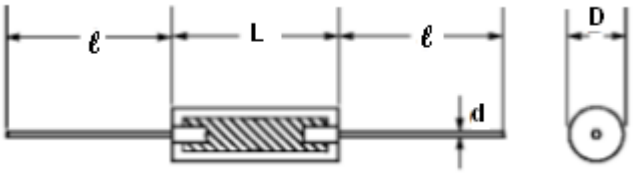
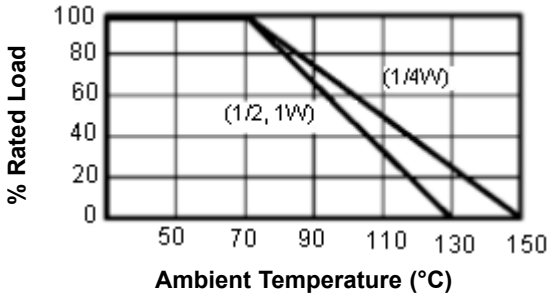
Carbon Composition Resistor

Dimensions



Derating Curve



Ratings and Dimensions

Rated Power (W)	Dimensions in mm				Maximum Rated Voltage (v)	Maximum Overload Voltage (v)	Resistance Range (Ω)	Resistance Tolerance (%)
	L	D	ℓ	d				
0.25	6.3 ±0.7	2.4 ±0.1	30 ±3	± 0.06 0.02	250	400	2.2 Ω 22 MΩ	±5/ ±10
0.5	9.5 +0.8 -0.7	3.6 ±0.2	25 ±1	± 0.7 0.02	350	700	2.2 Ω 22 MΩ	±5/ ±10
1	14.3 ±0.07	5.7 ±0.3	30 ±3	± 0.92 0.02	500	1,000	2.2 Ω 22 MΩ	±10

Dimensions : Millimetres

1 Watt

DC Resistance

DC resistance value must be within the specified tolerance

DC resistance value measured at the test voltage specified below:

Nominal Resistance	DC test voltage
99 Ω and lower	0.5 V to 1 V
10 Ω to 999 Ω	2.5 V to 3 V
1,000 Ω to 9,999 Ω	8 V to 10 V
10,000 Ω to 99,999 Ω	24 V to 30 V
100,000 Ω and higher	80 V to 100 V

Resistance Temperature Characteristics

Nominal Resistance	Test Temperature at -55°C	Test Temperature at 100°C
1 KΩ and under	6.5 to -3%	5 to 4%
1.1 KΩ to 10 KΩ	10 to -3%	6 to 5%
11 KΩ to 100 KΩ	13 to -3%	7.5 to 6%
110 KΩ to 1 MΩ	15 to -3%	10 to 7%
1.1 MΩ to 10 MΩ	20 to -3%	10 to 7%
11 MΩ and over	25 to -3%	10 to 7%

$$\frac{R2 - R1}{R1} \times 100\ (\%)$$

R1: Resistance value at reference temperature
R2 : Resistance value at test temperature

Sequence of temperature : -25°C, -15°C, -55°C, 25°C, 60°C,100°C

Voltage Coefficient (Application for 1 KΩ minimum)

A total resistance change of 2% maximum or chart below

Rated Power	Coefficient Voltage
1 Watt	-0.02 % / V

Instantaneous change in resistance per volt based on:

$$\frac{R - r}{r} \times \frac{100}{0.9 \times RCWV}\ (\%/V)$$

Carbon Composition Resistor

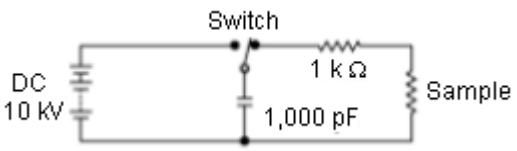
1 Watt

<table>
<tr><td>Dielectric Withstanding Voltage</td><td>No evidence of flashover, mechanical damage, arcing or insulation breakdown</td><td>Resistors shall be clamped in the trough of a 90° metallic V-block and shall be tested at AC potential respectively specified in the above list for 5 s</td></tr>
<tr><td>Insulation Resistance</td><td>10,000 MΩ Minimum</td><td>Resistors shall be clamped in the trough of a 90° metallic V-block and shall be measured at DC 100 V for 1/4 W and DC 500 V for 1/2 W and 1 W</td></tr>
<tr><td>Temperature Cycling</td><td>±4% Maximum with no evidence of mechanical damage</td><td>Resistance change after continuous five cycles for duty cycle specified below
<table>
<tr><th>Step</th><th>Temperature</th><th>Time (minute)</th></tr>
<tr><td>1</td><td>-55°C</td><td>30</td></tr>
<tr><td>2</td><td>25°C</td><td>10 to 15</td></tr>
<tr><td>2</td><td>85°C</td><td>30</td></tr>
<tr><td>4</td><td>25°C</td><td>10 to 15</td></tr>
</table></td></tr>
<tr><td>Humidity (Steady State)</td><td>±10% Maximum with no evidence of arcing, burning, or charring</td><td>Permanent resistance change after the application of a potential of 2.5 times RCWV, or the maximum overload voltage respectively specified in the above list, whichever is less for 5 s</td></tr>
<tr><td>Short Time Overload</td><td>± (2.5% + 0.05Q) Maximum with no evidence of arcing, burning, or charring</td><td>Permanent resistance change after the application of a potential of 2.5 time RCWV, or the maximum overload voltage respectively specified in the above list, whichever is less for 5 s</td></tr>
<tr><td>Load Life in Humidity</td><td>±20% Maximum with no evidence of mechanical damage</td><td>500 hours exposure in a humidity test chamber controlled at 40° ±2°C and 90 to 95 relative humidity</td></tr>
<tr><td>Load Life</td><td>Resistance Change
<table>
<tr><td>Average</td><td>±6%</td></tr>
<tr><td>Maximum</td><td>±10%</td></tr>
</table></td><td>Permanent resistance change after 1,000 hours operating at RCWV, or maximum RCWV, whichever is less with a duty cycle of 1.5 hours "ON", 0.5 hour "OFF" at 70° ±2°C ambient</td></tr>
<tr><td>Terminal Strength</td><td>± (1% + 0.05Ω) Maximum with no evidence of mechanical damage</td><td>Direct load:
Resistance to a 2.5 kgf (25N) direct load for 5 seconds in the direction of the longitudinal axis of the terminal leads

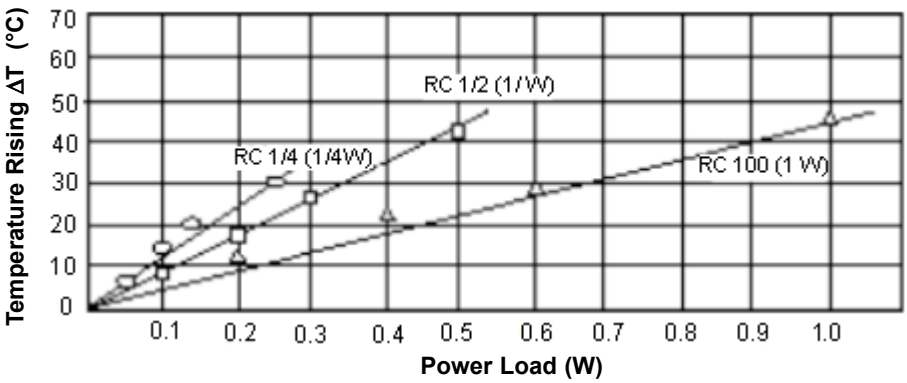
Twist test:
Terminal leads shall be bent through 90° at a point of 6.35 mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations</td></tr>
</table>

Carbon Composition Resistor

1 Watt

Resistance to Soldering Heat	± (3% + 0.05 Ω) Maximum with no evidence of mechanical damage	Permanent resistance change when leads immersed 4 ±0.8 mm from the body in 350° ±10°C, solder for 3 ±0.5 s
Vibration	± (1 % + 0.05Ω) Maximum with no evidence of mechanical, electrical damage and electrical discontinuity	A single vibration having an amplitude for 1.6 mm. for 2 hours in each X, Y, Z, direction. One minute between 10 and 55 Hz
Low Temperature Operation	± 3% Maximum with no evidence of mechanical damage	Resistor shall be placed in a cold chamber at room temperature, the temperature shall be gradually decreased to -65 + 10/-5°C. After 1 hour of stabilization at this temperature, RCWV or maximum RCWV, whichever less shall be applied for 45 minutes. Return to room temperature. Resistance change measured 24 hours a f t e r t h e test
Solderability	95% coverage Minimum	Test temperature of solder: 230 ±5°C, Dwell time in solder: 3 ±0.5 s
Resistance to Solvents	No deterioration of colour code paints	Colour code paints must resist the solvent
Overload Test	± 10% Maximum with no evidence of mechanical damage	In room temperature, 1,350 V ac in 1 second or 1,000 V ac in 1 minute shall be applied
High Voltage Pulse	±50% Maximum with no evidence of mechanical damage	The resistors are subjected to 50 discharges at a maximum rate of 12 per minute, from a 1,000 pF capacitor charged to 10 kV, in test circuit as shown below 

Hot-Spot Temperature Due to Rate of Power Dissipation



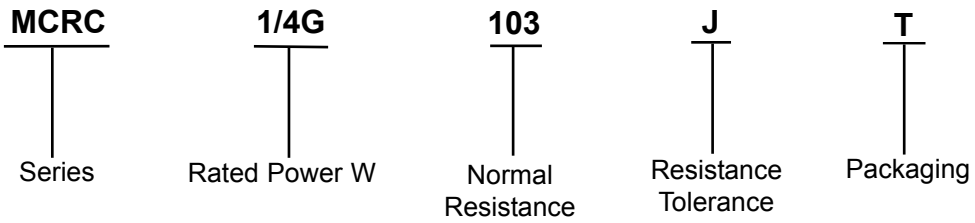
Carbon Composition Resistor

Part Number Table

Description	Part Number
Carbon Composition Resistor	MCRC1/4G103JT-RH

RoHS Compliant

Part Number Explanation:



Series : MCRC
Rated Power W : 1/4G = 1/4W
1/2G = 1/2W
100G = 1W
Normal Resistance : 5%
3 Digits
e.g. 2R2 = 2.2 to
e.g. 102 = 1K to
Resistance Tolerance : J = ±5%
T = ±10%
Packaging : B = Bulk
T = Tape and Reel