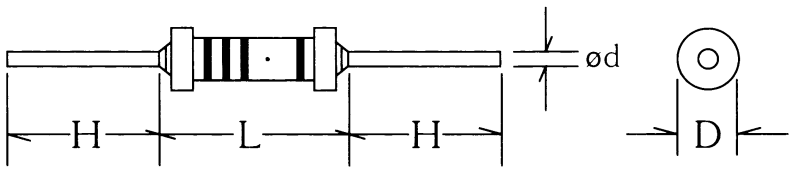
Carbon Film Fixed Resistors

Features

- High quality performance
- Great economy
- Flame retardant type available
- Automatically insertable
- Too low or too high ohmic value can be supplied on a case to case basis

Dimension



Normal Size

	Dimension (mm)				
	Rating	L Max.	D Max.	d $^{+0.02}_{-0.05}$	H ± 3
	0.125W	3.5	1.85	0.5	28
1/974	0.25W	6.8	2.50	0.6	28
	0.5W	10.0	3.50	0.6	28
	1W	16.0	5.50	0.8	28
	2W	17.5	6.50	0.8	28

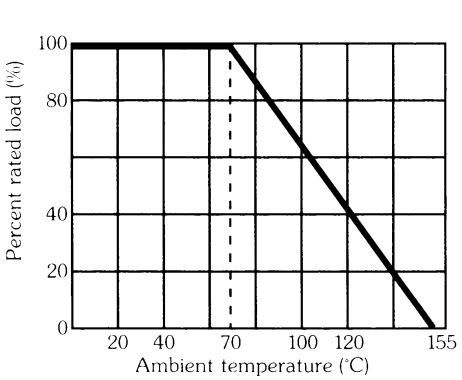
Small Size

	Dimension (mm)				
	Rating	L Max.	D Max.	d $^{+0.02}_{-0.05}$	H ± 3
	0.25W	3.5	1.85	0.5	28
1/1462	0.5W	9.0	3.00	.0.6	28
	0.5W	6.8	2.50	0.6	28
	1W	12.0	5.00	0.7	28
1/5138	2W	16.0	5.50	0.8	28
	3W	17.5	6.50	0.8	28

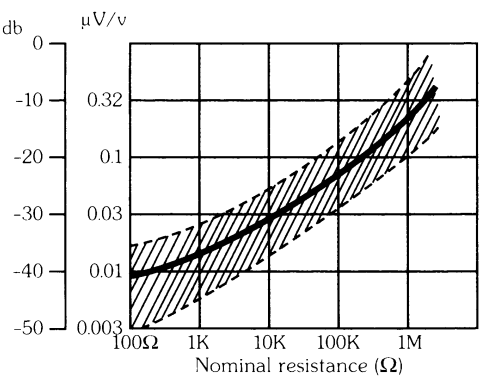
Rating

Rating Wattage	Max. Working V.	Max. Overload V.	Resistance Range
0.125W	200V	400V	1Ω - 1MegΩ
0.25W	250V	500V	1Ω - 10MegΩ
0.5W	350V	700V	1Ω - 10MegΩ
1W	500V	1,000V	1Ω - 10MegΩ
2W	500V	1,000V	1Ω - 10MegΩ
3W	500V	1,000V	1Ω - 10MegΩ

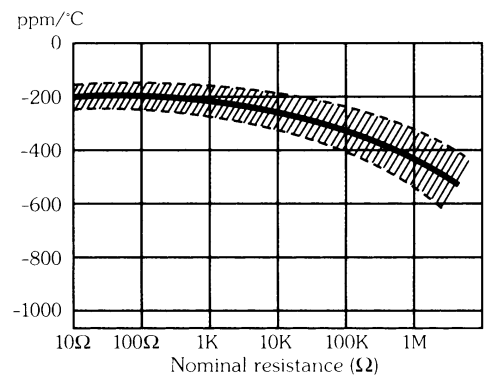
Derating Curve



Current Noise



Temp Coefficient



Performance Specifications

<table>
<tr><th>Characteristics</th><th>Limits</th><th>Test Methods</th></tr>
<tr><td>Temperature coefficient
JIS-C-5202 5.2</td><td><table><tr><th>RANGE</th><th>T.C.R.</th></tr><tr><td>≤ 10Ω</td><td>0 ~ ± 350PPM/°C</td></tr><tr><td>11Ω~91K</td><td>0 ~ ± 450PPM/°C</td></tr><tr><td>100K~1M</td><td>0 ~ ± 700PPM/°C</td></tr><tr><td>1.1M~10M</td><td>0 ~ ±1500PPM/°C</td></tr></table></td><td>Natural resistance change per temp. degree centigrade.
$\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (ppm/°C)
R_1: Resistance value at room temperature (t_1)
R_2: Resistance value at room temp. plus 100°C (t_2)
Test Pattern: Room temp., Room temp. + 100°C</td></tr>
<tr><td>Dielectric withstanding voltage
JIS-C-5202 5.7</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 60 + 10/-0 seconds.</td></tr>
<tr><td>Temperature cycling
JIS-C-5202 7.4</td><td>Resistance change rate is ± (1% + 0.05Ω) Max. 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</th></tr><tr><td>1</td><td>-55°C±3°C</td><td>30 minutes</td></tr><tr><td>2</td><td>Room temp.</td><td>10-15 minutes</td></tr><tr><td>3</td><td>+155°C±2°C</td><td>30 minutes</td></tr><tr><td>4</td><td>Room temp.</td><td>10-15 minutes</td></tr></table></td></tr>
<tr><td>Short-time overload
JIS-C-5202 5.5</td><td>Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage.</td><td>Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds.</td></tr>
<tr><td>Load life in humidity
JIS-C-5202 5.9</td><td><table><tr><th colspan="2">Resistance value</th><th>Δ R/R</th></tr><tr><td rowspan="2">Normal type</td><td>Less than 100KΩ</td><td>±3%</td></tr><tr><td>100KΩ or more</td><td>±5%</td></tr><tr><td rowspan="2">Flame retardant type</td><td>Less than 100KΩ</td><td>±5%</td></tr><tr><td>100KΩ or more</td><td>±10%</td></tr></table></td><td>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 ±2°C and 90 to 95% relative humidity.</td></tr>
<tr><td>Load life
JIS-C-5202 7.10</td><td><table><tr><th colspan="2">Resistance value</th><th>Δ R/R</th></tr><tr><td rowspan="2">Normal type</td><td>Less than 56KΩ</td><td>±2%</td></tr><tr><td>56KΩ or more</td><td>±3%</td></tr><tr><td rowspan="2">Flame retardant type</td><td>Less than 100KΩ</td><td>±5%</td></tr><tr><td>100KΩ or more</td><td>±10%</td></tr></table></td><td>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.</td></tr>
<tr><td>Insulation resistance
JIS-C-5202 5.6</td><td>Insulation resistance is 10,000 MΩ Min.</td><td>Resistors shall be clamped in the trough a 90° metallic V-block and shall be tested at DC. potential respectively specified in the above list for 60 + 10/-0 seconds.</td></tr>
<tr><td>Terminal strength
JIS-C-5202 6.1</td><td>No evidence of mechanical damage.</td><td>Direct load:
Resistance to a 2.5kg 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.</td></tr>
<tr><td>Resistance to soldering heat
JIS-C-5202 6.4</td><td>Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage.</td><td>Pemanent resistance change when leads immersed to 3.2-4.8mm from the body in 350°C ±10°C solder for 3 ± 0.5 seconds.</td></tr>
<tr><td>Solderability
JIS-C-5202 6.5</td><td>95% coverage Min.</td><td>The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes.
Test temp. of solder: 235°C ± 5°C
Dwell time in solder: 3 +0.5 / -0 seconds</td></tr>
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