) |
|--|---|--|
| Biased Humidity | Resistance change rate is 1%: $\pm (1.0\%+0.1\Omega)$ Max. 5%: $\pm (3.0\%+0.1\Omega)$ Max. | 10% rated power, 85°C/85%RH, 1000H, Measurement at 24 hours after test conclusion. (MIL-STD-202 Method 103) |
| Mechanical Shock | Resistance change rate is $\pm(1.0\%+0.1\Omega)$ max | Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6. (MIL-STD-202 Method 213) |
| Vibration | Resistance change rate is $\pm(1.0\%+0.1\Omega)$ max | 5g's for 20 min., 12cycle each of 3 orientations. Note: Use 8"*5"PCB. 031" thick 7 secure points (onone) long side and 2 secure points at corners of opposite sides. Parts mounted within 2' from any secure point. Test from 10-2000Hz. (MIL-STD-202 Method 204) |
| Thermal Shock | Resistance change rate is $\pm(1.0\%+0.1\Omega)$ max | -55°C/+155°C, Note: Number of cycles required -300, Maximum transfer time -20 seconds, Dwell time -15 minutes. Air-Air. (MIL-STD-202 Method 107) |
| ESD | Resistance change rate is $\pm(10\%+0.1\Omega)$ max | With the electrometer in direct contact with the discharge tip, verify the voltage setting at levels of $\pm 500V, \pm 1KV, \pm 2KV, \pm 4KV, \pm 8KV$, The electrometer reading shall be within $\pm 10\%$ for voltages from 500V to 800V. (AEC-Q200-002) |
| Solderability | 95% coverage Min. | For both leaded & SMD. Electrical test not required. Magnification 50X. Conditions: a) Method B 4hrs at 155°C dry heat, the dip in bath with 245°C, 5s. b) Method B: at 215°C, 5s. c) Method D: at 260°C, 60s. (J-STD-002) |
| Flammability | No ignition of the tissue paper or scorching or the pinewood board | V-0 or V-1 are acceptable. Electrical test not required. (UL-94) |
| Board Flex | Resistance change rate is $\pm(1\%+0.05\Omega)$ max | 2mm (Min) (JIS-C-6429) |
| Flame Retardance | No flame | Temperature sensing at 500°C, Voltage power subjected to 32V DC current clamped up to 500A DC and decreased in 1.0V DC/hour. (AEC-Q200-001) |
| Resistance to Soldering Heat | Resistance change rate is $\pm(1\%+0.05\Omega)$ max. | Condition B No per-heat of samples. Note: Single Wave Solder-Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body. (MIL-STD-202 Method 210) |
| * Sulfuration test: H ₂ S 3~5PPM 50°C \pm 2°C 91%~93%RH 1000H | | |

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Packing specification

Tapping Dimension



| Type | A ±0.1 | B ±0.1 | C ±0.15 | ∅D +0.1 -0 | E ±0.1 | F ±0.15 | G ±0.1 | W ±0.30 | ∅D1 ±0.1 | T ± 0.1 |
|-----------------|--------|--------|---------|---------------|--------|---------|--------|---------|----------|---------|
| MPP10 (2010) | 2.65 | 5.25 | 2 | 1.5 | 1.75 | 5.5 | 4 | 12 | 1 | 1.35 |
| MPP12 (2512) | 3.5 | 6.7 | | | | 5.5 | | 12 | 1.5 | |
| MPP17 (2817) | 4.5 | 7.4 | | | | 7.5 | | 16 | - | |
| MPP17 (2817) | 5.4 | 11.5 | | | | 11.5 | | 24 | - | |
| MPP27 (4527) | 7.2 | 11.9 | | | | 11.5 | | 24 | - | |

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Part Number Table

| Description | Part Number |
|--------------------------------|-----------------|
| Thick Film Chip Resistor, 1R | MPP102WF100KT2E |
| Thick Film Chip Resistor, 1.2R | MPP102WF120KT2E |
| Thick Film Chip Resistor, 1.5R | MPP102WF150KT2E |
| Thick Film Chip Resistor, 1.6R | MPP102WF160KT2E |
| Thick Film Chip Resistor, 1.8R | MPP102WF180KT2E |
| Thick Film Chip Resistor, 2R | MPP102WF200KT2E |
| Thick Film Chip Resistor, 2.7R | MPP102WF270KT2E |
| Thick Film Chip Resistor, 3R | MPP102WF300KT2E |
| Thick Film Chip Resistor, 3.9R | MPP102WF390KT2E |
| Thick Film Chip Resistor, 4.7R | MPP102WF470KT2E |
| Thick Film Chip Resistor, 5.1R | MPP102WF510KT2E |
| Thick Film Chip Resistor, 5.6R | MPP102WF560KT2E |
| Thick Film Chip Resistor, 6.2R | MPP102WF620KT2E |
| Thick Film Chip Resistor, 6.8R | MPP102WF680KT2E |
| Thick Film Chip Resistor, 7.5R | MPP102WF750KT2E |
| Thick Film Chip Resistor, 8.2R | MPP102WF820KT2E |
| Thick Film Chip Resistor, 9.1R | MPP102WF910KT2E |
| Thick Film Chip Resistor, 10R | MPP102WF100JT2E |
| Thick Film Chip Resistor, 12R | MPP102WF120JT2E |
| Thick Film Chip Resistor, 13R | MPP102WF130JT2E |
| Thick Film Chip Resistor, 16R | MPP102WF160JT2E |
| Thick Film Chip Resistor, 20R | MPP102WF200JT2E |
| Thick Film Chip Resistor, 33R | MPP102WF330JT2E |
| Thick Film Chip Resistor, 43R | MPP102WF430JT2E |
| Thick Film Chip Resistor, 62R | MPP102WF620JT2E |

| Description | Part Number |
|--------------------------------|-----------------|
| Thick Film Chip Resistor, 75R | MPP102WF750JT2E |
| Thick Film Chip Resistor, 100R | MPP102WF1000T2E |
| Thick Film Chip Resistor, 110R | MPP102WF1100T2E |
| Thick Film Chip Resistor, 120R | MPP102WF1200T2E |
| Thick Film Chip Resistor, 160R | MPP102WF1600T2E |
| Thick Film Chip Resistor, 220R | MPP102WF2200T2E |
| Thick Film Chip Resistor, 300R | MPP102WF3000T2E |
| Thick Film Chip Resistor, 470R | MPP102WF4700T2E |
| Thick Film Chip Resistor, 620R | MPP102WF6200T2E |
| Thick Film Chip Resistor, 680R | MPP102WF6800T2E |
| Thick Film Chip Resistor, 750R | MPP102WF7500T2E |
| Thick Film Chip Resistor, 910R | MPP102WF9100T2E |
| Thick Film Chip Resistor, 1.2K | MPP102WF1201T2E |
| Thick Film Chip Resistor, 1.5K | MPP102WF1501T2E |
| Thick Film Chip Resistor, 3.6K | MPP102WF3601T2E |
| Thick Film Chip Resistor, 12K | MPP102WF1202T2E |
| Thick Film Chip Resistor, 43K | MPP102WF4302T2E |
| Thick Film Chip Resistor, 62K | MPP102WF6202T2E |
| Thick Film Chip Resistor, 91K | MPP102WF9102T2E |
| Thick Film Chip Resistor, 1R | MPP102WJ010JT2E |
| Thick Film Chip Resistor, 5.6R | MPP102WJ056JT2E |
| Thick Film Chip Resistor, 120R | MPP102WJ0121T2E |
| Thick Film Chip Resistor, 470R | MPP102WJ0471T2E |
| Thick Film Chip Resistor, 560R | MPP102WJ0561T2E |
| Thick Film Chip Resistor, 1M | MPP102WJ0105T2E |

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