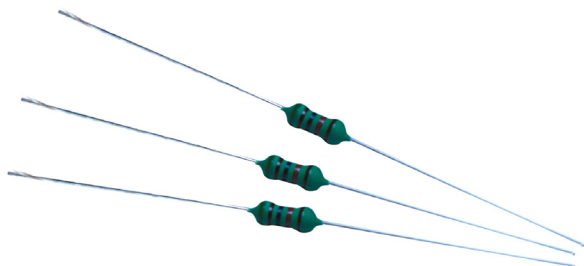


Metal Film Fixed Resistors

0.6W, 50 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	10Ω to 1MΩ

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:

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

Where : 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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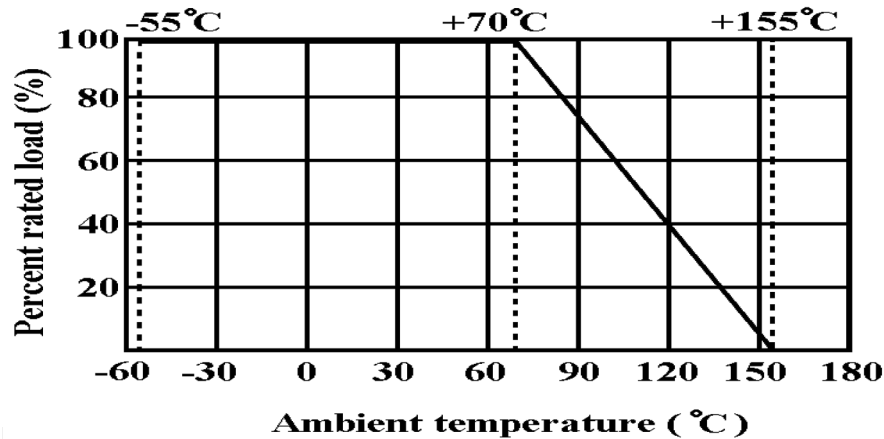
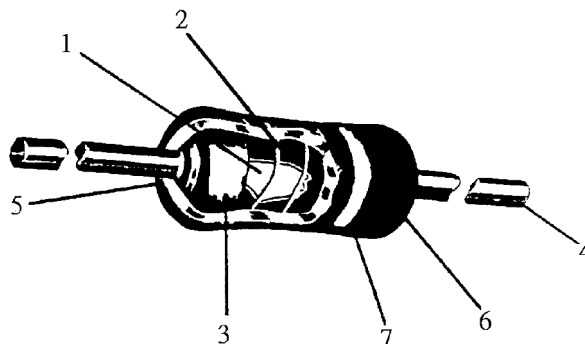


Figure. 1

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	Colour 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	$\pm 50 \text{ PPM}/^{\circ}\text{C}$	<p>Natural resistance change per temp. degree centigrade</p> $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM}/^{\circ}\text{C)}$ <p>R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100°C (t2)</p>
Short time overload	Resistance change rate is $\pm (0.5\% + 0.05\Omega)$ 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 $\pm (1\% + 0.05\Omega)$ 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	<p>Direct load : Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads</p> <p>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</p>
Resistance to soldering heat	Resistance change rate is $\pm (1\% + 0.05\Omega)$ 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 $\pm 10^{\circ}\text{C}$ solder for 3 ± 0.5 seconds

Metal Film Fixed Resistors

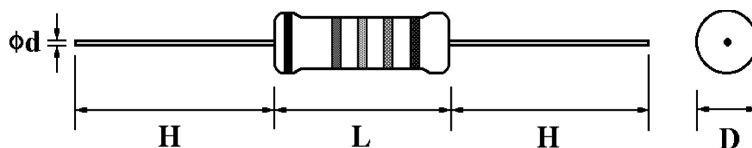
0.6W, 50 PPM



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:		
			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			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			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

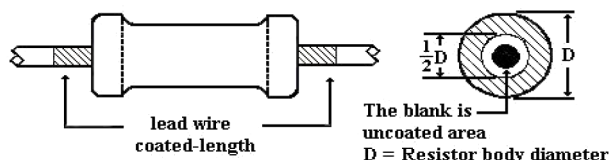
Metal Film Fixed Resistors

0.6W, 50 PPM



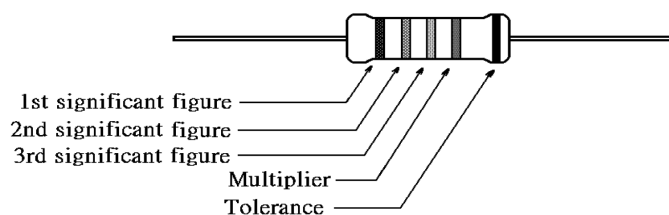
Painting Method:

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, 6R8, 0.6W, 1%	MCMF006FJ680KA50
Resistor, Metal Film, 10R, 0.6W, 1%	MCMF006FF100JA50
Resistor, Metal Film, 11R, 0.6W, 1%	MCMF006FF110JA50
Resistor, Metal Film, 12R, 0.6W, 1%	MCMF006FF120JA50
Resistor, Metal Film, 13R, 0.6W, 1%	MCMF006FF130JA50
Resistor, Metal Film, 15R, 0.6W, 1%	MCMF006FF150JA50
Resistor, Metal Film, 16R, 0.6W, 1%	MCMF006FF160JA50
Resistor, Metal Film, 18R, 0.6W, 1%	MCMF006FF180JA50
Resistor, Metal Film, 20R, 0.6W, 1%	MCMF006FF200JA50
Resistor, Metal Film, 22R, 0.6W, 1%	MCMF006FF220JA50
Resistor, Metal Film, 24R, 0.6W, 1%	MCMF006FF240JA50
Resistor, Metal Film, 27R, 0.6W, 1%	MCMF006FF270JA50
Resistor, Metal Film, 30R, 0.6W, 1%	MCMF006FF300JA50

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Part Number Table

Description	Part Number
Resistor, Metal Film, 33R, 0.6W, 1%	MCMF006FF330JA50
Resistor, Metal Film, 36R, 0.6W, 1%	MCMF006FF360JA50
Resistor, Metal Film, 39R, 0.6W, 1%	MCMF006FF390JA50
Resistor, Metal Film, 43R, 0.6W, 1%	MCMF006FF430JA50
Resistor, Metal Film, 47R, 0.6W, 1%	MCMF006FF470JA50
Resistor, Metal Film, 51R, 0.6W, 1%	MCMF006FF510JA50
Resistor, Metal Film, 56R, 0.6W, 1%	MCMF006FF560JA50
Resistor, Metal Film, 62R, 0.6W, 1%	MCMF006FF620JA50
Resistor, Metal Film, 68R, 0.6W, 1%	MCMF006FF680JA50
Resistor, Metal Film, 75R, 0.6W, 1%	MCMF006FF750JA50
Resistor, Metal Film, 82R, 0.6W, 1%	MCMF006FF820JA50
Resistor, Metal Film, 91R, 0.6W, 1%	MCMF006FF910JA50
Resistor, Metal Film, 100R, 0.6W, 1%	MCMF006FF1000A50
Resistor, Metal Film, 110R, 0.6W, 1%	MCMF006FF1100A50
Resistor, Metal Film, 120R, 0.6W, 1%	MCMF006FF1200A50
Resistor, Metal Film, 130R, 0.6W, 1%	MCMF006FF1300A50
Resistor, Metal Film, 150R, 0.6W, 1%	MCMF006FF1500A50
Resistor, Metal Film, 160R, 0.6W, 1%	MCMF006FF1600A50
Resistor, Metal Film, 180R, 0.6W, 1%	MCMF006FF1800A50
Resistor, Metal Film, 200R, 0.6W, 1%	MCMF006FF2000A50
Resistor, Metal Film, 220R, 0.6W, 1%	MCMF006FF2200A50
Resistor, Metal Film, 240R, 0.6W, 1%	MCMF006FF2400A50
Resistor, Metal Film, 270R, 0.6W, 1%	MCMF006FF2700A50
Resistor, Metal Film, 300R, 0.6W, 1%	MCMF006FF3000A50
Resistor, Metal Film, 330R, 0.6W, 1%	MCMF006FF3300A50
Resistor, Metal Film, 360R, 0.6W, 1%	MCMF006FF3600A50
Resistor, Metal Film, 390R, 0.6W, 1%	MCMF006FF3900A50
Resistor, Metal Film, 430R, 0.6W, 1%	MCMF006FF4300A50
Resistor, Metal Film, 470R, 0.6W, 1%	MCMF006FF4700A50
Resistor, Metal Film, 510R, 0.6W, 1%	MCMF006FF5100A50
Resistor, Metal Film, 560R, 0.6W, 1%	MCMF006FF5600A50
Resistor, Metal Film, 621R, 0.6W, 1%	MCMF006FF6200A50
Resistor, Metal Film, 680R, 0.6W, 1%	MCMF006FF6800A50
Resistor, Metal Film, 750R, 0.6W, 1%	MCMF006FF7500A50
Resistor, Metal Film, 820R, 0.6W, 1%	MCMF006FF8200A50
Resistor, Metal Film, 910R, 0.6W, 1%	MCMF006FF9100A50
Resistor, Metal Film, 1k, 0.6W, 1%	MCMF006FF1001A50
Resistor, Metal Film, 1k1, 0.6W, 1%	MCMF006FF1101A50

Metal Film Fixed Resistors

0.6W, 50 PPM



Part Number Table

Description	Part Number
Resistor, Metal Film, 1k2, 0.6W, 1%	MCMF006FF1201A50
Resistor, Metal Film, 1k3, 0.6W, 1%	MCMF006FF1301A50
Resistor, Metal Film, 1k5, 0.6W, 1%	MCMF006FF1501A50
Resistor, Metal Film, 1k6, 0.6W, 1%	MCMF006FF1601A50
Resistor, Metal Film, 1k8, 0.6W, 1%	MCMF006FF1801A50
Resistor, Metal Film, 2k, 0.6W, 1%	MCMF006FF2001A50
Resistor, Metal Film, 2k2, 0.6W, 1%	MCMF006FF2201A50
Resistor, Metal Film, 2k4, 0.6W, 1%	MCMF006FF2401A50
Resistor, Metal Film, 2k7, 0.6W, 1%	MCMF006FF2701A50
Resistor, Metal Film, 3k, 0.6W, 1%	MCMF006FF3001A50
Resistor, Metal Film, 3k3, 0.6W, 1%	MCMF006FF3301A50
Resistor, Metal Film, 3k6, 0.6W, 1%	MCMF006FF3601A50
Resistor, Metal Film, 3k9, 0.6W, 1%	MCMF006FF3901A50
Resistor, Metal Film, 4k3, 0.6W, 1%	MCMF006FF4301A50
Resistor, Metal Film, 4k7, 0.6W, 1%	MCMF006FF4701A50
Resistor, Metal Film, 5k1, 0.6W, 1%	MCMF006FF5101A50
Resistor, Metal Film, 5k6, 0.6W, 1%	MCMF006FF5601A50
Resistor, Metal Film, 6k2, 0.6W, 1%	MCMF006FF6201A50
Resistor, Metal Film, 6k8, 0.6W, 1%	MCMF006FF6801A50
Resistor, Metal Film, 7k5, 0.6W, 1%	MCMF006FF7501A50
Resistor, Metal Film, 8k2, 0.6W, 1%	MCMF006FF8201A50
Resistor, Metal Film, 9k1, 0.6W, 1%	MCMF006FF9101A50
Resistor, Metal Film, 10k, 0.6W, 1%	MCMF006FF1002A50
Resistor, Metal Film, 11k, 0.6W, 1%	MCMF006FF1102A50
Resistor, Metal Film, 12k, 0.6W, 1%	MCMF006FF1202A50
Resistor, Metal Film, 13k, 0.6W, 1%	MCMF006FF1302A50
Resistor, Metal Film, 15k, 0.6W, 1%	MCMF006FF1502A50
Resistor, Metal Film, 16K, 0.6W, 1%	MCMF006FF1602A50
Resistor, Metal Film, 18k, 0.6W, 1%	MCMF006FF1802A50
Resistor, Metal Film, 20k, 0.6W, 1%	MCMF006FF2002A50
Resistor, Metal Film, 22k, 0.6W, 1%	MCMF006FF2202A50
Resistor, Metal Film, 24k, 0.6W, 1%	MCMF006FF2402A50
Resistor, Metal Film, 27k, 0.6W, 1%	MCMF006FF2702A50
Resistor, Metal Film, 30k, 0.6W, 1%	MCMF006FF3002A50
Resistor, Metal Film, 33k, 0.6W, 1%	MCMF006FF3302A50
Resistor, Metal Film, 36k, 0.6W, 1%	MCMF006FF3602A50
Resistor, Metal Film, 39k, 0.6W, 1%	MCMF006FF3902A50

Metal Film Fixed Resistors

0.6W, 50 PPM



Part Number Table

Description	Part Number
Resistor, Metal Film, 43k, 0.6W, 1%	MCMF006FF4302A50
Resistor, Metal Film, 47k, 0.6W, 1%	MCMF006FF4702A50
Resistor, Metal Film, 51k, 0.6W, 1%	MCMF006FF5102A50
Resistor, Metal Film, 56k, 0.6W, 1%	MCMF006FF5602A50
Resistor, Metal Film, 62k, 0.6W, 1%	MCMF006FF6202A50
Resistor, Metal Film, 68k, 0.6W, 1%	MCMF006FF6802A50
Resistor, Metal Film, 75k, 0.6W, 1%	MCMF006FF7502A50
Resistor, Metal Film, 82k, 0.6W, 1%	MCMF006FF8202A50
Resistor, Metal Film, 91k, 0.6W, 1%	MCMF006FF9102A50
Resistor, Metal Film, 100k, 0.6W, 1%	MCMF006FF1003A50
Resistor, Metal Film, 110k, 0.6W, 1%	MCMF006FF1103A50
Resistor, Metal Film, 120k, 0.6W, 1%	MCMF006FF1203A50
Resistor, Metal Film, 130k, 0.6W, 1%	MCMF006FF1303A50
Resistor, Metal Film, 150k, 0.6W, 1%	MCMF006FF1503A50
Resistor, Metal Film, 160k, 0.6W, 1%	MCMF006FF1603A50
Resistor, Metal Film, 180k, 0.6W, 1%	MCMF006FF1803A50
Resistor, Metal Film, 200k, 0.6W, 1%	MCMF006FF2003A50
Resistor, Metal Film, 220k, 0.6W, 1%	MCMF006FF2203A50
Resistor, Metal Film, 240k, 0.6W, 1%	MCMF006FF2403A50
Resistor, Metal Film, 270k, 0.6W, 1%	MCMF006FF2703A50
Resistor, Metal Film, 300k, 0.6W, 1%	MCMF006FF3003A50
Resistor, Metal Film, 330k, 0.6W, 1%	MCMF006FF3303A50
Resistor, Metal Film, 360k, 0.6W, 1%	MCMF006FF3603A50
Resistor, Metal Film, 390k, 0.6W, 1%	MCMF006FF3903A50
Resistor, Metal Film, 430k, 0.6W, 1%	MCMF006FF4303A50
Resistor, Metal Film, 470k, 0.6W, 1%	MCMF006FF4703A50
Resistor, Metal Film, 510k, 0.6W, 1%	MCMF006FF5103A50
Resistor, Metal Film, 560k, 0.6W, 1%	MCMF006FF5603A50
Resistor, Metal Film, 620k, 0.6W, 1%	MCMF006FF6203A50
Resistor, Metal Film, 680k, 0.6W, 1%	MCMF006FF6803A50
Resistor, Metal Film, 750k, 0.6W, 1%	MCMF006FF7503A50
Resistor, Metal Film, 820k, 0.6W, 1%	MCMF006FF8203A50
Resistor, Metal Film, 910k, 0.6W, 1%	MCMF006FF9103A50
Resistor, Metal Film, 1M, 0.6W, 1%	MCMF006FF1004A50
Resistor, Metal Film, 10M, 0.6W, 1%	MCMF006FF1005A50