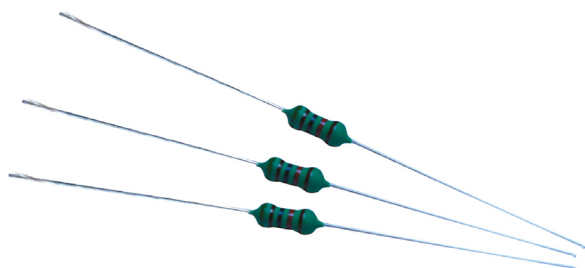


Metal Film Fixed Resistors

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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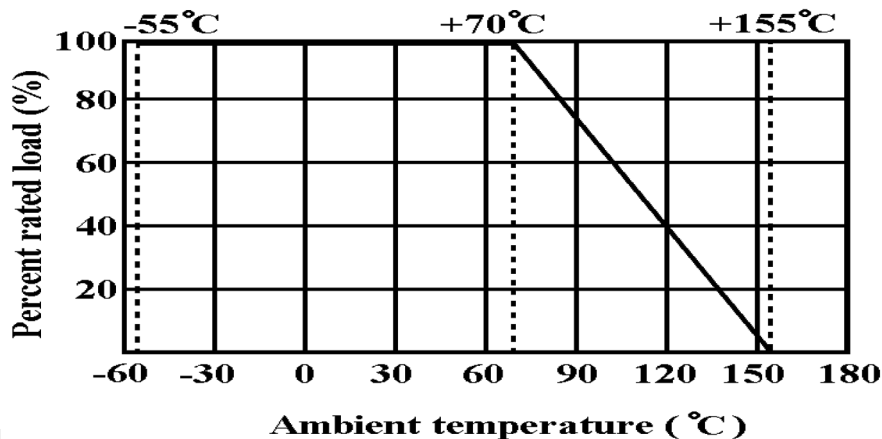
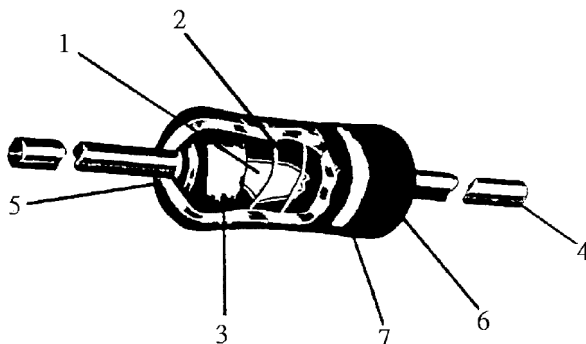


Figure. 1

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

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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

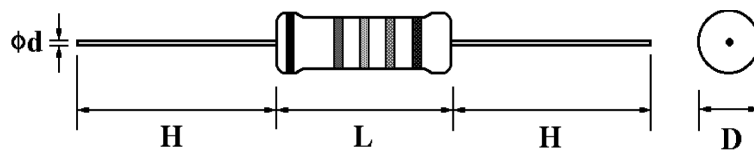
0.6W, 200 PPM



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													
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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

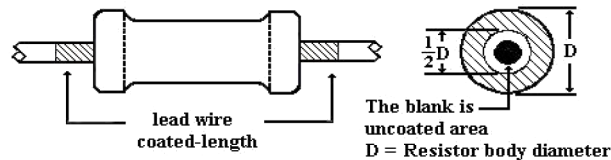
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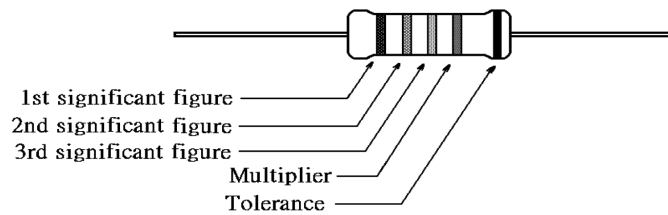
Painting Method:

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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