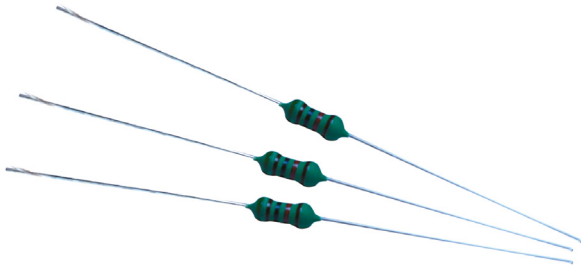


Metal Film Fixed Resistors

0.6W, 200 PPM



Scope:

This specification for approval relates to Metal Film Fixed Resistors.

Ratings:

| Type | MF |
|---------------------------------|-----------------|
| Rated Power | 0.6W at 70°C |
| Max. Working Voltage | 250V |
| Max. Overload Voltage | 500V |
| Dielectric Withstanding Voltage | 500V |
| Rated Ambient Temp. | 70°C |
| Operating Temp. Range | -55°C to +155°C |
| Resistance Tolerance | ± 1% |
| Resistance Range | 1Ω to 3.3Ω |

Table. 1

Power Rating:

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

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:

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

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

P = Power Rating (watt)

R = Nominal Resistance (ohm)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.

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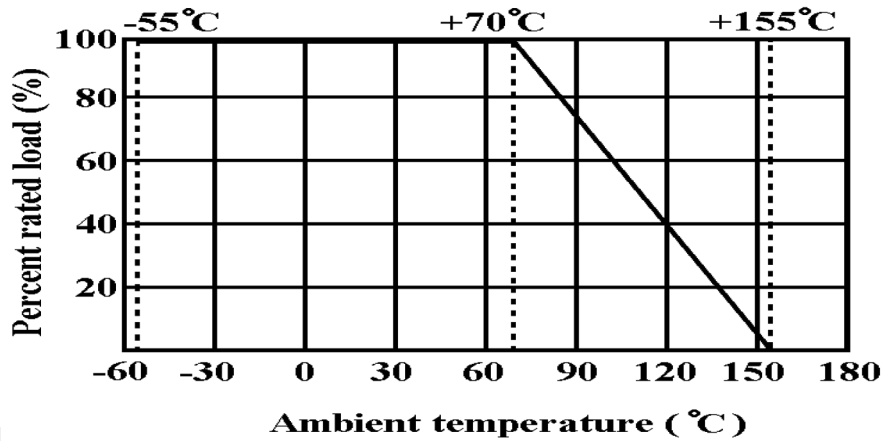
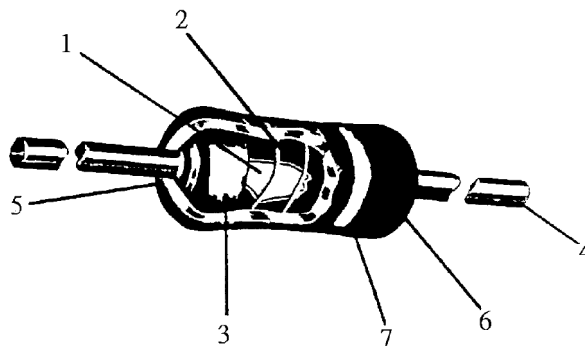


Figure. 1

Nominal Resistance:

Effective figures of nominal resistance shall be in accordance with E-96 series, and resistance tolerance shall be shown by table 1.

Construction:



| No. | Name | Material |
|-----|-----------------|--|
| 1 | Basic Body | Rod Type Ceramics |
| 2 | Resistance Film | Metal Film |
| 3 | End Cap | Steel (Tin plated iron surface) |
| 4 | Lead Wire | Annealed copper wire coated with tin |
| 5 | Joint | By Welding |
| 6 | Coating | Insulated epoxy resin (Colour: Sky blue) |
| 7 | Color Code | Epoxy Resin |

Metal Film Fixed Resistors

0.6W, 200 PPM



Characteristics:

| Characteristics | Limits | Test Methods (JIS C 5201-1) |
|---------------------------------|---|---|
| DC. Resistance | Must be within the specified tolerance | The limit of error of measuring apparatus shall not exceed allowable range or 5% of resistance tolerance |
| Temperature coefficient | ± 200 PPM/°C | Natural resistance change per temp. degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/°C)}$ R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100°C (t2) |
| Short time overload | Resistance change rate is ± (0.5% + 0.05Ω) Max. with no evidence of mechanical damage | Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds |
| Dielectric withstanding voltage | No evidence of flashover mechanical damage, arcing or insulation break down | Resistors shall be clamped in the trough of a 90° metallic V-block and shall be tested at AC potential respectively specified in the table 1. for 60 + 10/ -0 seconds |
| Pulse overload | Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage | Resistance change after 10,000 cycles (1 sec. "on" , 25 secs. "off") at 4 times RCWV |
| Terminal strength | No evidence of mechanical damage | Direct load : Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads Twist test : Terminal leads shall be bent through 90 ° at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations |
| Resistance to soldering heat | Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage | Permanent resistance change when leads immersed to 3.2 to 4.8mm from the body in 350°C ±10°C solder for 3 ±0.5 seconds |

Metal Film Fixed Resistors

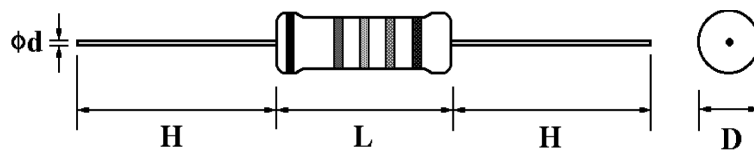
0.6W, 200 PPM



Characteristics:

| Characteristics | Limits | Test Methods (JIS C 5201-1) | | | | | | | | | | | | | | | |
|-----------------------|---|--|-------------|---------------|-------|---|------------|---------|---|------------|---------------|---|-------------|---------|---|------------|---------------|
| Solderability | 95 % coverage Min. | The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. of solder : 245°C ±3°C Dwell time in solder : 2 to 3 seconds | | | | | | | | | | | | | | | |
| Resistance to solvent | No deterioration of protective coatings and markings | Specimens shall be immersed in bath of trichroethane completely for 3 mins. with ultrasonic | | | | | | | | | | | | | | | |
| Temperature cycling | Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage | Resistance change after continuous 5 cycles for duty shown below: | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C ±3°C</td> <td>30 mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10 to 15 mins</td> </tr> <tr> <td>3</td> <td>+155°C ±2°C</td> <td>30 mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10 to 15 mins</td> </tr> </tbody> </table> | Step | Temperature | Time | 1 | -55°C ±3°C | 30 mins | 2 | Room temp. | 10 to 15 mins | 3 | +155°C ±2°C | 30 mins | 4 | Room temp. | 10 to 15 mins |
| | | Step | Temperature | Time | | | | | | | | | | | | | |
| | | 1 | -55°C ±3°C | 30 mins | | | | | | | | | | | | | |
| | | 2 | Room temp. | 10 to 15 mins | | | | | | | | | | | | | |
| 3 | +155°C ±2°C | 30 mins | | | | | | | | | | | | | | | |
| 4 | Room temp. | 10 to 15 mins | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| Load life in humidity | <table border="1"> <thead> <tr> <th>Resistance value</th> <th>ΔR/R</th> </tr> </thead> <tbody> <tr> <td>Normal type</td> <td>±1.5%</td> </tr> </tbody> </table> | Resistance value | ΔR/R | Normal type | ±1.5% | 7.9 Resistance change after 1,000 hours (1.5 hours "on", 0.5 hour "off") at RCWV in a humidity test chamber controlled at 40°C ± 2°C and 90 to 95 % relative humidity | | | | | | | | | | | |
| | Resistance value | ΔR/R | | | | | | | | | | | | | | | |
| | Normal type | ±1.5% | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| Load life | <table border="1"> <thead> <tr> <th>Resistance value</th> <th>ΔR/R</th> </tr> </thead> <tbody> <tr> <td>Normal type</td> <td>±1.5%</td> </tr> </tbody> </table> | Resistance value | ΔR/R | Normal type | ±1.5% | 7.10 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") at 70°C ±2°C ambient | | | | | | | | | | | |
| | Resistance value | ΔR/R | | | | | | | | | | | | | | | |
| | Normal type | ±1.5% | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

Dimension:



| Power Rating | D (Max.) | L (Max.) | d ±0.05 | H ±3 |
|--------------|----------|----------|---------|------|
| 0.6W-S | 2.5mm | 6.8mm | 0.54mm | 28mm |

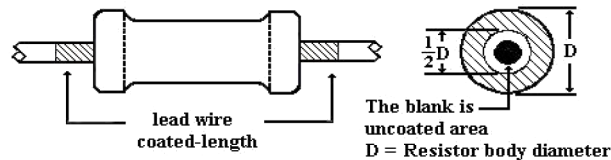
Metal Film Fixed Resistors

0.6W, 200 PPM



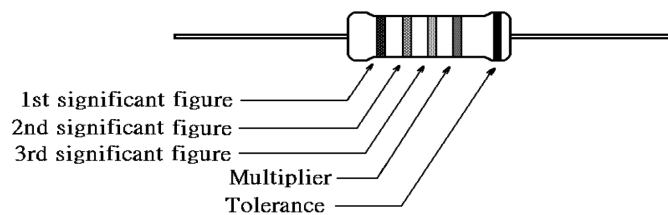
Painting Method:

Welding point, terminal and lead wire, is permissible to be exposed without the outer coated cover. The extent should be within 1/2 of the arc angle.



Marking :

Resistors shall be marked with color coding colors shall be in accordance with JIS C 0802



Part Number Table

| Description | Part Number |
|-------------------------------------|------------------|
| Resistor, Metal Film, 1R, 0.6W, 1% | MCMF006FJ100KA50 |
| Resistor, Metal Film, 1R5, 0.6W, 1% | MCMF006FJ150KA50 |
| Resistor, Metal Film, 2R2, 0.6W, 1% | MCMF006FJ220KA50 |
| Resistor, Metal Film, 2R7, 0.6W, 1% | MCMF006FJ270KA50 |
| Resistor, Metal Film, 3R3, 0.6W, 1% | MCMF006FJ330KA50 |
| Resistor, Metal Film, 4R7, 0.6W, 1% | MCMF006FJ470KA50 |

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