

Carbon Film Fixed Resistor



**RoHS
Compliant**

General Specifications:

Ratings

Rated Power at 70°C	: 1W
Max. Working Voltage	: 500V
Max. Overload Voltage	: 1,000V
Dielectric Withstanding Voltage	: 1,000V
Rated Ambient Temperature	: 70°C
Operating Temp. Range	: -55°C to +155°C
Resistance Tolerance	: ±5%
Resistance Range	: 1Ω to 10MΩ



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 below figure.

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:

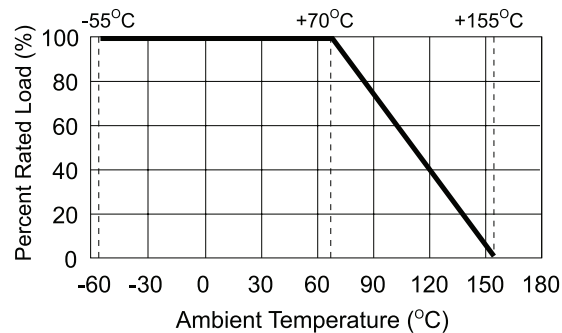
$$RCWV = \sqrt{P \times R}$$

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)

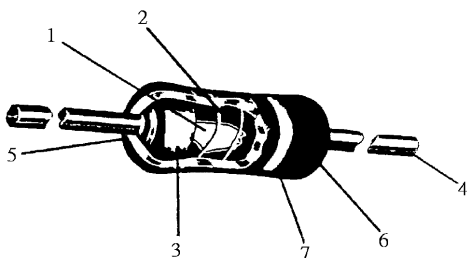
In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.



Nominal resistance:

Nominal resistance shall be in accordance with E-24 series.

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 coated with tin
5	Joint	By welding
6	Coating	Insulated resin (Colour : Beige)
7	Colour Code	Epoxy Resin



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Characteristics

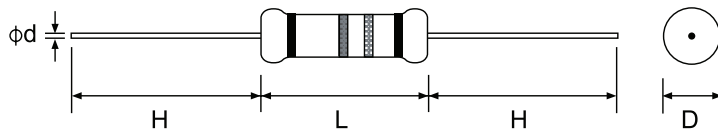
Characteristics	Limits	Test Methods (JIS C 5201-1)	
DC resistance	Must be within the specified tolerance	The limit of error of measuring apparatus shall not exceed allowable range or 5% of resistance tolerance	
Insulation resistance	Insulation resistance is 10,000MΩ Min.	Resistors shall be clamped in the trough of a 90° metallic V-block or foil method use a metal foil shall be wrapped closely around the body of the resistor. After that shall be tested at DC potential respectively specified in the above list for 60 +10/-0 secs.	
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 or foil method use a metal foil shall be wrapped closely around the body of the resistor. After that shall be tested at AC potential respectively specified in the ratings specification, for 60 +10/-0 secs.	
Temperature coefficient	Resistance Range	Natural resistance change per temperature degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/}^\circ\text{C)}$ R1: Resistance value at room temperature (t1) R2: Resistance value at room temperature plus 100°C (t2)	
	≤10Ω		0 to ±350
	11Ω to 99kΩ		0 to -450
	100kΩ to 1MΩ		0 to -700
	1.1MΩ to 10MΩ	0 to -1500	
Short time overload	Resistance change rate is ±(1% + 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	
Terminal strength	No evidence of mechanical damage	Direct load: Resistance to a 2.5 kgs 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	
Solderability	95% coverage minimum	The area covered with a new, smooth clean, shiny and continuous surface free from concentrated pinholes. Test temperature of solder : 245°C ±3°C Dwell time in solder : 2 to 3 seconds	
Soldering temperature reference	Electrical characteristics shall be satisfied. Without distinct deformation in appearance. (95 % coverage Min.)	The leads immersed into solder bath to 3.2 to 4.8mm from the body. Permanent resistance change shall be checked. Wave soldering condition: (2 cycles Max.) Pre-heat : 100 ~ 120°C, 30 ± 5 sec. Suggestion solder temp. : 235 ~ 255°C, 10 sec. (Max.) Peak temp. : 260°C Hand soldering condition: Hand Soldering bit temp. : 380 ±10°C Dwell time in solder : 3 +1/-0 sec.	
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 255°C ±5°C solder for 5 +1/-0 seconds (Preheat 120°C 60s)	



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Characteristics	Limits	Test Methods (JIS C 5201-1)															
Temperature cycling	Resistance change rate is $\pm(1\% + 0.05\Omega)$ max. with no evidence of mechanical damage	Resistance change after continuous 5 cycles for duty shown below: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C $\pm 3^\circ\text{C}$</td> <td>30 minutes</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>10 to 15 minutes</td> </tr> <tr> <td>3</td> <td>+155°C $\pm 2^\circ\text{C}$</td> <td>30 minutes</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>10 to 15 minutes</td> </tr> </tbody> </table>	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
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Vibration	Resistance change rate is $\pm(1\% + 0.05\Omega)$ Max.	55Hz, 3 planes 2hrs each Total amplitude = 1.5mm															
Load life in humidity	<table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Resistance value</th> <th>$\Delta R/R$</th> </tr> </thead> <tbody> <tr> <td>Normal Type <100kΩ</td> <td>$\pm 3\%$</td> </tr> <tr> <td>$\geq 100\text{k}\Omega$</td> <td>$\pm 5\%$</td> </tr> </tbody> </table>	Resistance value	$\Delta R/R$	Normal Type <100k Ω	$\pm 3\%$	$\geq 100\text{k}\Omega$	$\pm 5\%$	Resistance change after 1,000 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									
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Resistance to solvent	No deterioration of protective coatings and markings	Specimens shall be immersed in a bath of trichroethane completely for 3 minutes with ultrasonic															
RCWV = Rated continuous working Voltage = $\sqrt{\text{Rated Power} \times \text{Resistance Value}}$																	

Dimension



Part Number	Power Rating at 70°C	Dimension (mm)			
		D Max.	L Max.	H ± 3	d ± 0.05
MCCFR0SJ0xxxA10 Series	1W	5	12	25	0.7

Part Number Table

Description	Resistance	Part Number	Description	Resistance	Part Number
Carbon Film Fixed Resistor	4.7 Ω	MCCFR01SJ047JA10	Carbon Film Fixed Resistor	47 Ω	MCCFR01SJ0470A10
	10 Ω	MCCFR01SJ0100A10		51 Ω	MCCFR01SJ0510A10
	15 Ω	MCCFR01SJ0150A10		68 Ω	MCCFR01SJ0680A10
	22 Ω	MCCFR01SJ0220A10		100 Ω	MCCFR01SJ0101A10
	33 Ω	MCCFR01SJ0330A10		110 Ω	MCCFR01SJ0111A10

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Description	Resistance	Part Number	Description	Resistance	Part Number
Carbon Film Fixed Resistor	150Ω	MCCFR01SJ0151A10	Carbon Film Fixed Resistor	10kΩ	MCCFR01SJ0103A10
	180Ω	MCCFR01SJ0181A10		12kΩ	MCCFR01SJ0123A10
	200Ω	MCCFR01SJ0201A10		15kΩ	MCCFR01SJ0153A10
	220Ω	MCCFR01SJ0221A10		18kΩ	MCCFR01SJ0183A10
	330Ω	MCCFR01SJ0331A10		20kΩ	MCCFR01SJ0203A10
	390Ω	MCCFR01SJ0391A10		22kΩ	MCCFR01SJ0223A10
	470Ω	MCCFR01SJ0471A10		33kΩ	MCCFR01SJ0333A10
	680Ω	MCCFR01SJ0681A10		47kΩ	MCCFR01SJ0473A10
	1kΩ	MCCFR01SJ0102A10		68kΩ	MCCFR01SJ0683A10
	1.2kΩ	MCCFR01SJ0122A10		100kΩ	MCCFR01SJ0104A10
	1.5kΩ	MCCFR01SJ0152A10		120kΩ	MCCFR01SJ0124A10
	1.8kΩ	MCCFR01SJ0182A10		150kΩ	MCCFR01SJ0154A10
	2kΩ	MCCFR01SJ0202A10		180kΩ	MCCFR01SJ0184A10
	2.2kΩ	MCCFR01SJ0222A10		220kΩ	MCCFR01SJ0224A10
	3.2kΩ	MCCFR01SJ0332A10		330kΩ	MCCFR01SJ0334A10
	4.7kΩ	MCCFR01SJ0472A10		470kΩ	MCCFR01SJ0474A10
6.8kΩ	MCCFR01SJ0682A10	680kΩ	MCCFR01SJ0684A10		
8.2kΩ	MCCFR01SJ0822A10	1MΩ	MCCFR01SJ0105A10		

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