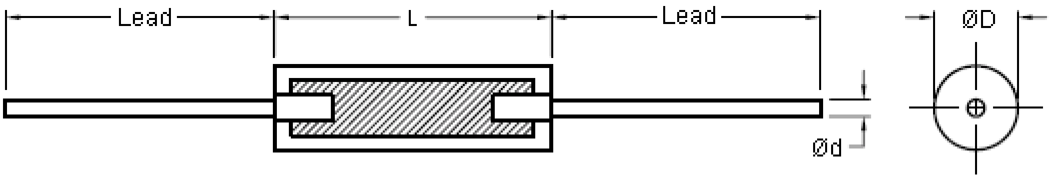
Carbon Composition Resistor

multicomp

RoHS Compliant

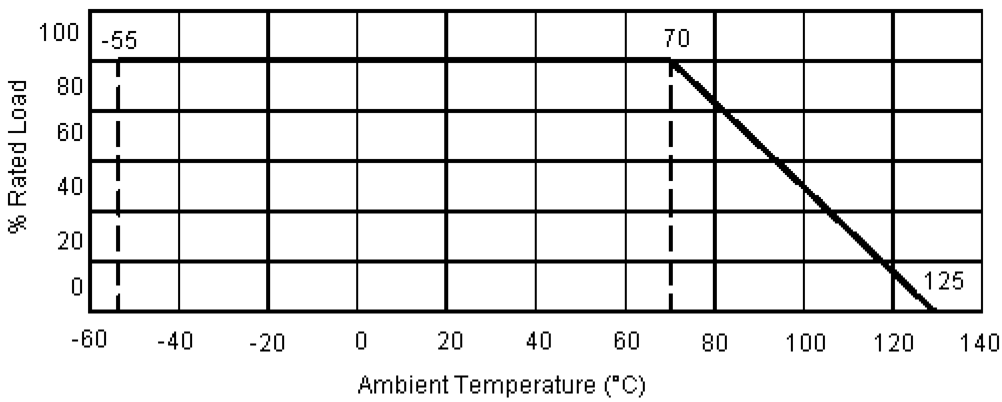


Dimensions : Millimetres

Rating and Dimensions

Power	Dimensions				Maximum Rated Voltage (V)	Maximum Overload Voltage (V)	Dielectric Withstand (V)	Tolerance ±(%)	R-Value
	L	D	Lead	d					
1/4 W	6.4 ±0.7	2.3 ±0.2	30 ±3	0.6	250	400	500	5	E-24
1/2 W	9.5 ±0.7	3.5 ±0.3		0.74	350	700	700	5	E-24
1 W	14.3 ±0.7	5.7 ±0.3		0.92	500	1,000	1,000	10	E-12

Derating Curve



Specification Table

Power (W)	Resistance	Part Number
1/2	100 Ω	MCRC1/2G101JT-RH

<table>
<tr><th>Characteristics</th><th>Limits</th><th>Test Methods</th></tr>
<tr><td>DC Resistance</td><td>DC resistance value must be within the specified tolerance</td><td>DC resistance value measured at the test voltage specified below:
<table>
<tr><th>Nominal Resistance</th><th>DC Test Voltage</th></tr>
<tr><td>99 Ω and Lower</td><td>0.5 V to 1 V</td></tr>
<tr><td>100 Ω to 999 Ω</td><td>2.5 V to 3 V</td></tr>
<tr><td>1,000 Ω to 9,999 Ω</td><td>8 V to 10 V</td></tr>
<tr><td>10,000 Ω to 99,999 Ω</td><td>24 V to 30 V</td></tr>
<tr><td>100,000 Ω and Higher</td><td>80 V to 100 V</td></tr>
</table></td></tr>
<tr><td>Resistance Temperature Characteristics</td><td>
<table>
<tr><th>Nominal Resistance</th><th>Test Temperature at -55°C</th><th>Test Temperature at 100°C</th></tr>
<tr><td>1 KΩ and under</td><td>6.5 to -3%</td><td>5 to -4%</td></tr>
<tr><td>1.1 KΩ to 10 KΩ</td><td>10 to -3%</td><td>6 to -5%</td></tr>
<tr><td>11 KΩ to 100 KΩ</td><td>13 to -3%</td><td>7.5 to -6%</td></tr>
<tr><td>110 KΩ1 to 1 MΩ</td><td>15 to -3%</td><td rowspan="3">10 to -7%</td></tr>
<tr><td>1.1 MΩ to 10 MΩ</td><td>20 to -3%</td></tr>
<tr><td>11 MΩ and over</td><td>25 to -3%</td></tr>
</table></td><td>$\frac{R2 - R1}{R1} \times 100$ (%)

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</td></tr>
<tr><td>Voltage Coefficient (Application for 1 KΩ minimum)</td><td>A total resistance change of 2% maximum or chart below
<table>
<tr><th>Rated Power</th><th>Coefficient Voltage</th></tr>
<tr><td>RC 1/4 W</td><td>-0.035% / V</td></tr>
<tr><td>RC 1/2 W</td><td>-0.035% / V</td></tr>
<tr><td>RC 1 W</td><td>-0.02% / V</td></tr>
</table></td><td>Instantaneous change in resistance per volt based on:
$\frac{R - r}{r} \times \frac{100}{0.9 \times RCWV}$ (%) / V

r = Resistance value at one-tenth RCWV
R = Resistance value at RCWV</td></tr>
<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 seconds</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 ¼ W and DC 500 V for ½ 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>3</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>
</table>

Carbon Composition Resistor

Characteristics	Limits	Test Methods
Humidity (Steady State)	±10% maximum with no evidence of mechanical damage	Temporary resistance change after a 240 hours exposure in a humidity test chamber controlled at 40° ±2C and 90 to 95% relative humidity
Short Time Over load	±(2.5% + 0.05 Ω) maximum with no evidence of arcing, burning, or charring	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 seconds
Load Life in Humidity	±20% maximum with no evidence of mechanical damage	500 hours exposure in a humidity test chamber controlled at 40° ±2°C and 90 to 95% relative humidity
Load Life	Resistance Change Average: ±6% Maximum: ±10%	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 hours "OFF" at 70° ±2°C ambient
Terminal Strength	±(1% + 0.05W) maximum with no evidence of mechanical damage	**Direct Load:** Resistance to a 2.5 kgf (25 N) 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
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 seconds
Vibration	±(1% + 0.05 Ω) 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 +0 / -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 after the test
Solderability	95% coverage minimum	Test temperature of solder : 230 ±5°C, Dwell time in solder : 3 ±0.5 seconds
Resistance to Solvents	No deterioration of colour code paints	Colour code paints must resist the solvent test per MIL-STD-202 Method 215
Overload Test (Application for Only Over 820 KΩ in 1/2 W)	±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

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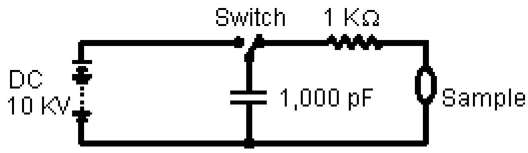
Characteristics	Limits	Test Methods
High Voltage Pulse (Application for only 1/2 W 3.3 KΩ and over)	±50% maximum with no evidence of mechanical damage	The resistors are subjected to 50 discharges at a maximum rate of 12 per minute, from a 1,000 pF capacitor charged to 10 KV, in test circuit as shown below 

Application Notes

Following consideration are needed because this resistors is consisted formed resistance element by mixing materials of carbon and resin system and fitted terminals moulded into it then considerably influenced by humidity and temperature

1. Soldering

If long-time soldering is made on the resistors at high temperature, they will be damaged and resistance value will change widely. Solder under following conditions

(1) Position of soldering
  Left leads 3 mm at least from the body

(2) Temperature and time of soldering
  Flow method-temperature of solder bath : 250C maximum
  Dipping periods : 3 seconds maximum
  Soldering iron method- temperature of soldering iron : 350C maximum
  Soldering periods : 3 seconds maximum

2. Long Time Storage

When stored at high temperature and high humidity for a long-time, resistance value will change due to absorption moisture. (5 to 8% in resistance value / year). So following consideration are required

(1) Stored at better condition than 25°C, 40% RH
(2) Keep first in first out based inventory control

Construction and Materials

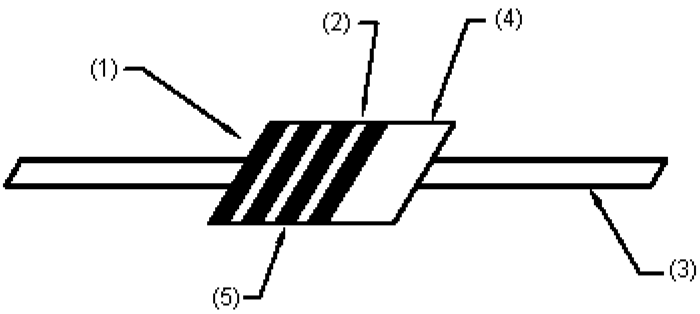
(1) Solid Resistive Element
  Resistance element consists of high purity and high stability electrochemical materials
  It has large cross section resulting in low current density and high overload capability

(2) Durable Construction
  The solid, integral structure combining lead, insulation, and hot-moulding process provides exceptional strength, resistance to damage in a automatic handing machinery

(3) Solder Plated Pb Free Leads
  Soldered leads remain easy to solder and provide freedom from catastrophic failure in soldering process

(4) Firmly Embedded Terminals
Rightly formed terminals are firmly embedded to provide a large contact area resulting excellent performances and high pull strength

(5) Solvent Proof Colour Marking
Baked-on colour code paints are resistance to solvents and also resist the abration and chipping. They remain bright and easily readable even after long periods of use



High-Spot Temperature Due to Rate of Power Dissipation