

**TY-OHM Electronic Works Co., Ltd.****RDN CARBON FILM RESISTORS  
RESISTOR SPECIFICATION****Version : 2002.A**

| APPROVED BY |          |            |
|-------------|----------|------------|
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# RDN Carbon Film Resistors

## 1. Applicable Scope:

This RDN1/4WS standard specification is for use in consumer electronics, computers, telecommunications, control instruments...etc.

## 2. Part Number:

It is composed by Type, Rated Wattage, Terminal Form, Nominal Resistance ,Tolerance and Package. e.g.

|      |               |                    |           |         |
|------|---------------|--------------------|-----------|---------|
| RDN  | 1/4WS         | 4Ω7                | J         | T/B     |
| Type | Rated Wattage | Nominal Resistance | Tolerance | Package |

### 2.1 Type :

Carbon Film Resistors are called "RD". "RDN" represents flameproof.

### 2.2 Rated Wattage:

Shown by "W", such as 1/8W(1/4WS).

### 2.3 Nominal Resistance:

Ω, KΩ, MΩ are its unit, which be in accordance with JIS-C6409 article 6 (EIA RS-196A) series.

### 2.4 Tolerance:

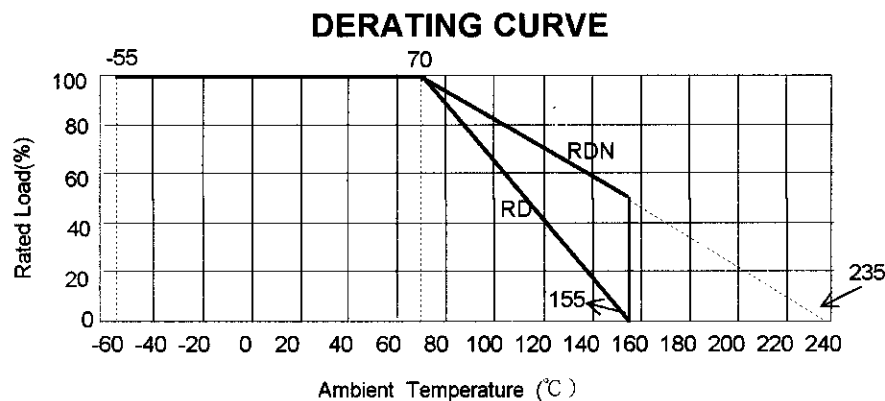
It is measured by Bridge-method at room temperature and expressed by a capital letter. G=± 2% , J=± 5% , K=± 10%.

### 2.5 Package:

T/R=tape & reel ; T/B=tape in box; Bulk.

## 3. Rated Power:

Rated power is the value of Max load voltage specified at the ambient temperature of 70°C, and shall meet the functions of electrical and mechanical performance. When the ambient temperature surpasses above mentioned temperature, the value declines as per following DERATING CURVE.



### 3.1 Rated Voltage:

It is calculated through the following formula:

$$E = \sqrt{P \cdot R}$$

where E: rated voltage (V)

P: rated power (W)

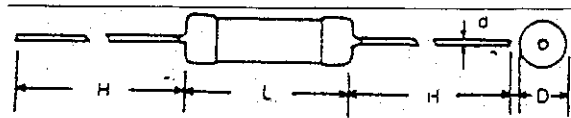
R: nominal resistance value (Ω)

However, in case the voltage calculated exceeds the maximum load voltage, such the maximum load voltage shall be regarded as its rated voltage, means whichever less.

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## 4. Dimension and structure

### 4.1 Dimension:



Unit : mm

| WATTAGE     | $L \pm 0.5$ | $D \pm 0.2$ | $H \pm 3$ | $d \pm 0.05$ | Resistance Range           | Max Working Voltage |
|-------------|-------------|-------------|-----------|--------------|----------------------------|---------------------|
| 1/8W(1/4WS) | 3.7         | 1.7         | 30        | 0.45         | $3.9\Omega \sim 10M\Omega$ | 200V                |

- © Notes: 1. Too low or too high ohmic value can be supplied only case by case.  
2. Max Overload Voltage is 2 times of Max Working Voltage.  
3. Resistance value over  $4.7M\Omega$  ( $\geq 4.7M\Omega$ ) the tolerance shall be  $\pm 10\%$ .

### 4.2 Structure

#### 4.2.1 Ceramic Rod:

It is made of Forste imported from Japan.

#### 4.2.2 Carbon Film:

Under high vacuum and high temperature to split and oxidize the pure carbon-hydric.

#### 4.2.3 Terminal:

Terminal is to be firmly connected with resistors element, both electrically and mechanically, and allow easy soldering.

#### 4.2.4 Coating:

Coating is done by flameproof silicon paint which is solid enough to be free from looseness, crack and easy breakage. The paint shall be limited within 2mm of lead wires from resistors body

#### 4.2.5 Marking:

Marking is made by color coding on surface.

## 5. Operating Temperature Range: $-55^{\circ}\text{C} \sim 155^{\circ}\text{C}$

## 6. Mechanical Performance

### 6.1 Terminal tensile:

To Fix the resistor body, a static load of 1kg. is to be gradually applied into the terminal for 10 seconds without causing any looseness and fall.

### 6.2 Twist withstand:

To bend the lead wire at the point of about 6mm from resistor body to  $90^{\circ}$ , then catch the wire at  $1.2 \pm 0.4\text{mm}$  apart from the bent point end and turn it (clockwise) by 360 degrees perpendicular to the resistor axis at speed of 5 seconds per turn, and do the same counterclockwise again which constitute a whole turn. Repeat the turn 2 times without causing any break and looseness.

## 7. Electrical Performance

### 7.1 Resistance Temperature Coefficient:

It shall be as following:

| WATTAGE \ T.C. | 0~450         | 0~700                       | 0~1000                       | 0~1300            |
|----------------|---------------|-----------------------------|------------------------------|-------------------|
| 1/8W(1/4WS)    | $< 47K\Omega$ | $51K\Omega \sim 100K\Omega$ | $110K\Omega \sim 330K\Omega$ | Over $360K\Omega$ |

## RDN Carbon Film Resistors

$$T.C. (ppm/^{\circ}C) = [(R2 - R1) \div R1] \times [1 \div (T2 - T1)] \times 10^6$$

where R1: resistance value at reference temperature

R2: resistance value at test temp.

T1: reference temp. (usu. 25^{\circ}C)

T2: test temp. (about 75^{\circ}C)

### 7.2 Temperature Cycle:

Following temp. cycles are to be made 5 times and then put at room temp. for one hour, the resistance value change rate between pre-and-post test shall be within  $\pm 1\%$ .

| Steps    | Temperature (^{\circ}C) | Time (minutes) |
|----------|-------------------------|----------------|
| 1st step | -55 $\pm$ 3             | 30             |
| 2nd step | room temp.              | 3              |
| 3rd step | 155 $\pm$ 3             | 30             |
| 4th step | room temp.              | 3              |

### 7.3 Short Time Over Load:

When the resistors are applied 2.5 times as much as rated voltage for 5 seconds continuously, it shows no evidence of arc, flame...etc. Removing the voltage and place the resistors to the normal condition for 30 minutes, the resistance value change rate between pre-and-post test shall be within  $\pm 1\%$ .

### 7.4 Insulation Character :

Resistors are located in a V-shaped metal trough. Using the DC500V megger instrument 2 poles to clutch either side of lead wires and metal trough, measuring the Insulation Resistance which shall be over 10000M $\Omega$ .

### 7.5 Voltage Withstanding:

Resistors are located in a V-shaped metal trough. Then applying Max Working Voltage for one minute) and should find no physical damage to the resistors. The resistance value change shall be within  $\pm 0.5\%$ .

### 7.6 Load Life:

The resistors arrayed are sent into the 70^{\circ}C oven, applying rated voltage at the cycle of 1.5 hours ON, 0.5 hour OFF for 1000 $^{+48}_{-0}$  hours in total. Then, after removing the voltage, take the resistors out of the oven and left under normal temp. for one hour cooling. The resistance value change rate between pre-and-post test shall be within  $\pm 5\%$ .

### 7.7 Moisture-proof Load Life:

The resistors arrayed are placed into a constant temp./humidity oven at the temp. of 40 $\pm$  2^{\circ}C and the humidity of 90~95%, then rated power is applied for 1.5 hours and cut off for 0.5 hour. The similar cycle will be repeated for 500 $^{+24}_{-0}$  hours in total (including cut-off time). Then remove the voltage, taking the resistors out of the oven and leaving them at room temp. for one hour. The resistance value change rate between pre-and-post test shall be within  $\pm 5\%$ . There also shall be no evidence of remarkable change on appearance, and the marking shall not be illegible.

### 7.8 Solderability:

The leads with flux are dipped in a melted solder of 235 $\pm$  5^{\circ}C for 2 seconds, more than 95% of the circumference of the lead wires shall be covered with solder.

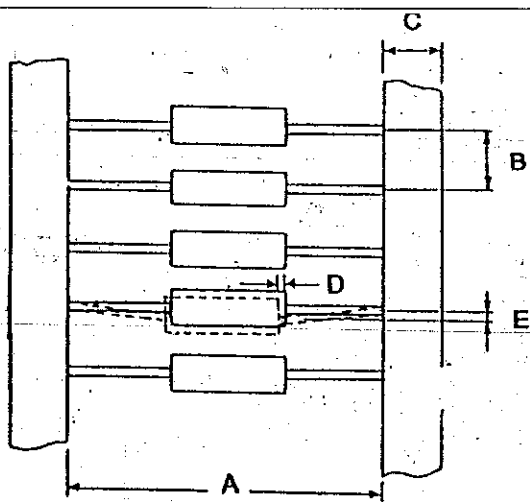
### 7.9 Incombustibility:

The resistors are applied the power of 16 times the rated wattage for 5 min. and shall not get flame.

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## 8. Packing:

### 8.1 Taping Specifications:



Unit:mm

| Wattage         | Size<br>Type | A               | B           | C $\pm$ 1 | D Max | E Max |
|-----------------|--------------|-----------------|-------------|-----------|-------|-------|
| 1/8W<br>(1/4WS) | T-26         | 26 $^{+1}_{-0}$ | 5 $\pm$ 0.5 | 6         | 0.6   | 1.2   |
|                 | T-52         | 52 $\pm$ 1      | 5 $\pm$ 0.5 | 6         | 0.6   | 1.2   |

### 8.2 Tape in Box

Unit:mm

| Wattage     | TYPE | QTY<br>PER BOX | a  | b  | c   |
|-------------|------|----------------|----|----|-----|
| 1/8W(1/4WS) | T-26 | 5,000          | 50 | 70 | 255 |
|             | T-52 | 5,000          | 75 | 70 | 255 |

