

MCF Series

+/-5% Carbon Film Resistors



1. Type Designation

The type designation shall be in the following form :

Type	Power Rating (W)	Resistance Tolerance	Nominal Resistance
MCF 0.125	0.125	±5%	1KΩ
MCF 0.25	0.25		
MCF 0.5	0.5		
MCF 1.0	1.0		1Ω
MCF 2.0	2.0		

2. Ratings

Type	MCF 0.125	MCF 0.25	MCF 0.5	MCF 1.0	MCF 2.0
Power Rating (W) @ 70°C	0.125	0.25	0.5	1.0	2.0
Maximum Working Voltage (V)	200	250	350	500	500
Maximum Overload Voltage (V)	400	500	700	1000	1000
Dielectric Withstanding Voltage (V)				700	
Resistance Range	1Ω to 1MΩ	1Ω to 10MΩ	1Ω to 10MΩ	1Ω to 10MΩ	1Ω to 10MΩ
Temperature Range	-55°C to +155°C				
Ambient Temperature	70°C				
Temperature Coefficient	0 to -700ppm/°C				

2.1 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.

2.2 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).



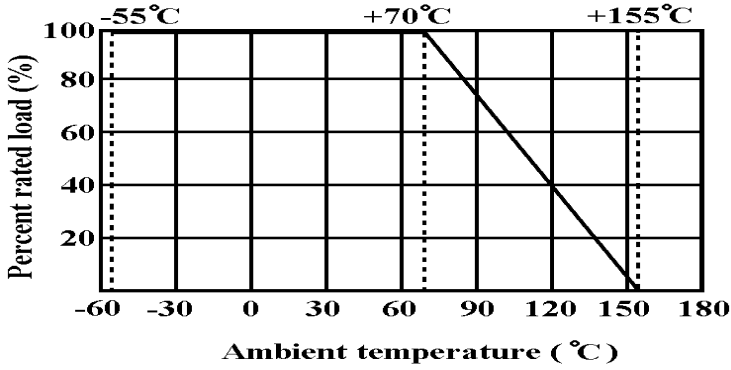
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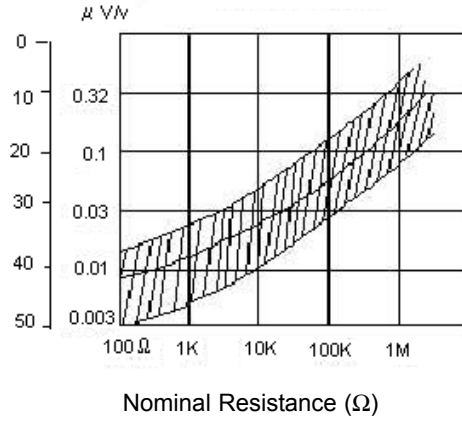


In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.

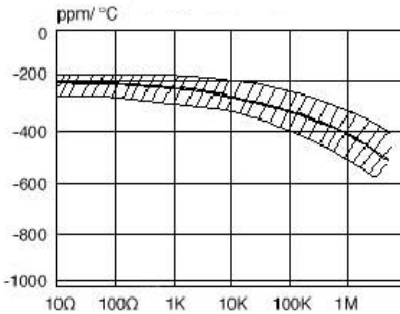
Figure 1



Current Noise



Temperature Coefficient

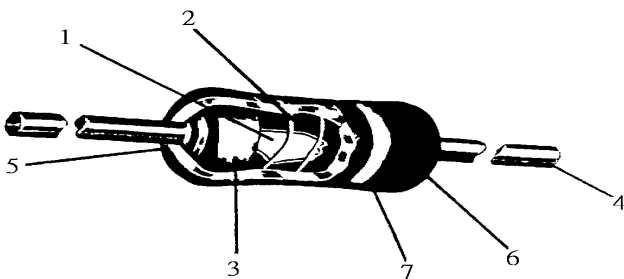


Nominal Resistance (Ω)

2.3 Nominal Resistance

Effective figures of nominal resistance shall be in accordance with E-24 series, and resistance tolerance shall be shown by table 1.

3. Construction



No.	Name	Material
1	Basic Body	Rod Type Ceramics
2	Resistance Film	Carbon Film
3	End Cap	Steel (Tin plated iron surface)
4	Lead Wire	Annealed copper wire (Electrosolder plated surface)
5	Joint	By welding
6	Coating	Insulated resin (Colour : Beige)
7	Colour Code	Epoxy Resin



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4. Characteristics

Characteristics	Limits		Test Methods
DC Resistance	Must be within the specified tolerance		The limit of error of measuring apparatus shall not exceed allowable range or 10% of resistance tolerance
Temperature coefficient	Resistance Range	T.C.R. (PPM/°C)	Natural resistance change per temperature degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/°C)}$ R ₁ : Resistance value at room temperature (t ₁) R ₂ : Resistance value at room temperature plus 100°C (t ₂)
	≤10Ω	0 to ±350	
	1Ω to 99K	0 to -450	
	100K to 1M	0 to -700	
	1.1M to 10M	0 to -1500	
Short time overload	Resistance change rate is ±(1% +0.05Ω) Maximum with no evidence of mechanical damage		Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds
Insulation Resistance	Insulation resistance is 10,000MΩ Minimum		Resistors shall be clamped in the trough of a 90° metallic V-block and shall be tested at DC potential respectively specified in the above list for 60 +10/-0 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 table1 for 60 +10/-0 seconds
Terminal strength	No evidence of mechanical damage		Direct load : Resistance to a 2.5kgs direct load for 10 seconds 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) Maximum 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
Solderability	95% coverage Minimum		The area covered with a new, smooth clean, shiny and continuous surface free from concentrated pinholes. Test temperature of solder : 235°C ±5°C Dwell time in solder : 3 +0.5/-0 seconds

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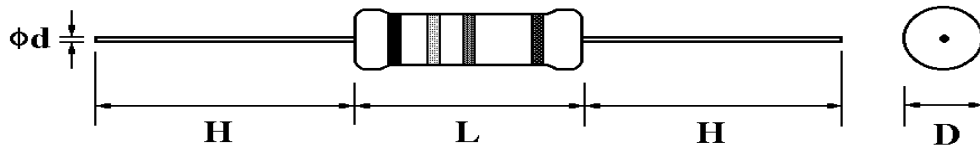
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4. Characteristics

Characteristics	Limits		Test Methods		
Temperature cycling	Resistance change rate is $\pm(1\% + 0.05\Omega)$ Maximum with no evidence of mechanical damage		Resistance change after continuous 5 cycles for duty shown below:		
			Step	Temperature	Time
			1	-55°C $\pm 3^\circ\text{C}$	30 minutes
			2	Room temperature	10 to 15 minutes
			3	+155°C $\pm 2^\circ\text{C}$	30 minutes
4	Room temperature	10 to 15 minutes			
Load life in humidity	Resistance value		Resistance change after 1000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") in a humidity test chamber controlled at 40°C $\pm 2^\circ\text{C}$ and 90 to 95% relative humidity		
	Normal Type	Less than 100K Ω			$\pm 3\%$
		100K Ω or more			$\pm 5\%$
Load life	Resistance value		Permanent resistance change after 1000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") at 70°C $\pm 2^\circ\text{C}$ ambient		
	Normal Type	Less than 56K Ω			$\pm 2\%$
		56K Ω or more			$\pm 3\%$

5. Dimension

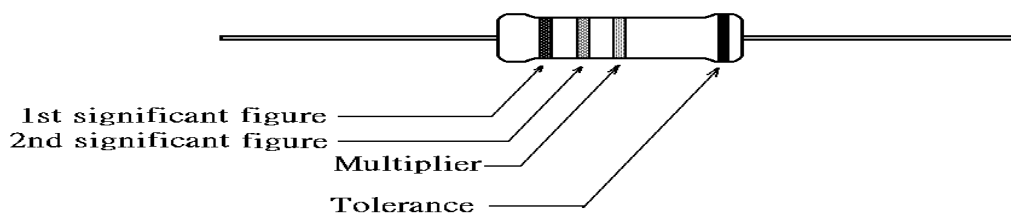


Type	Wattage (W)	D (Maximum)	L (Maximum)	d $\begin{matrix} +0.02 \\ -0.05 \end{matrix}$	H ± 3
MCF 0.125	0.125	1.8	3.5	0.45	28
MCF 0.25	0.25	2.5	6.8	0.6	
MCF 0.5	0.5	3.0	9.0	7.0	
MCF 1.0	1.0	5.0	12.0	0.8	
MCF 2.0	2.0	5.5	16.0		

Dimensions : Millimetres

6. Marking

6.1 Resistor : Resistors shall be marked with colour coding colours shall be in accordance with JIS C 0802

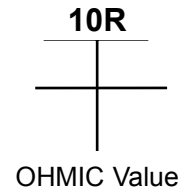
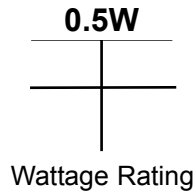
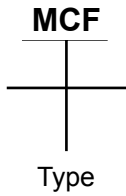


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Part Number Explanation :



Wattage Rating : 0.125, 0.25, 0.5, 1.0 and 2.0W.

OHMIC Value : Where R = Ohms = Ω
 K = Kiloohms = $K\Omega$
 M = Megahohms = $M\Omega$
 And replaces the decimal point.
 eg: 1R5 = 1.5 Ω
 4K7 = 4.7 $K\Omega$
 6M8 = 6.8 $M\Omega$

*Also available in 0.25 Watt - MCF 0.25 Series - 0.01 Ω Maximum resistance

Part number MCF 0.25W 0R

L = 6.8mm maximum

Diameter = 2.5mm maximum

Lead length = 28.0mm

Lead diameter = 0.6mm

Supplied bandoliered on tape (box = 5K pcs)

Power rating at 70°C : 0.25W

Maximum resistance : 0.01 Ω

Dielectric strength : 500Vrms

Insulation resistance - Dry : 10,000 $M\Omega$

- Wet : 100 $M\Omega$

Current rating : 25A at 25°C derating

: 0A at 150°C

Stocked Values

Tolerance	Wattage (W)	Range Value	E-Value
5%	0.125	1R - 1M	E12
5%	0.25	1R - 10M	E24
5%	0.5	1R - 10M	E24
5%	1.0	1R - 1M	E12
5%	2.0	10R - 1M	E6



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Resistance Preferred Value Range

E6	E12	E24	E96	E6	E12	E24	E96	E6	E12	E24	E96
10	10	10	10.0				21.5				46.4
			10.2	22	22	22	22.1	47	47	47	47.5
			10.5				22.6				48.7
			10.7				23.2				49.9
		11	11.0				23.7			51	51.1
			11.3			24	24.3				52.3
			11.5				24.9				53.6
			11.8				25.5				54.9
	12	12	12.1				26.1		56	56	56.2
			12.4				27.7				57.6
			12.7		27	27	27.4				59.0
		13	13.0				28.0				60.4
			13.3				28.7			62	61.9
			13.7				29.4				63.4
			14.0			30	30.1				64.9
			14.3				30.9				66.5
			14.7				31.6	68	68	68	68.1
	15	15	15.0				32.4				69.8
			15.4	33	33	33	33.2				71.5
			15.8				34.0				73.2
		16	16.2				34.8			75	75.0
			16.5				35.7				76.8
			16.9			36	36.5				78.7
			17.4				37.4				80.6
			17.8				38.3		82	82	82.5
	18	18	18.2		39	39	39.2				84.5
			18.7				40.2				86.6
			19.1				41.2				88.7
			19.6				42.2			91	90.9
		20	20.0			43	43.2				93.1
			20.5				44.2				95.3
			21.0				45.3				97.6

Above values in accordance with IEC Publication 63 (1963) and BS2488



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Notes:

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