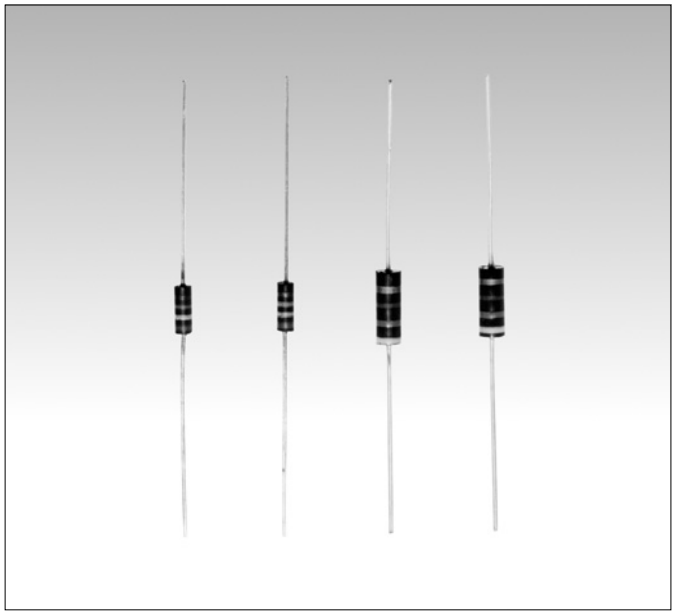
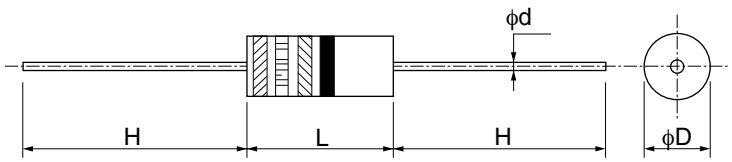
# RC

## ●Features

1. Improved pulse endurance characteristics compared to carbon-film devices.
2. Wide resistance range is available, 1 ohm ~ 22M ohm.
3. Stability Class : 10%



## ●Dimensions




Unit : mm

| Style | L | D | H | d | *Unit weight/pc. |
|---|---|---|---|---|---|
| **RC1/4** | 6.3 ±0.7 | 2.4±0.1 | 30±3 | 0.6 ±0.05 | 222mg |
| **RC1/2** | 9.5 $^{+0.8}_{-0.7}$ | 3.6±0.2 | 28±3 | 0.7 $^{+0.07}_{-0.05}$ | 422mg |

*Values for reference

## ●Part Number Description

Example

Style: RC 1/4

102 | J | B

**Product Type**

| |
|---|
| RC |

**Rated Dissipation**

| | |
|---|---|
| 1/4 | 0.25W |
| 1/2 | 0.5W |

**Rated Resistance**

E24, 12, 6 Series
e.g. : 2R2=2.2 ohm
102=1k ohm

**Tolerance on Rated Resistance**

| | |
|---|---|
| **J** | ±5% |
| K | ±10% |
| M | ±20% |

***Packaging**

| | |
|---|---|
| B | Bulk (Straight) |
| H | Horizontal Forming |
| TB | 52 mm Width Tape (Ammo Box) |
| TD | 52 mm Width Tape (Reel) |

*Refer to Tape and Packaging information on pages 66.

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# FIXED CARBON COMPOSITION RESISTORS RC

## ●Ratings

| Style | Rated Dissipation at 70°C W | Limiting Element Voltage V | Rated Resistance Range | Combination of Rated Resistance Range and Temperature Coefficient of Resistance: Temperature Coefficient of Resistance % at −55 °C | Temperature Coefficient of Resistance % at +125 °C | Rated Resistance Range | Tolerance on Rated Resistance and Perferred Number Series for Resistors | Isolation Voltage V | Category Temperature Range °C |
|---|---|---|---|---|---|---|---|---|---|
| RC1/4 | 0.25 | 250 | 1 ohm~5.6M ohm | +6.5 ~0 | +1~−5 | 1 ohm ~ 1k ohm | J ( ± 5%) : E24<br>K ( ± 10%) : E12<br>M( ± 20%) : E6 | 100 | −55~+125 |
| | | | | +10 ~0 | 0~−6 | 1.1k ohm ~ 10k ohm | | | |
| RC1/2 | 0.5 | 350 | 1 ohm~22M ohm | +13 ~0 | 0~−7.5 | 11k ohm ~100k ohm | | 500 | |
| | | | | +15 ~0 | 0~−10 | 110k ohm ~ 1M ohm | | | |
| | | | | +20 ~0 | 0~−15 | 1.1M ohm ~ 22M ohm | | | |

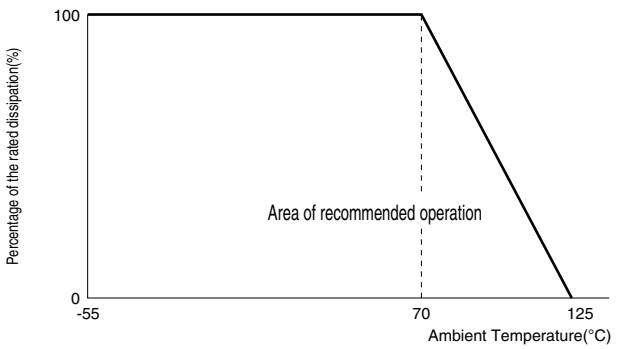
Note1. Rated Voltage = $\sqrt{(\text{Rated Dissipation})\times(\text{Rated Resistance})}$. (d.c. or a.c. r.m.s. Voltage)
Note2. Limiting Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.
Note3. Critical Resistance Value is the resistance value at which the rated voltage is equal to the limiting element voltage.

## ●Storage

Temperature 20±15°C, Humidity 60%R.H. Max, Recommendation Storing Term 6 months after shipped from factory.

## ●Derating Curve

The derated values of dissipation for temperatures in excess of 70°C shall be indicated by the following Curve.




## ●Climatic Category

55/125/56

| | |
|---|---|
| Lower Category Temperature | −55°C |
| Upper Category Temperature | +125°C |
| Duration of the Damp heat, Steady-State Test | 56 days |

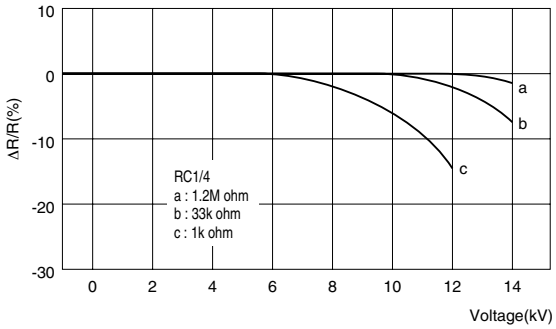
## ●Performance Characteristics JIS C 5201-1 : 1998

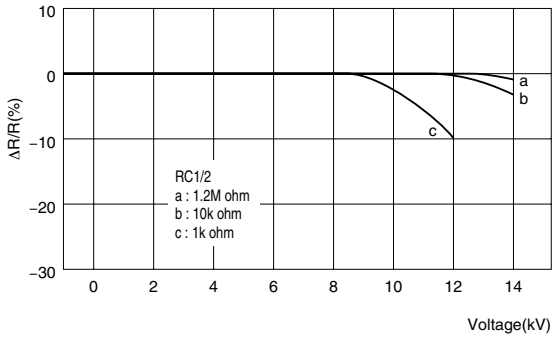
| Description | | Requirements | Test Methods |
|---|---|---|---|
| Voltage proof | | No breakdown or flashover | Clause 4.7 V-block method RC1/4 100Va.c.,60s<br>RC1/2 500Va.c.,60s |
| Variation of resistance with temperature | | See Ratings Table | Clause 4.8 Measuring temperature : +20°C/−55°C/ +20°C/+125°C/+20°C |
| Overload | | ΔR≤±(2%+0.1 ohm)<br>No visible damage, legible marking | Clause 4.13 The applied voltage shall be 2.5 times of the rated voltage or twice of the limiting element voltage, whichever is the less Severe, 5s. |
| Robustness of terminations | Tensile | ΔR≤±(2%+0.1 ohm) No visible damage | Clause 4.16.2 10N for 5~10s |
| | Bending | ΔR≤±(2%+0.1 ohm) No visible damage | Clause 4.16.3 5N twice |
| | Torsion | ΔR≤±(2%+0.1 ohm) No visible damage | Clause 4.16.4 180°C, 2 rotation |
| Solderability | | In accordance with Clause 4.17.4.5 | Clause 4.17 235°C, 5s |
| Resistance to soldering heat | | ΔR≤±(3%+0.1 ohm)<br>No visible damage, legible marking | Clause 4.18 After immersion into the flux, the immersion into solder shall be carried out 4mm from the body at 350°C for 3.5s. |
| Rapid change of temperature | | ΔR≤±(2%+0.1 ohm) No visible damage | Clause 4.19 5 cycles between −55°C and +125°C. |
| Climatic sequence | | ΔR≤±(10%+0.5 ohm) Insulation resistance : R≥100M ohm<br>No visible damage | Clause 4.23 Dry/Damp heat(12+12h cycle), first cycle./ Cold/Damp heat(12+12h cycle), remaining cycle./ D.C.Load. |
| Damp test, steady state | | ΔR≤±(10%+0.5 ohm) Insulation resistance : R≥100M ohm<br>No visible damage, legible marking | Clause 4.24 40°C, 95%R.H., 56 days, test a) , b) and c) of Clause 4.24.2.1 |
| Endurance at 70°C | | ΔR≤±(10%+0.5 ohm) No visible damage<br>Insulation resistance : R≥1G ohm | Clause 4.25.1 Rated voltage, 1.5h "ON", 0.5h "OFF", 70°C, 1,000h. |
| Endurance at the upper category temperature | | ΔR≤±(10%+0.5 ohm) No visible damage<br>Insulation resistance : R≥1G ohm | Clause 4.25.3 125°C, no-load, 1,000h. |

## ●Typical Characteristics

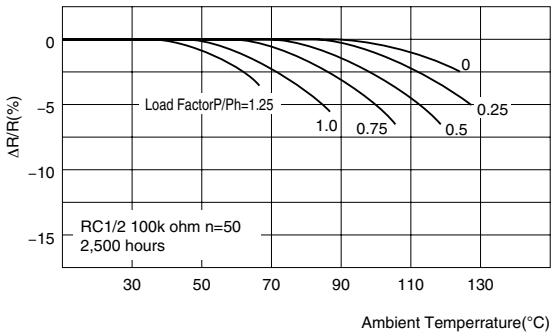
### •Surge Resistance Characteristics

Charging and discharging a 2,000 pF capacitor for 100 cycles.

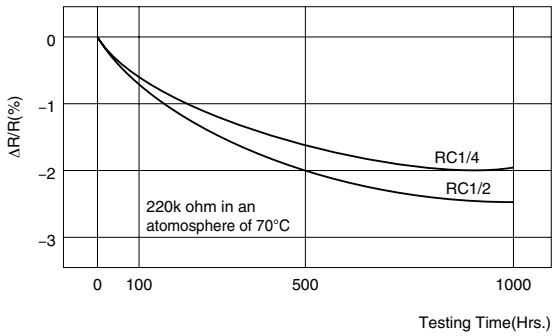



### •Relationship between Load Ratio and Category Temperature

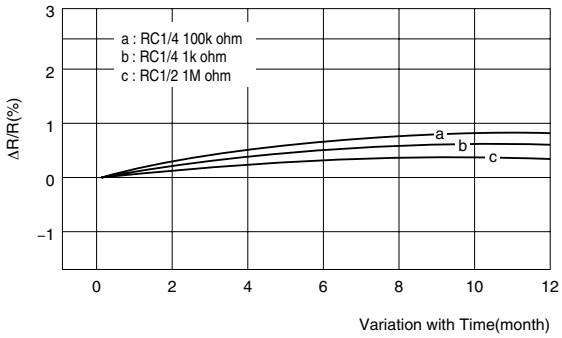



### •Endurance at 70°C

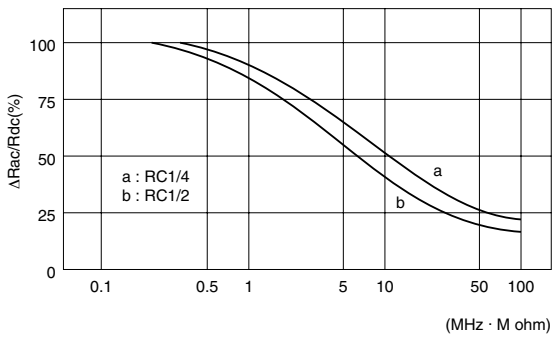



### •Variation with Time

Condition : 5~35°C , 45~85% R.H.




### •Frequency Characteristics




"Typical characteristics indicate the mean values of ΔR/R etc."

## ●Reliability Test

**Endurance in humidity**

**Samples :** RC1/4J,100 ohm,1k ohm,10k ohm,100k ohm×150 each. Total 2,400.

**Conditions :** Direct current voltage equivalent to the following load ratings in cycles on "ON" for 1.5h and "OFF" for 0.5h for a total of 5,000h in an atmosphere of 40°C, 90 to 95%R.H.

| Criterion (%) | | Load Ratio P/Pn (%) | Total Testing Time T(Hrs. ) | Number of Failures r(pcs.) | Failure Ratio | | Average Lifetime (60% reliability level) (Hrs.) |
|---|---|---|---|---|---|---|---|
| | | | | | $\hat{\lambda}$ | λCL(60%) | |
| ΔR/R | ±5 | 0 | $2.984X10^6$ | 6 | 0.201 | 0.244 | $4.098\times10^5$ |
| | | 20 | $2.990X10^6$ | 4 | 0.134 | 0.176 | $5.682\times10^5$ |
| | | 60 | $2.997X10^6$ | 2 | 0.067 | 0.104 | $9.615\times10^5$ |
| | | 100 | $2.992X10^6$ | 3 | 0.100 | 0.139 | $7.194\times10^5$ |
| | | Total | $1.196X10^7$ | 15 | 0.125 | 0.138 | $7.209\times10^5$ |
| | ±10 | Total | $1.20X10^7$ | 0 | 0.0055 | 0.007 | $1.299\times10^7$ |

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