

Data Sheet

Customer:

Product: Metal Foil Chip Fixed Resistor - MF Series

Sizes: 0402/0603/0805/1206/2010/2512

Issued Date: 27-Oct-22

Edition: REV.A5



VIKING TECH CORPORATION
光頡科技股份有限公司
No.70, Guangfu N. Rd., Hukou
Township, Hsinchu County
303, Taiwan (R.O.C)

TEL:886-3-5972931
FAX:886-3-5972935•886-3-5973494
E-mail:sales@viking.com.tw

VIKING TECH CORPORATION KAOHSIUNG BRANCH
光頡科技股份有限公司高雄分公司
No.248-3, Sin-Sheng Rd., Cian-Jhen Dist., Kaohsiung,
806, Taiwan

TEL:886-7-8217999
FAX:886-7-8228229
E-mail:sales@viking.com.tw

VIKING ELECTRONICS (WUXI) CO., LTD.
光頡電子(無錫)有限公司
No.22 Xixia Road, Machinery & Industry Park,
National Hi-Tech Industrial Development Zone
of Wuxi, Wuxi, Jiangsu Province, China
Zip Code:214028
TEL:86-510-85203339
FAX:86-510-85203667•86-510-85203977
E-mail:china@viking.com.tw

| Produced by (QC) | Checked (QC) | Approved by (QC) | Prepared by (Sales) | Accepted by (Customer) |
|---------------------|------------------|---------------------|------------------------|---------------------------|
| 27-Oct-22 | 27-Oct-22 | 27-Oct-22 | | |
| Mandy Chen | Ben Chang | Ben Chang | | |

Metal Foil Chip Fixed Resistor

Features

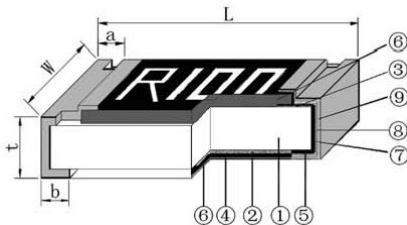
- High power rating up to 2 Watts
- Low TCR down to ± 50 PPM/ $^{\circ}$ C
- Current detecting resistors
- Superior mechanical and frequency characteristics
- Compliant with RoHS directive
- Halogen free requirement



Applications

- Switching Power Supply, Over Current Protection
- Voltage Regulation Module (VRM)
- DC-DC Converter, Charger
- Portable Devices etc

Construction



| | | |
|---------------------|----------------------|----------------------|
| ① Ceramic Substrate | ④ Primary Overcoat | ⑦ Edge Electrode |
| ② Alloy Plate | ⑤ Cu Plating | ⑧ Barrier Layer |
| ③ Top Electrode | ⑥ Secondary Overcoat | ⑨ External Electrode |

Dimensions

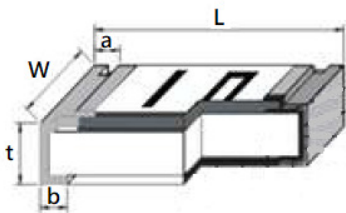


Figure1

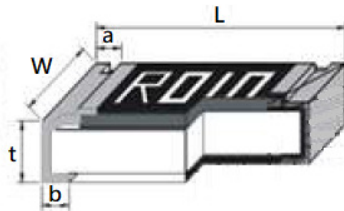


Figure2

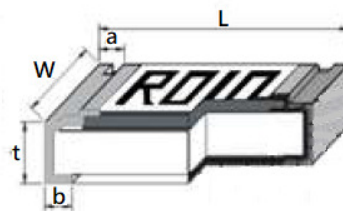


Figure3

| Type | Size (Inch) | Resistance (m Ω) | L mm | W mm | t mm | a mm | b mm |
|------|-------------|--------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| MF02 | 0402 | 10 | 1.00 \pm 0.10 | 0.50 \pm 0.10 | 0.40 \pm 0.10 | \leq 0.35 | 0.35 \pm 0.15 |
| MF03 | 0603 | \geq 5 | 1.60 \pm 0.20 | 0.80 \pm 0.20 | 0.70 \pm 0.15 | \leq 0.60 | 0.35 \pm 0.20 |
| MF05 | 0805 | 3-4 | 2.00 \pm 0.20 | 1.25 \pm 0.15 | 0.70 \pm 0.15 | 0.40 \pm 0.25 | 0.70 \pm 0.30 |
| | | \geq 5 | | | | | 0.40 \pm 0.30 |
| MF06 | 1206 | 3-4 | 3.20 \pm 0.20 | 1.60 \pm 0.20 | 0.75 \pm 0.15 | 0.50 \pm 0.30 | 0.90 \pm 0.30 |
| | | \geq 5 | | | | | 0.50 \pm 0.30 |
| MF10 | 2010 | 2 | 5.00 \pm 0.20 | 2.50 \pm 0.20 | 0.75 \pm 0.20 | 0.60 \pm 0.30 | 1.80 \pm 0.30 |
| | | 3 | | | | | 1.60 \pm 0.30 |
| | | 4-5 | | | | | 1.30 \pm 0.30 |
| | | >5 | | | | | 0.80 \pm 0.30 |
| MF12 | 2512 | 2 | 6.40 \pm 0.20 | 3.20 \pm 0.20 | 0.75 \pm 0.20 | 0.90 \pm 0.30 | 2.30 \pm 0.30 |
| | | 3 | | | | | 1.90 \pm 0.30 |
| | | 4 | | | | | 1.70 \pm 0.30 |
| | | 5-6 | | | | | 1.20 \pm 0.30 |
| | | 7 | | | | | 1.10 \pm 0.30 |
| | | >7 | | | | | 0.90 \pm 0.30 |

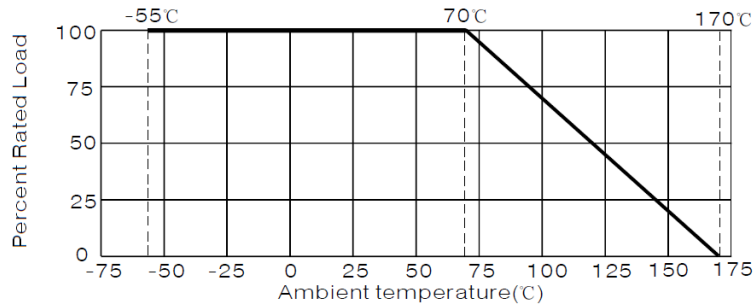
■ Figure 1 for MF03 type ; Figure 2 for MF05 \geq 10m Ω / MF06 type / MF12 type ; Figure 3 for MF05<10m Ω / MF10 type

■ MF02 chip resistor is without marking

Part Numbering

| | | | | | | |
|--------------|--|----------------------------|----------------|------------------------------|---|---|
| MF | 06 | J | T | E | U | R005 |
| Product Type | Dimensions (L×W) | Resistance Tolerance | Packaging Code | TCR (PPM/°C) | Power Rating | Resistance |
| | 02: 0402 03: 0603 05: 0805 06: 1206 10: 2010 12: 2512 | F: ±1% G: ±2% J: ±5% | T: Taping Reel | D: ±50 E: ±100 F: ±200 | P: 1/5W V: 1/4W O: 1/3W U: 1/2W Q: 3/4W T: 1W S: 2W | R005: 0.005Ω R010: 0.01Ω R100: 0.1Ω |

Derating Curve



Standard Electrical Specifications

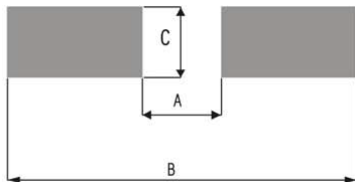
| Item Type | Power Rating at 70°C | Operating Temp. Range | Limiting Element Current | Max. Overload Current | Resistance Range(mΩ) | | | TCR (PPM/°C) |
|-----------|----------------------|-----------------------|--------------------------|-----------------------|----------------------|-----|-----|--------------|
| | | | | | ±1% | ±2% | ±5% | |
| MF02 | 1/5W | -55 ~ +170°C | 4.5A | 10A | 10 | | | ±100 |
| MF03 | 1/2W | -55 ~ +170°C | 12.9A | 28.9A | 5 - 9 | | | ±200 |
| MF05 | 3/4W | -55 ~ +170°C | 15.8A | 35.4A | 10 - 30 | | | ±100 |
| | 1/4W, 1/3W, 1/2W | | 12.9A | 28.9A | 3 - 9 | | | ±50 |
| MF06 | 1/2W, 1W | -55 ~ +170°C | 18.3A | 40.8A | 10 - 50 | | | ±100 |
| | | | | | 3 - 9 | | | ±50 |
| MF10 | 1W | -55 ~ +170°C | 22.4A | 50A | 10 - 68 | | | ±200 |
| | | | | | 2 | | | ±100 |
| | | | | | 3 - 9 | | | ±50 |
| MF12 | 1W | -55 ~ +170°C | 3.2A | 7.1A | 10 - 100 | | | ±50 |
| | | | | | 2 | | | ±200 |
| | 2W | | 31.6A | 63.3A | 101 - 200 | | | ±100 |
| | | | | | 10 - 100 | | | ±50 |

Current of DC or AC RMS value.
 Rated current= $\sqrt{(P/R)}$ or Limiting element voltage whichever is lower.

Environmental Characteristics

| Item | Requirement | Test Method |
|--|---|---|
| Temperature Coefficient of Resistance (T.C.R.) | As Spec. | IEC 60115-1 4.8 +20/+125/+20°C |
| Short Time Overload | No mechanical damage $\Delta R \leq \pm 1\%$ | IEC 60115-1 4.13 1/5W ~ 1W: 5x rated power for 5s; 2W: 4x rated power for 5s |
| Endurance | | IEC 60115-1 4.25.1 70±2°C, 1000 hrs, rated current or limiting element current whichever is lower for 1.5 hrs "ON" and 0.5 hr "OFF" |
| Endurance at upper Category Temperature | | IEC 60115-1 4.25.3 at 170±2°C for 1000 hrs |
| Damp Heat Steady State | | IEC 60115-1 4.24 40±2°C, 93±3% RH, 1000 hrs, rated current or limiting element current whichever is lower for 1.5 hrs "ON" and 0.5 hr "OFF" |
| Rapid Change of Temperature | | IEC 60115-1 4.19 -55°C(30min) → normal temperature(5min) → 125°C(30min), 100 cycles |
| Solderability | 95% min. coverage | IEC 60115-1 4.17 245±5°C for 3±0.3 seconds |
| Resistance to Soldering Heat | No mechanical damage $\Delta R \leq \pm 1\%$ | IEC 60115-1 4.18 270±5°C for 10±1 seconds |
| Substrate Bending Test | | IEC 60115-1 4.33 2010, 2512 sizes: 2mm Other sizes: 3mm Duration: 60±5 seconds |
| Insulation Resistance | >1000MΩ | IEC 60115-1 4.6 Apply DC 100V±15V between substrate and terminations for 1min, then check insulation resistance |
| Voltage Proof | No breakdown or flashover | IEC 60115-1 4.7 Apply max. overload voltage of AC RMS at a rate of approximately 100V/s between substrate and terminations for 60±5 seconds |
| Component Solvent Resistance | No mechanical damage $\Delta R \leq \pm 1\%$ | IEC 60115-1 4.29 Iso-propyl alcohol (IPA), 23±5°C, 10hrs |

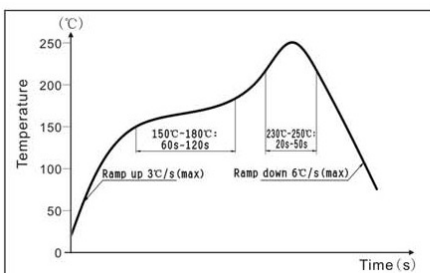
Recommend Land Pattern



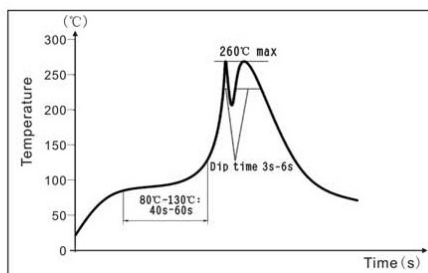
| Type | Resistance | A mm | B mm | C mm |
|------|--------------|------|------|------|
| MF02 | 10mΩ | 0.35 | 1.45 | 0.6 |
| MF03 | 5mΩ - 30mΩ | 0.6 | 2.8 | 1.0 |
| MF05 | 3mΩ - 4mΩ | 0.5 | 3.2 | 1.4 |
| | 5mΩ - 50mΩ | 0.8 | | |
| MF06 | 3mΩ - 4mΩ | 0.8 | 4.4 | 1.8 |
| | 5mΩ - 68mΩ | 1.8 | | |
| MF10 | 2mΩ | 1.0 | 6.3 | 2.9 |
| | 3mΩ - 9mΩ | 1.6 | | |
| | 10mΩ - 100mΩ | 2.7 | | |
| MF12 | 2mΩ - 4mΩ | 1.0 | 8.0 | 3.4 |
| | 5mΩ - 200mΩ | 3.8 | | |

Soldering Condition

Recommended reflow profile



Recommended wave solder profile

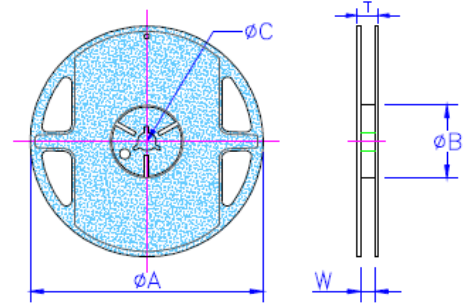


■Packaging

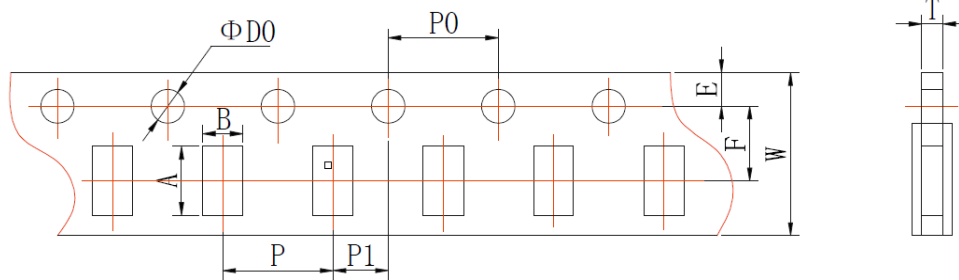
Packing Quantity & Reel Specifications

Unit :mm

| Type | ØA | ØB | ØC | W | T | Paper Tape (EA) | Emboss Plastic Tape (EA) |
|------|-----------|----------|----------|----------|----------|-----------------|--------------------------|
| MF02 | 178.0±2.0 | 58.0±2.0 | 13.0±0.5 | 9.5±1.0 | 12.5±1.5 | 10,000 | - |
| MF03 | 178.0±2.0 | 58.0±2.0 | 13.0±0.5 | 9.5±1.0 | 12.5±1.5 | 5,000 | - |
| MF05 | 178.0±2.0 | 58.0±2.0 | 13.0±0.5 | 9.5±1.0 | 12.5±1.5 | 5,000 | - |
| MF06 | 178.0±2.0 | 58.0±2.0 | 13.0±0.5 | 9.5±1.0 | 12.5±1.5 | 5,000 | - |
| MF10 | 178.0±2.0 | 57.0±2.0 | 13.0±0.5 | 13.0±0.5 | 15.5±1.5 | - | 4,000 |
| MF12 | 178.0±2.0 | 57.0±2.0 | 13.0±0.5 | 13.0±0.5 | 15.5±1.5 | - | 4,000 |



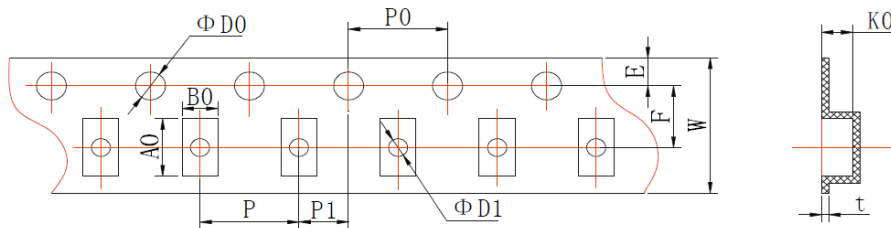
Paper Tape Specifications



Unit: mm

| Type | A | B | W | F | E | P | P0 | P1 | ØD0 | T |
|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| MF02 | 1.20±0.10 | 0.7±0.10 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 | 2.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | 0.50±0.10 |
| MF03 | 1.85±0.10 | 1.10±0.10 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | 0.75±0.10 |
| MF05 | 2.35±0.10 | 1.65±0.10 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | 0.95±0.10 |
| MF06 | 3.50±0.20 | 1.90±0.20 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | 0.95±0.10 |

Emboss Plastic Tape Specifications



Unit: mm

| Type | A0 | B0 | W | F | E | t | P | P0 | P1 | D0 | D1 | K0 |
|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------------|-----------|-----------|
| MF10 | 5.50±0.15 | 2.82±0.15 | 12.0±0.10 | 5.50±0.10 | 1.75±0.10 | 0.25±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50 +0.10/-0 | 1.50±0.10 | 0.84±0.10 |
| MF12 | 6.78±0.15 | 3.45±0.15 | 12.0±0.10 | 5.50±0.10 | 1.75±0.10 | 0.25±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50 +0.10/-0 | 1.50±0.10 | 1.00±0.10 |