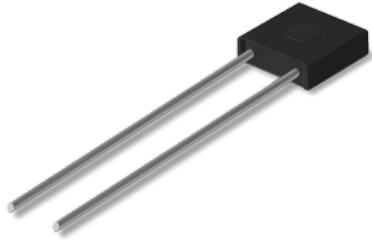


Data Sheet for Precision Resistors

Metal Foil Resistor

Series MR



- Very good long term stability
- Any resistance from 1Ω..400kΩ
- Best resistance tolerance $\pm 0.005\%$
- Temperature coefficient up to $\pm 1\text{ppm}/^\circ\text{C}$
- Low current noise
- Rugged epoxy housing

| Electrical Specification | MR 9101 | MR 9102 | MR 9103 |
|---------------------------------------|--|---------|---|
| Resistance range | 1Ω..200kΩ | | 5Ω..400kΩ |
| Resistance tolerance | $\pm 0.005\%.. \pm 1\%$ | | |
| Power rating @ 125°C (0W @ +175°C) | 0.3W ($\geq 150\text{k}\Omega = 0.2\text{W}$) | | 0.5W ($\geq 200\text{k}\Omega = 0.3\text{W}$) |
| Max. working voltage | 300V | | 350V |
| TCR-rate | $\pm 1\text{ppm}/^\circ\text{C}^{**}$, $\pm 2.5\text{ppm}/^\circ\text{C}$ @ R = 30..200kΩ $\pm 5\text{ppm}/^\circ\text{C}$ @ R = 5..200kΩ $\pm 15\text{ppm}/^\circ\text{C}$ @ R = 1..5Ω | | $\pm 1\text{ppm}/^\circ\text{C}^{**}$, $\pm 2.5\text{ppm}/^\circ\text{C}$ @ R = 30..400kΩ $\pm 5\text{ppm}/^\circ\text{C}$ @ R = 5..400kΩ |
| Working temperature range (max.) | -55 °C up to +125 °C (-65..+175°C) | | |

**limited max. working temperature range 0..+60°C

Mechanical Specification

| | |
|----------------------------------|----------------------|
| Resistance technology / material | Metal foil |
| Housing material | Epoxy moulded |
| Connections | Radial cooper tinned |

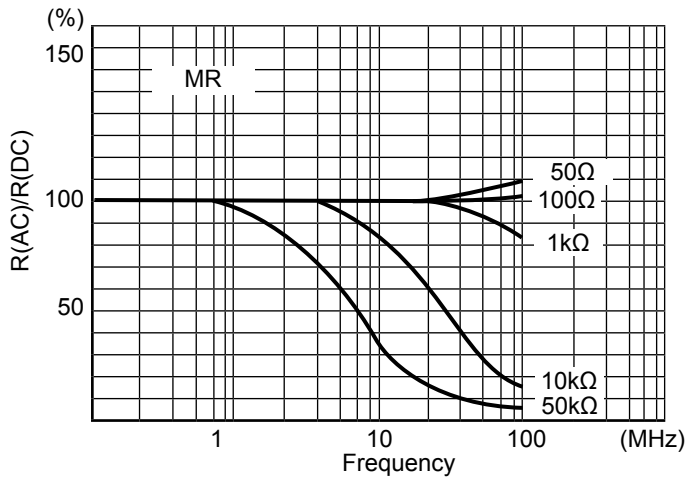
| Parameters | Test Conditions (MIL-PRF-55182/9) | Specification |
|------------------------------|--|----------------------------------|
| Power Conditioning | 125°C, rated power, 100 h | $\Delta R \pm 0.005\%$ |
| Short time overload | 6.25 x rated power, 5 sec. | $\Delta R \pm 0.005\%$ |
| Life span (biased) | 125°C, rated voltage, 90 min. on 30 min off, 2000 h | $\Delta R \pm 0.015\%$ |
| High temperature / humidity | +65°..-10°C, 90..98% RH rated voltage, 10 cycles, 240h | $\Delta R \pm 0.01\%$ |
| Temperature shock | -65°C (30 min)..+150°C (30 min), 5 cycles | $\Delta R \pm 0.005\%$ |
| High temperature exposure | +175°C, no load 2000 h | $\Delta R \pm 0.015\%$ |
| Solderability | 245°C, 5 sec. | Coverage >95% |
| Resistance to soldering heat | 260°C, 10 sec. | $\Delta R \pm 0.0025\%$ |
| Isolation resistance | 100 VDC, 2 min. | >10000MΩ |
| Dielectric strength | Atmo. Pres.: 300 Vrms. | $\Delta R \pm 0.0025\%$ |
| Low temperature operation | -65°C, 45 min. rated voltage | $\Delta R \pm 0.0025\%$ |
| Shock | 100G, 6 ms, halfsine, X, Y each 10 shocks | $\Delta R \pm 0.0025\%$ |
| High frequency vibration | 20G, 10Hz to 2kHz to 10Hz, 20 min. X, Y each 4 h | $\Delta R \pm 0.0025\%$ |
| Current noise | | -42 dB |
| Voltage coefficient | | 0,00003%/V |
| Thermal EMF | | 1.0 $\mu\text{V}/^\circ\text{C}$ |

Data Sheet for Precision Resistors

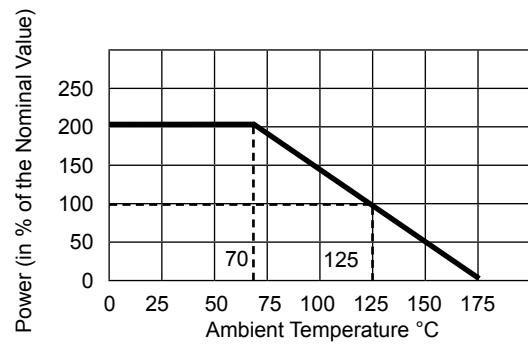
Metal Foil Resistor

Series MR

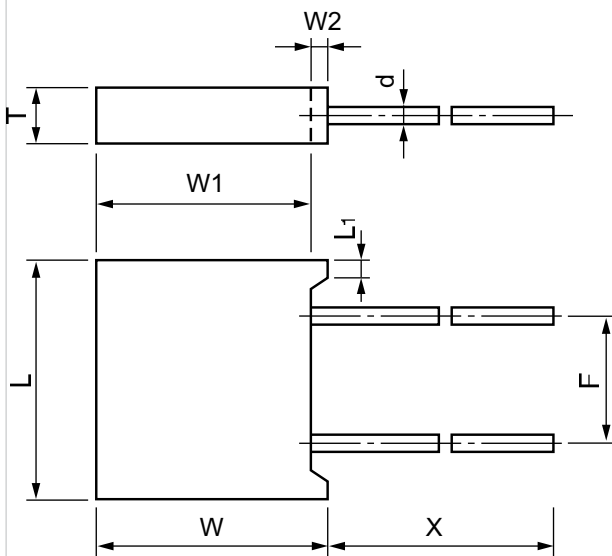
Frequency Characteristics



Power Derating Curve



Technical Drawing



| | MR 9101 | MR 9102 | MR 9103 |
|----|----------------|---------------|-------------|
| L | 7.9 ±0.2 mm | | 13 ±0.3 mm |
| L1 | max. 1 mm | | max. 1.5 mm |
| W | 8.3 ±0.2 mm | | 10 ±0.3 mm |
| W1 | 8.0 ±0.2 mm | | 9.5 ±0.3 mm |
| W2 | max. 0.3 mm | | max. 0.5 mm |
| T | 2.8 ±0.2 mm | 2.3 ±0.2 mm | 4.0 ±0.3 mm |
| F | 3.81 ±0.25 mm | 5.08 ±0.25 mm | 7.5 ±0.5 mm |
| X | 25 ±10 mm | 10 ±3 mm | |
| d | Ø0.65 ±0.05 mm | | |

Data Sheet for Precision Resistors

Metal Foil Resistor

Series MR

Order code

| Description | Selection: standard=black/bold , possible <i>options=grey/italic</i> | | | | |
|--|---|---|---|---|----------------|
| Series: | MR | | | | |
| Type / size: 9101 (1Ω..200kΩ) 9102 (1Ω..200kΩ) 9103 (5Ω..400kΩ) | | 9101 9102 9103 | | | |
| Resistance tolerance for 9101 and 9102: ±1% @ R >1Ω ±0.5% @ R >1Ω ±0.1% @ R >5Ω ±0.05% @ R >30Ω ±0.02% @ R >30Ω ±0.01% @ R >30Ω ±0.005% @ R >30Ω | | | W1% W0,5% W0,1% W0,05% W0,02% W0,01% W0,005% | | |
| Resistance tolerance for 9103: ±1% @ R >5Ω ±0.5% @ R >5Ω ±0.1% @ R >5Ω ±0.05% @ R >30Ω ±0.02% @ R >30Ω ±0.01% @ R >30Ω ±0.005% @ R >30Ω | | | W1% W0,5% W0,1% W0,05% W0,02% W0,01% W0,005% | | |
| Temperature coefficient for 9101 and 9102: ±15ppm/°C @ R ≤5Ω ±5ppm/°C @ R >5Ω ±2.5ppm/°C @ R ≥30Ω <i>Option ±1ppm/°C @ R ≥30Ω</i> | | | | TK15 TK5 TK2,5 <i>TK1</i> | |
| Temperature coefficient for 9103: ±5ppm/°C @ R >5Ω ±2.5ppm/°C @ R ≥30Ω <i>Option ±1ppm/°C @ R ≥30Ω</i> | | | | TK5 TK2,5 <i>TK1</i> | |
| Resistance value - please choose: see type/size | | | | | xxxkxxx |

| Order Example | Series | Type | Resistance tolerance | Temperature coefficient | Resistance value |
|---------------|--------|------|----------------------|-------------------------|------------------|
| Choice | MR | 9102 | ±0.1% | 5ppm/°C | 10.1kΩ |
| Code | MR | 9102 | W0.1% | TK5 | 10k100 |