

Metal Foil on Ceramic Chip Resistors

MFC Series

- Small size down to 0402
- Tolerance to $\pm 0.5\%$
- TCR to $\pm 50\text{ppm}/^\circ\text{C}$
- High power density
- AEC-Q200 qualified (excluding 0.5% tolerance)



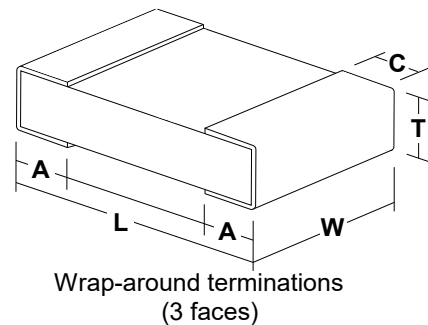
 All parts are Pb-free and comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

Electrical Data

| | | 0402 | 0603 | 0805 | | 1206 | | 2010 | | 2512 | | |
|-----------------------|---------|--|-------------------------|---------------------|---------|---------|---------|---------|---------|--|----------|--------|
| Power rating @ 70°C | W | 0.25 | 0.5 | 0.25 | 0.75 | 0.5 | 1 | 0.75 | 1 | 1 | 2 | |
| Overload rating 5s | W | 2.25 | 2.5 | 2.25 | 3.75 | 2.5 | 5 | 3.75 | 5 | 5 | 8 | |
| Resistance range | mΩ | 10- 50 | 3- 100 | 30- 100 | 3- 100 | 30- 100 | 3- 100 | 30- 100 | 3- 100 | 30- 100 | 101- 200 | 2- 100 |
| AEC-Q200 qualified | | | | | | | | | | | | |
| Tolerance | ±% | 1, 2, 5 | | 0.5 | 1, 2, 5 | 0.5 | 1, 2, 5 | 0.5 | 1, 2, 5 | 0.5 | 1, 2, 5 | |
| TCR (-55°C to +125°C) | ±ppm/°C | 100 | <R01: 200, ≥R01: 100 | <R01: 100, ≥R01: 50 | | | | | | R002: 200, R003 – R009: 100, ≥R01: 50 | | |
| Standard values | | E24 plus integer milliohm values below R01 preferred | | | | | | | | | | |
| Operating temperature | °C | -55 to +155 | | | | | | | | | | |

Physical Data

| Dimensions (mm) and weight (mg) | | | | | | | |
|---------------------------------|------------|-----------|-----------|-----------|-----------|-------|--------|
| Size | Value (mΩ) | L | W | C | A | T max | Wt |
| 0402 | All | 1.05±0.1 | 0.55±0.1 | - | 0.27±0.1 | 0.55 | 0.9 |
| 0603 | ≤4 | 1.6±0.2 | 0.85±0.25 | 0.35±0.25 | 0.6±0.2 | 0.85 | 2.9 |
| | >4 | | | | 0.35±0.2 | | |
| 0805 | ≤4 | 2±0.25 | 1.3±0.2 | 0.38±0.28 | 0.7±0.3 | 0.85 | 7- 10 |
| | >4 | | | | 0.4±0.3 | | |
| 1206 | ≤4 | 3.15±0.25 | 1.6±0.2 | 0.5±0.3 | 0.9±0.3 | 0.9 | 13- 15 |
| | >4 | | | | 0.53±0.33 | | |
| 2010 | <4 | 5±0.2 | 2.5±0.2 | 0.6±0.3 | 1.6±0.3 | 0.73 | 33 |
| | 4 – 5 | | | | 1.3±0.3 | | |
| | >5 | | | | 0.85±0.35 | | |
| 2512 | 2 | 6.35±0.25 | 3.2±0.2 | 0.75±0.45 | 2.3±0.3 | 0.95 | 54 |
| | 3 – 4 | | | | 1.8±0.4 | | |
| | 5 – 7 | | | | 1.15±0.35 | | |
| | >7 | | | | 1.05±0.45 | | |



Construction

Metal foil resistor material is bonded onto an alumina substrate and connected to wraparound terminations with nickel barrier and 100% Sn finish. Protection and marking are applied and each resistor is measured immediately before packing into tape.

Marking

MFC0402 parts are not marked. Larger MFC sizes are marked with 2, 3 or 4 characters indicating ohmic value. Where "R" is used it indicates the decimal point location for the value in ohms, e.g. "R047" = 47mΩ, "R01" = 10mΩ. Where "R" is omitted, the value is in milliohms e.g. "047" = 47mΩ, "03" = 3mΩ. Reels are marked with type, value, tolerance, date code and quantity.

Solvent Resistance

The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuits.

General Note

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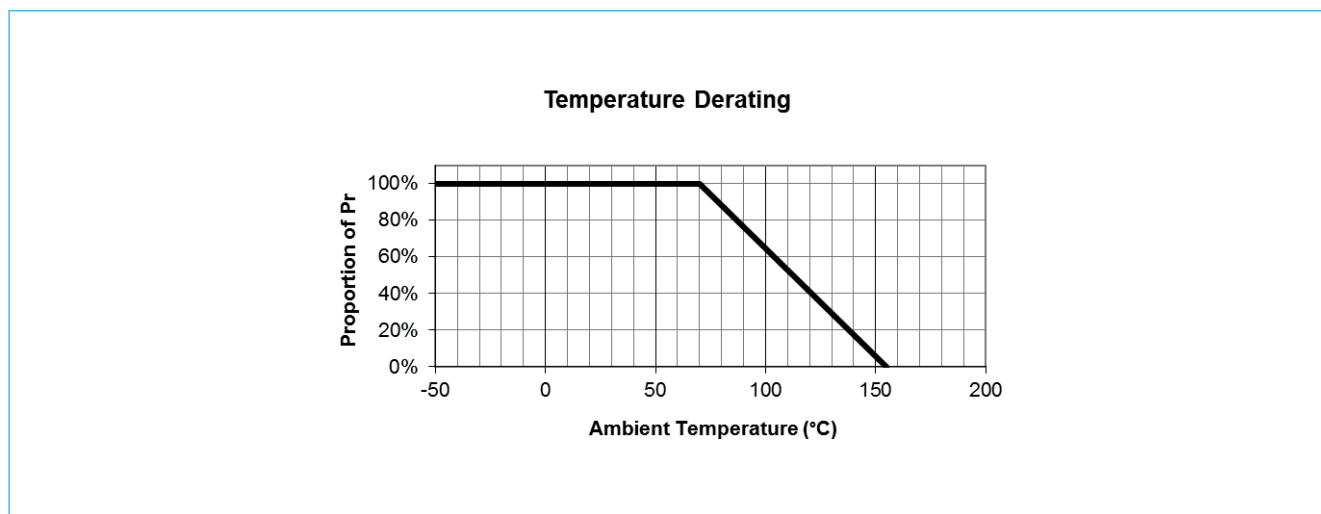
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Performance Data

| Test | | | | Maximum |
|------------------------------|---|--|-----------------|------------------------------|
| Operational Life | MIL-STD-202 Method 108 | 1000 hours, steady state, $T_A=125^{\circ}\text{C}$ at de-rated power | $\pm\Delta R\%$ | 1 |
| Short Term Overload | IEC-60115-1 4.13 | $P_r < 2W$; 5 x P_r for 5 seconds $P_r = 2W$; 4 x P_r for 5 seconds | $\pm\Delta R\%$ | 1 |
| Biased Humidity | MIL-STD-202 Method 103 | 1000 hours, 85°C , 85%RH, 10% of P_r | $\pm\Delta R\%$ | 1 |
| High Temperature Exposure | MIL-STD-202 Method 108 | 1000 hours, 155°C | $\pm\Delta R\%$ | 0.5 |
| Operation at Low Temperature | IEC-60115-1 4.36 | -55°C , 45 mins P_r , 15 mins no load | $\pm\Delta R\%$ | 1 |
| Temperature Rapid Change | IEC-60115-1 4.19 | -55°C to $+155^{\circ}\text{C}$, 5 cycles | $\pm\Delta R\%$ | 1 |
| Voltage Proof | IEC-60115-1 4.7 | 1.42 x max operating voltage for 1 minute | $\pm\Delta R\%$ | No breakdown or flashover |
| Board Flex | JIS-C-521-1 4.33 | 3mm deflection for 5 seconds | $\pm\Delta R\%$ | 1 |
| Solderability | IEC-60115-1 4.17 | $245 \pm 5^{\circ}\text{C}$ for 3 seconds | | >95% coverage |
| Resistance to Solder Heat | MIL-STD-202 Method 210 | $260 \pm 5^{\circ}\text{C}$ for 10 seconds | $\pm\Delta R\%$ | 1 |
| Leaching | JIS-S-5201-1 4.18 IEC-60068-2-58 8.2.1 | $260 \pm 5^{\circ}\text{C}$ for 30 seconds | $\pm\Delta R\%$ | >90% coverage |
| Resistance to Solvents | MIL-STD-202 Method 215 | Aqueous wash OKEM or equivalent. No banned solvents. | | No damage |

Thermal Performance Data



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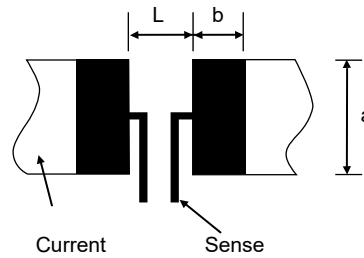
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MFC Series

Mounting Recommendations

| Size | Resistance Value | L | a | b |
|------|------------------|-----|-----|------|
| 0402 | 10- 50 | 0.5 | 0.6 | 0.5 |
| 0603 | 3- 4 | 0.4 | 1 | 1.2 |
| | 5- 9 | 0.6 | | 1.1 |
| | 10- 100 | 0.5 | 0.9 | 1 |
| 0805 | 3- 4 | 0.5 | 1.4 | 1.35 |
| | 5- 9 | 0.8 | | 1.2 |
| | 10- 100 | | 1.3 | 1.3 |
| 1206 | 3- 4 | 0.8 | 1.8 | 1.8 |
| | 5- 9 | 1.8 | | 1.3 |
| | 10- 100 | 1.5 | 1.7 | 1.4 |
| 2010 | 3- 9 | 1.6 | 2.9 | 2.4 |
| | 10- 100 | 2.7 | | 1.8 |
| 2512 | 2- 4 | 1 | 3.4 | 3.5 |
| | 5- 200 | 3.8 | | 2.1 |



Packaging

MFC0402 is packed on 8mm paper tape at 2mm component pitch. MFC0603, 0805 & 1206 are packed on 8mm paper tape at 4mm component pitch. MFC2010 & 2512 are packed on 12mm plastic tape at 4mm component pitch. All sizes are on 178mm diameter reels.

Ordering Procedure

Example: MFC0603-R005FT5 (0603, 5 milliohms ±1%, Pb-free)



| 1 | 2 | 3 | 4 | 5 | |
|------|------|----------------------------|-----------|---------|-------------------------|
| Type | Size | Value | Tolerance | Packing | |
| MFC | 0402 | E24 | D = ±0.5% | T10 | 0402, 10,000/reel |
| | 0603 | 3/4 characters R = ohms | F = ±1% | T5 | 0603 to 1206, 5000/reel |
| | 0805 | | G = ±2% | T4 | 2010, 2512, 4000/reel |
| | 1206 | | J = ±5% | | |
| | 2010 | | | | |
| | 2512 | | | | |

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