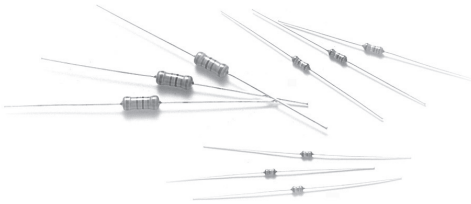


## Metal Film Resistors

# General Type

## Normal & Miniature Style [ MFR Series ]



### INTRODUCTION

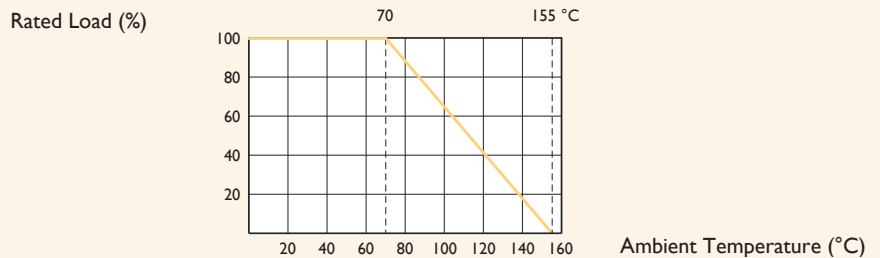
The MFR Series Metal Film Resistors are manufactured using a vacuum sputtering system to deposit multiple layers of mixed metal alloys and passivative materials onto a carefully treated high grade ceramic substrate. After a helical groove has been cut in the resistive layer, tinned connecting leads of electrolytic copper are welded to the end-caps. The resistors are coated with layers of blue color lacquer.

### FEATURES

|                      |                              |
|----------------------|------------------------------|
| Power Rating         | 1/6W, 1/4W, 1/2W, 1W, 2W, 3W |
| Resistance Tolerance | ±0.5%, ±1%, ±2%, ±5%         |
| T.C.R.               | ±50ppm/°C, ±100ppm/°C        |

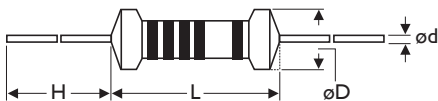
### DERATING CURVE

For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below.



### DIMENSIONS

Unit: mm



| STYLE  |           | DIMENSION |         |        |           |
|--------|-----------|-----------|---------|--------|-----------|
| Normal | Miniature | L         | øD      | H      | ød        |
| MFR-12 | MFR25S    | 3.4±0.3   | 1.9±0.2 | 28±2.0 | 0.45±0.05 |
| MFR-25 | MFR50S    | 6.3±0.5   | 2.4±0.2 | 28±2.0 | 0.55±0.05 |
| MFR-50 | MFR1WS    | 9.0±0.5   | 3.3±0.3 | 26±2.0 | 0.55±0.05 |
| MFR100 | MFR2WS    | 11.5±1.0  | 4.5±0.5 | 35±2.0 | 0.8±0.05  |
| MFR200 | MFR3WS    | 15.5±1.0  | 5.0±0.5 | 33±2.0 | 0.8±0.05  |

Note:

## ELECTRICAL CHARACTERISTICS

| STYLE                       | MFR-12                                 | MFR25S | MFR-25 | MFR50S | MFR-50 | MFR1WS | MFR100 | MFR2WS | MFR200 | MFR3WS |
|-----------------------------|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Power Rating at 70°C        | 1/6W                                   | 1/4W   |        | 1/2W   |        | 1W     |        | 2W     |        | 3W     |
| Maximum Working Voltage     | 200V                                   |        | 250V   | 300V   | 350V   | 400V   | 500V   |        |        |        |
| Maximum Overload Voltage    | 400V                                   |        | 500V   | 600V   | 700V   | 800V   | 1,000V |        |        |        |
| Voltage Proof on Insulation | 300V                                   | 400V   | 500V   |        |        | 700V   | 1,000V |        |        |        |
| Resistance Range            | 1Ω - 4M7Ω & for E24 & E96 series value |        |        |        |        |        |        |        |        |        |
| Operating Temp. Range       | -55°C to +155°C                        |        |        |        |        |        |        |        |        |        |
| Temperature Coefficient     | ±50ppm/°C, ±100ppm/°C                  |        |        |        |        |        |        |        |        |        |

Note: Special value is available on request

## ENVIRONMENTAL CHARACTERISTICS

| PERFORMANCE TEST              | TEST METHOD      |  | APPRAISE                                  |
|-------------------------------|------------------|--|---|
| Short Time Overload           | IEC 60115-1 4.13 | 2.5 times RCWV for 5 sec. (Not more than maximum Overload Voltage)             | ±0.25%+0.05Ω                              |
| Voltage Proof on Insulation   | IEC 60115-1 4.7  | In V-Block for 60 sec., test voltage as above table                            | No Breakdown                              |
| Temperature Coefficient       | IEC 60115-1 4.8  | Between -55°C to +155°C  | By type                                   |
| Insulation Resistance         | IEC 60115-1 4.6  | in V-block for 60 Sec.   | >10,000MΩ                                 |
| Solderability                 | IEC 60115-1 4.17 | 245±5°C for 3±0.5 Sec.   | 95% Min. coverage                         |
| Solvent Resistance of Marking | IEC 60115-1 4.30 | IPA for 5±0.5 Min. with ultrasonic   | No deterioration of coatings and markings |
| Robustness of Terminations    | IEC 60115-1 4.16 | Direct load for 10 Sec. in the direction of the terminal leads                 | ≥2.5kg (24.5N)                            |
| Periodic-pulse Overload       | IEC 60115-1 4.39 | 4 times RCWV 10,000 cycles (1 Sec. on, 25 Sec. off)                            | ±1.0%+0.05Ω                               |
| Damp Heat Steady State        | IEC 60115-1 4.24 | 40±2°C, 90-95% RH for 56 days, loaded with 0.1 times RCWV                      | ±1.5%+0.05Ω                               |
| Endurance at 70°C             | IEC 60115-1 4.25 | 70±2°C at RCWV (or Umax., Whichever less) for 1,000 Hr. (1.5Hr.on, 0.5Hr. Off) | ±1.5%+0.05Ω                               |
| Temperature Cycling           | IEC 60115-1 4.19 | -55°C ⇌ Room Temp. ⇌ +155°C ⇌ Room Temp. (5 cycles)                            | ±0.75%+0.05Ω                              |
| Resistance to Soldering Heat  | IEC 60115-1 4.18 | 260±3°C for 10±1 Sec., immersed to a point 3±0.5mm from the body               | ±0.25%+0.05Ω                              |

Note: RCWV(Rated Continuous Working Voltage) =  $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$  or Max. working voltage listed above, whichever less.

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