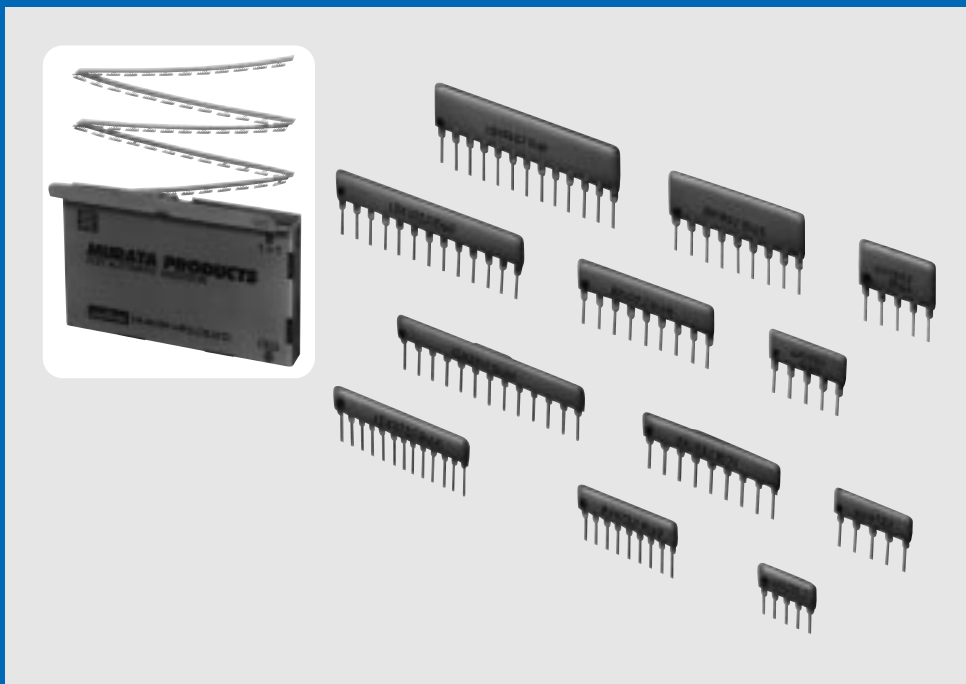


# SIP Resistor Network

R-NETWORK



datasheet.Directory



Murata  
Manufacturing Co., Ltd.

Cat.No.N16E-9

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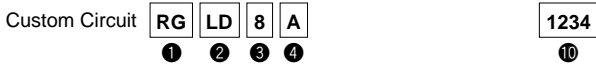
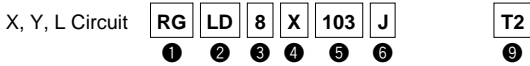
4

5

● **Part Numbering** (The structure of the "Global Part Numbers" that have been adopted since June 2001 and the meaning of each code are described herein.)  
 If you have any questions about details, inquire at your usual Murata sales office or distributor.

**R Network**

(Global Part Number)



① Product ID

| Product ID |            |
|------------|------------|
| RG         | R Networks |

② Structure

| Code | Structure                                    |
|------|--|
| LD   | Terminal Pitch : 2.54mm, Height : 5.0mm max. |
| LE   | Terminal Pitch : 1.78mm, Height : 5.0mm max. |
| SD   | Terminal Pitch : 2.54mm, Height : 6.5mm max. |
| HD   | Terminal Pitch : 2.54mm, Height : 9.0mm max. |

③ Number of Element

| Code | Number of Element                          |
|------|--|
| 8    | 1 or 2 digits shows the number of element. |

④ Circuit

| Code | Circuit                    |
|------|----------------------------|
| X    | Pull-up, Pull-down Circuit |
| Y    | Isolated Circuit           |
| Z    | Double Terminator Circuit  |
| M    | Divider Circuit            |
| L    | R/2R Ladder Circuit        |
| A    | Custom Circuit             |

⑤ Nominal Resistance (Z, M Circuit :  $R_A$   
 L Circuit : Output Impedance)

Expressed by three figures. The unit is ohm ( $\Omega$ ). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

Ex.)

| Code | Nominal Resistance |
|------|--------------------|
| 150  | 15 $\Omega$        |
| 103  | 10k $\Omega$       |

⑥ Resistance Tolerance (Z, M Circuit :  $R_A$   
 L Circuit : Impedance Tolerance)

| Code | Resistance Tolerance         |
|------|------------------------------|
| J    | $\pm 5\%$                    |
| G    | $\pm 2\%$ (22 $\Omega$ min.) |

⑦ Nominal Resistance (Z, M Circuit :  $R_B$ )

Expressed by three figures. The unit is ohm ( $\Omega$ ). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

Ex.)

| Code | Nominal Resistance |
|------|--------------------|
| 150  | 15 $\Omega$        |
| 104  | 100k $\Omega$      |

If  $R_A$  and  $R_B$  values are the same, ⑦ and ⑧ remain blanks, and the corresponding code is omitted.

⑧ Resistance Tolerance (Z, M Circuit :  $R_B$ )

| Code | Resistance Tolerance         |
|------|------------------------------|
| J    | $\pm 5\%$                    |
| G    | $\pm 2\%$ (22 $\Omega$ min.) |

⑨ Packaging

| Code | Packaging      |
|------|----------------|
| T1   | All-Pin Taping |
| T2   | 3pins Taping   |

⑩ Design No.

| Code | Design No.                |
|------|---------------------------|
| 1234 | Expressed by four figures |

# SIP Resistor Network Features/Applications

These high quality SIP resistor networks are designed using Murata's years of experience in thick film resistor technology. Their reliability is assured by a massproduction system that puts quality first.

## ■Features

### 1. Various Types

Murata's R-networks are designed to meet a wide variety of resistor needs. Three types are available : standard low profile (approximately the same height as ICs, 5mm max.), middle profile, and high profile.

### Series Name

| Height \ Pin Pitch | 2.54mm     | 1.78mm | Remarks         |
|--------------------|------------|--------|-----------------|
|                    | 9.0mm max. | RGHD   |                 |
| 6.5mm max.         | RGSD       | —      | Custom Series   |
| 5.0mm max.         | RGLD       | RGLE   | Standard Series |

### 2. Standard Circuits

Murata offers the circuits shown below in the standard series; they are frequently used in digital circuits and equipment. Also, Murata produces various custom products to fully meet the customer's needs.

### Standard Circuits

| Type Code | X Type | Y Type | M Type | Z Type | L Type (RGSD) |
|-----------|--------|--------|--------|--------|---------------|
| Circuit   |        |        |        |        |               |

## ■Applications

### ● Home Electronics

Color TVs, VCRs, audio equipment, home appliances containing microcomputers (air-conditioners, fan-heaters, washing machines, refrigerators, microwave ovens, etc.).

### ● Industrial Equipment

Computer and peripheral devices, office supplies (printers, word-processors, plain paper copiers, electric typewriters, etc.) Communication equipment (telephones, digital exchanges, communication systems, etc.) Programmable controllers, Measuring equipment, Car electronics and other types of equipment.

### 3. Compact Design

Compact design allows these resistors to be used in applications requiring high density insertion. An added feature of the 2.54mm pitch types enables insertion along rows and lines of holes with the same pitch.

### 4. Automatic Insertion

To meet demands to decrease assembly and labor costs, Murata offers two taping types. This allows the products to be automatically inserted in the same way as general radial taping parts. Please note that some automatic insertion machines are not supported.

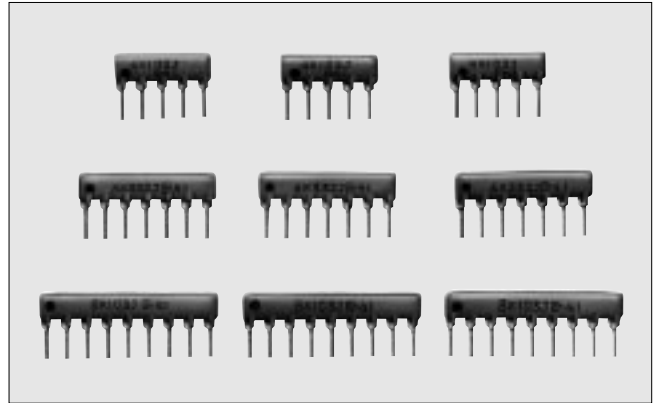
# SIP Resistor Network



## Standard Resistor Network RGLD Series

### Features

1. The popular RGLD series has standard low profile dimensions equivalent to those of an IC (height : 5.0mm max. ; pitch : 2.54mm).
2. Available in tape packaging to meet assembly cost reduction demands.
3. Products of this series are used in standard digital circuits.



### Standard Circuits

| Circuit Type              | Pull up, Pull down                          | Isolated                                    | Double Terminator   | Divider   |
|---------------------------|---|---|---|---|
| Type Code                 | X Type                                      | Y Type                                      | Z Type  | M Type  |
| Circuit                   | <p><math>R_1 = R_2 = \dots = R_n</math></p> | <p><math>R_1 = R_2 = \dots = R_n</math></p> | <p><math>R_A = R_1 = R_2 = \dots = R_{\frac{n}{2}}</math><br/> <math>R_B = R_{\frac{n}{2}+1} = R_{\frac{n}{2}+2} = \dots = R_n</math></p> | <p><math>R_A = R_1 = R_2 = \dots = R_{\frac{n}{2}}</math><br/> <math>R_B = R_{\frac{n}{2}+1} = R_{\frac{n}{2}+2} = \dots = R_n</math></p> |
| Number of Elements (Pins) | n=3 to 12<br>(4 to 13)                      | n=3 to 7<br>(6 to 14)                       | n=8 to 18 (even number)<br>(6 to 11)  | n=6 to 12 (even number)<br>(7 to 13)  |

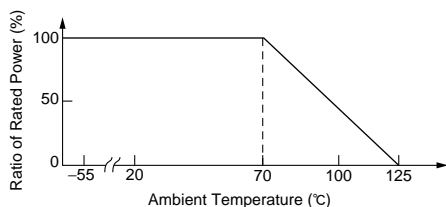
• Products with other circuits and other element numbers are also available as custom parts.

### Rating

|                               | RGLD[n]X Type   | RGLD[n]Y Type               | RGLD[n]M Type               | RGLD[n]Z Type                   |
|-------------------------------|---|-----------------------------|-----------------------------|---------------------------------|
| Power Rating Each Resistor *1 | 1/8W  | 1/8W                        | 1/8W                        | 1/8W                            |
| Total Rated Power             | 1/8W×Number of elements (n)   | 1/8W×Number of elements (n) | 1/8W×Number of elements (n) | 1/8W×Number of elements (n)×0.6 |
| Rated Voltage *2              | Rated voltage (V) = $\sqrt{\text{Power rating (W)} \times \text{Nominal resistance value } (\Omega)}$ |                             |                             |                                 |
| Standard Resistance           | E-12 series*3   |                             |                             | The following values*4          |
| Resistance Range              | 10(Ω) to 1MΩ  |                             |                             |                                 |
| Resistance Tolerance*5        | J : ±5%, G : ±2% (22Ωmin.)  |                             |                             |                                 |
| Temp.Coeff.of Resistance      | ±200ppm/°C  |                             |                             |                                 |
| Max. Operating Voltage        | 100V  |                             |                             |                                 |
| Operating Temperature         | -55 to +125°C   |                             |                             |                                 |

#### \*1 Derating Curve

The rated power per element and the total rated power are derated according to the following curve.



\*2 When rated voltage exceeds the max. operating voltage, the max. operating voltage shall be regarded as the rated voltage.

\*3 E-12 Standard Values

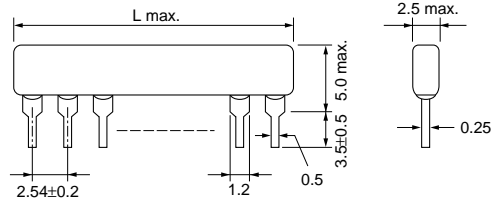
10, 12, 15, 18, 22, 27,  
33, 39, 47, 56, 68, 82

\*4 Standard Resistance Value for Z type (Ω)

$R_A/R_B = 180/390, 220/330, 330/390, 330/470$

\*5 Resistance tolerance : ±1%, T.C.R : ±100ppm/°C is also available.

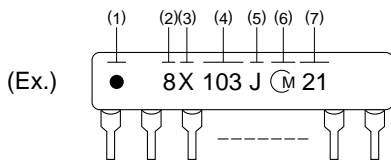
■Dimensions



| Number of Pins | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   |
|----------------|------|------|------|------|------|------|------|------|------|------|------|
| L              | 10.1 | 12.6 | 15.1 | 17.6 | 20.2 | 22.7 | 25.3 | 27.8 | 30.5 | 33.0 | 35.5 |

(in mm)

■Marking



- (1) Pin 1 identification
- (2) Number of Resistors
- (3) Type (Circuit) Designation
- (4) Nominal Resistance Value (3 digits)
- (5) Resistance Tolerance
- (6) Manufacturer's Code
- (7) Date Code (Year, Month)

# SIP Resistor Network

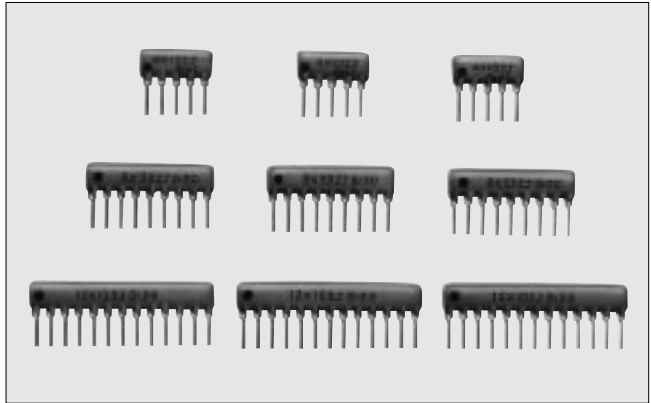


## Shrink Pitch Resistor Network RGLE Series

2

### ■ Features

1. The RGLE series comprises standard low profile R-networks with dimensions equivalent to those of a shrink pin pitch IC (height : 5.0mm; pitch : 1.78mm).
2. Equivalent dimensions to shrink pin pitch IC facilitates PCB pattern design and enables high density insertion.



### ■ Standard Circuits

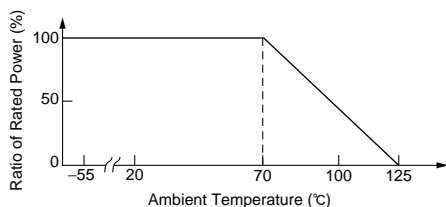
| Circuit Type              | Pull up, Pull down  | Isolated  | Divider   |
|---------------------------|---|---|---|
| Type Code                 | X Type  | Y Type  | M Type  |
| Circuit                   | <p style="text-align: center;"><math>R_1 = R_2 = \dots = R_n</math></p> | <p style="text-align: center;"><math>R_1 = R_2 = \dots = R_n</math></p> | <p style="text-align: center;"><math>R_A = R_1 = R_2 = \dots = R_{\frac{n}{2}}</math><br/> <math>R_B = R_{\frac{n}{2}+1} = R_{\frac{n}{2}+2} = \dots = R_n</math></p> |
| Number of Elements (Pins) | n=3 to 15<br>(4 to 16)  | n=3 to 8<br>(6 to 16)   | n=6 to 12 (even number)<br>(7 to 13)  |

• Products with other circuits and other element numbers are also available as custom parts.

### ■ Rating

|                               | RGLE□X Type  | RGLE□Y Type | RGLE□M Type |
|-------------------------------|--|-------------|-------------|
| Power Rating Each Resistor *1 | 1/10W  | 1/10W       | 1/10W       |
| Total Rated Power             | $1/10W \times \text{Number of elements (n)}$   |             |             |
| Rated Voltage *2              | $\text{Rated voltage (V)} = \sqrt{\text{Power rating (W)} \times \text{Nominal resistance value (}\Omega\text{)}}$ |             |             |
| Standard Resistance           | E-12 series *3   |             |             |
| Resistance Range              | 10Ω to 1MΩ   |             |             |
| Resistance Tolerance *4       | J : ±5%, G : ±2% (22Ωmin.)   |             |             |
| Temp. Coeff. of Resistance    | ±200ppm/°C   |             |             |
| Max. Operating Voltage        | 100V   |             |             |
| Operating Temperature         | -55 to +125°C  |             |             |

\*1 Derating Curve  
The rated power per element and the total rated power are derated according to the following curve.



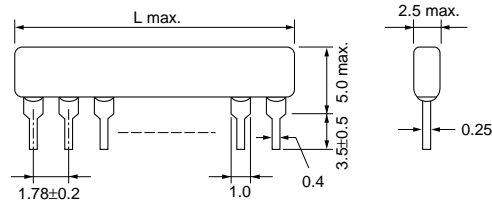
\*2 When rated voltage exceeds the max. operating voltage, the max. operating voltage shall be regarded as the rated voltage.

\*3 E-12 Standard Values

10, 12, 15, 18, 22, 27,  
33, 39, 47, 56, 68, 82

\*4 Resistance tolerance : ±1%, T.C.R : ±100ppm/°C is also available.

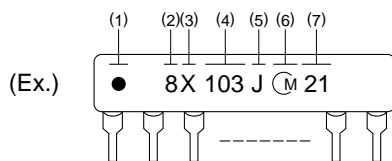
## ■Dimensions



| Number of Pins | 4   | 5   | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   |
|----------------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|
| L              | 7.7 | 9.5 | 11.2 | 12.9 | 14.6 | 16.4 | 18.2 | 20.0 | 21.8 | 23.5 | 25.3 | 27.1 | 28.9 |

(in mm)

## ■Marking



- (1) Pin 1 identification
- (2) Number of Resistors
- (3) Type (Circuit) Designation
- (4) Nominal Resistance Value (3 digits)

- (5) Resistance Tolerance
- (6) Manufacturer's Code
- (7) Date Code (Year, Month)



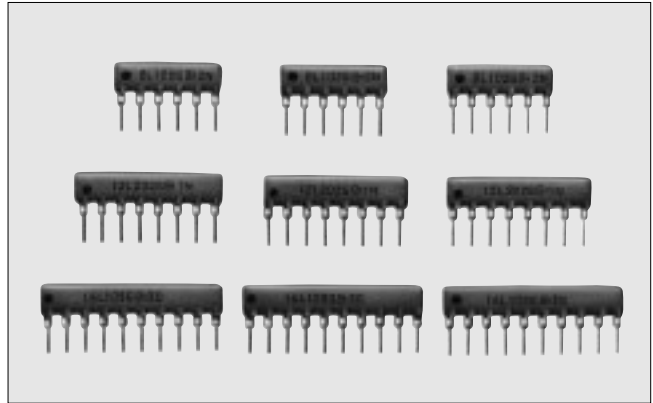
# SIP Resistor Network



## High-Power Isolated Resistor Network RGSD Series

### ■Features

1. Y type is isolated circuit type. And Y type is used as current limiting resistor, level translating resistor.
2. The RGSD series (height : 6.5mm max.; pitch : 2.54mm) is high-power resistor network.
3. Available in the tape packing to meet assembly cost reduction demands.
4. An added feature of the 2.54mm pitch types enables insertion along rows and lines of holes with the same pitch.



3

### ■Standard Circuits

| Circuit Type | Isolated    |  | Isolated    |  |  |  | Isolated    |  |  |  |  |  |  |  |
|--------------|-------------|--|-------------|--|--|--|-------------|--|--|--|--|--|--|--|
| Type Code    | RGSD3Y Type |  | RGSD4Y Type |  |  |  | RGSD5Y Type |  |  |  |  |  |  |  |
| Circuit      |             |  |             |  |  |  |             |  |  |  |  |  |  |  |
| Circuit Type | Isolated    |  |             |  |  |  | Isolated    |  |  |  |  |  |  |  |
| Type Code    | RGSD6Y Type |  |             |  |  |  | RGSD7Y Type |  |  |  |  |  |  |  |
| Circuit      |             |  |             |  |  |  |             |  |  |  |  |  |  |  |

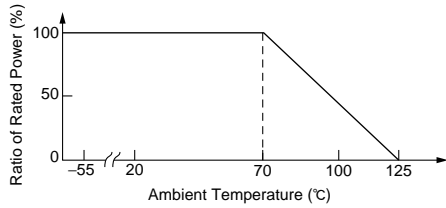
• Products with other circuits and other element numbers are also available as custom parts.

**Rating**

|                               | RGSD3Y  | RGSD4Y | RGSD5Y | RGSD6Y | RGSD7Y |
|-------------------------------|---|--------|--------|--------|--------|
| Power Rating Each Resistor *1 | 1/4W  |        |        |        |        |
| Total Rated Power             | 1/4W×Number of elements (n)   |        |        |        |        |
| Rated Voltage *2              | Rated voltage (V) = $\sqrt{\text{Power rating (W)} \times \text{Nominal resistance value } (\Omega)}$ |        |        |        |        |
| Standard Resistance           | E-12 series *3  |        |        |        |        |
| Resistance Range              | 10Ω to 1MΩ  |        |        |        |        |
| Resistance Tolerance *4       | J : ±5%, G : ±2% (22Ωmin.)  |        |        |        |        |
| Temp. Coeff. of Resistance    | ±200ppm/°C  |        |        |        |        |
| Max. Operating Voltage        | 100V  |        |        |        |        |
| Operating Temperature         | -55 to +125°C   |        |        |        |        |

\*1 Derating Curve

The rated power per element and the total rated power are derated according to the following curve.

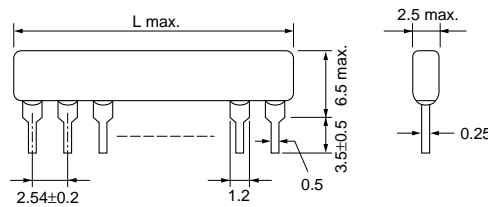


\*2 When rated voltage exceeds the max. operating voltage, the max. operating voltage shall be regarded as the rated voltage.

\*3 E-12 Standard Values  
10, 12, 15, 18, 22, 27,  
33, 39, 47, 56, 68, 82

\*4 Resistance tolerance : ±1%, T.C.R : ±100ppm/°C is also available.

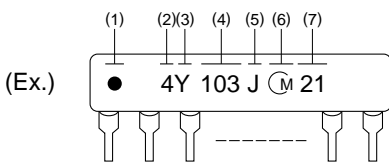
**Dimensions**



| Number of Pins | 6    | 8    | 10   | 12   | 14   |
|----------------|------|------|------|------|------|
| L              | 15.1 | 20.2 | 25.3 | 30.5 | 35.5 |

(in mm)

**Marking**



- (1) Pin 1 identification
- (2) Number of Resistors
- (3) Type (Circuit) Designation
- (4) Nominal Resistance Value (3 digits)
- (5) Resistance Tolerance
- (6) Manufacturer's Code
- (7) Date Code (Year, Month)

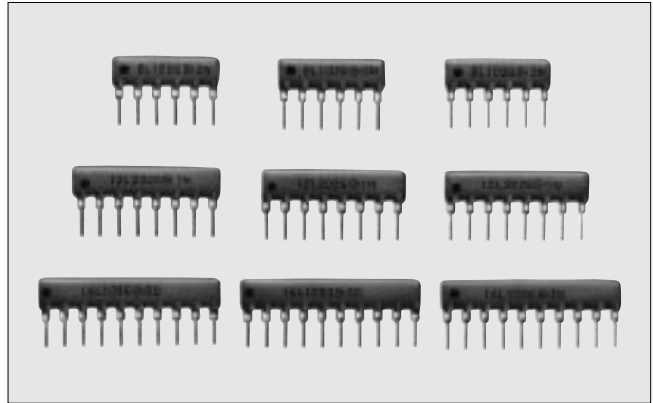
# SIP Resistor Network



## R/2R Ladder Resistor Network RGSD Series

### ■ Features

1. These high performance R/2R ladder R-networks enabled by thick film technology have a maximum of 8 bits.
2. The linearity of RGSD series R/2R ladder R-networks is guaranteed. They have the performance of  $\pm 1/2\text{LSB}$ .
3. This series has a compact design (height : 6.5mm) and is used in AD/DA converters in a variety of digital circuits and equipment.



4

### ■ Standard Circuits

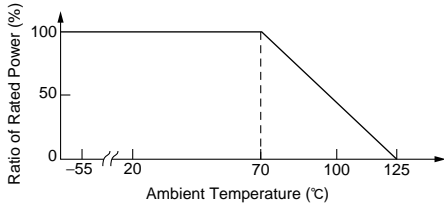
| Circuit Type | 4Bit R/R2 Ladder Circuit | 5Bit R/R2 Ladder Circuit | 6Bit R/R2 Ladder Circuit |
|--------------|--------------------------|--------------------------|--------------------------|
| Type Code    | RGSD8L Type              | RGSD10L Type             | RGSD12L Type             |
| Circuit      |                          |                          |                          |
| Circuit Type | 7Bit R/R2 Ladder Circuit |                          | 8Bit R/R2 Ladder Circuit |
| Type Code    | RGSD14L Type             |                          | RGSD16L Type             |
| Circuit      |                          |                          |                          |

■Rating

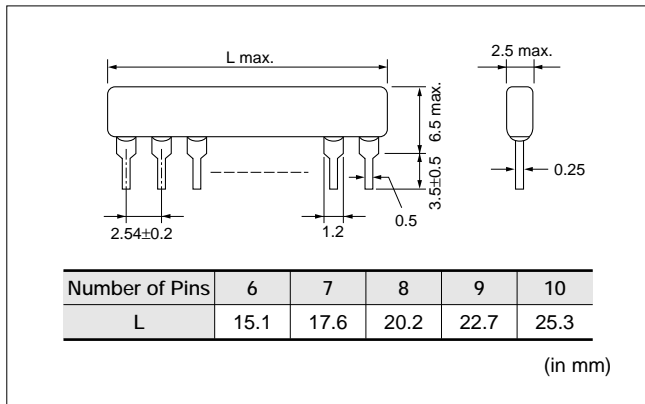
|                              |                     | RGSD8L   | RGSD10L | RGSD12L | RGSD14L | RGSD16L |
|------------------------------|---------------------|--|---------|---------|---------|---------|
| Power Rating Each Resistor * |                     | 1/32W  |         |         |         |         |
| Total Rated Power            |                     | 1/32W×Number of elements   |         |         |         |         |
| Rated Voltage                |                     | Rated voltage (V) =√Power rating (W) ×Nominal resistance value (Ω) |         |         |         |         |
| (R) Standard Resistance      |                     | 10, 20, 25, 50 Series  |         |         |         |         |
| (R) Resistance Range         |                     | 100Ω to 100kΩ  |         |         |         |         |
| Output Impedance Tolerance   |                     | G : ±2%  |         |         |         |         |
| Linearity                    | Bit Error           | ±1/2 LSB   |         |         |         |         |
|                              | Full Scale Accuracy | ±3.12%   | ±1.56%  | ±0.78%  | ±0.39%  | ±0.20%  |
| Temperature Coefficient      | Output Impedance    | ±200ppm/°C   |         |         |         |         |
|                              | Bit Voltage         | ±50ppm/°C  |         |         |         |         |
| Operating Temperature        |                     | -55 to +125°C  |         |         |         |         |

\* Derating Curve

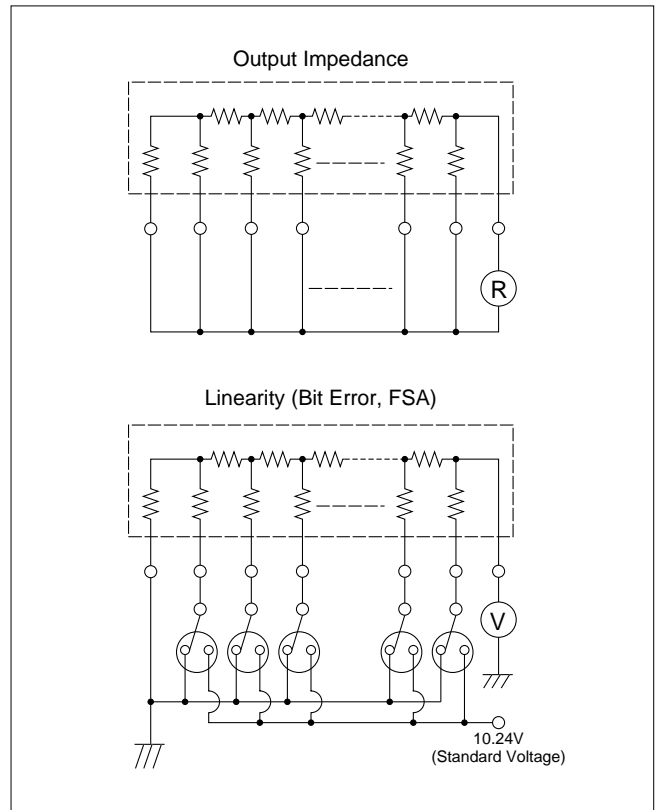
The rated power per element and the total rated power are derated according to the following curve.



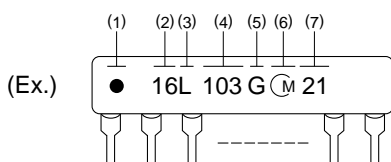
■Dimensions



■Measuring Circuit



■Marking



- (1) Pin 1 identification
- (2) Number of Resistors
- (3) Type (Circuit) Designation
- (4) Nominal Resistance Value (3 digits)
- (5) Impedance Tolerance
- (6) Manufacturer's Code
- (7) Date Code (Year, Month)

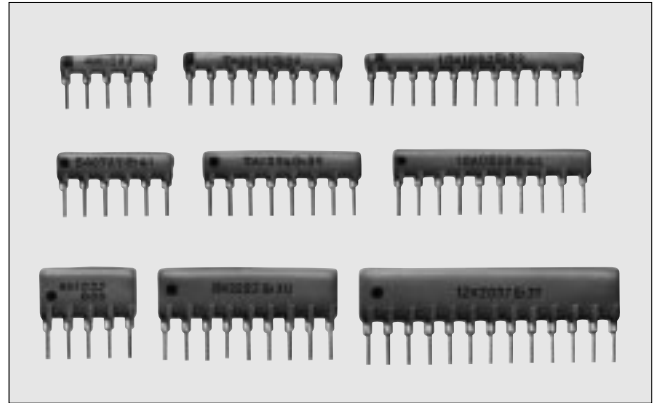
# SIP Resistor Network



## Custom Resistor Network Series

### ■Features

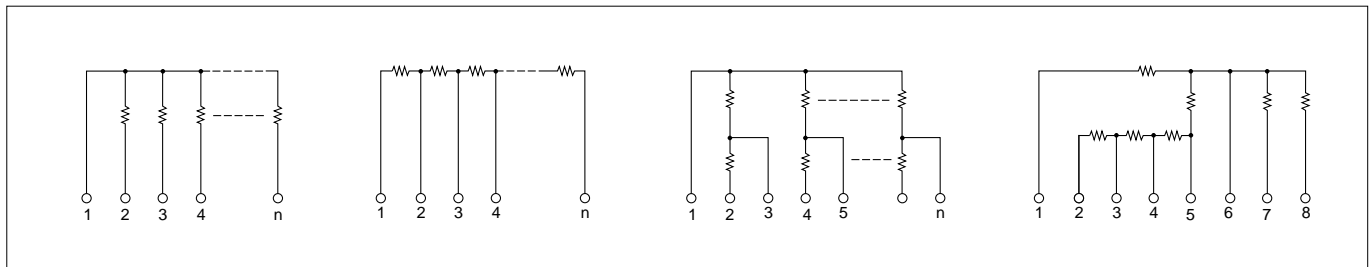
1. The profiles of custom resistor network series products range from high profile (9.0mm) to low profile (5.0mm). All R-network needs can be accommodated.
2. High accuracy performance on resistance tolerance, temperature coefficient etc, is available with high technology and high grade materials.
3. Also, on the relative precision of the performance between resistor elements, the high accuracy is available.



### ■Standard Series

| Series Name           | RGHD Series | RGSD Series | RGLD Series | RGLE Series |
|-----------------------|-------------|-------------|-------------|-------------|
| Dimensions<br>(in mm) |             |             |             |             |
| Standard No. of pins  | 4 to 14     | 4 to 14     | 4 to 14     | 4 to 16     |

### ■Example Custom Circuits



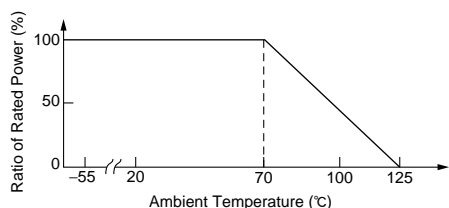
5

### Rating

|                               | RGHD Series  | RGSD Series             | RGLD Series | RGLE Series              |
|-------------------------------|--|-------------------------|-------------|--------------------------|
| Power Rating Each Resistor *1 | to 1/2W  | to 1/4W                 |             | to 1/8W                  |
| Total Rated Power *1          | 1/5X(Number of pins-1)W  | 1/8X(Number of pins-1)W |             | 1/16X(Number of pins-1)W |
| Rated Voltage *2              | Rated voltage (V) = $\sqrt{\text{Power rating (W)} \times \text{Nominal resistance value } (\Omega)}$  |                         |             |                          |
| Resistance Range              | 10 $\Omega$ to 10M $\Omega$  |                         |             |                          |
| Resistance Tolerance          | D : $\pm 0.5\%$ , (100 $\Omega$ to 100k $\Omega$ ), F : $\pm 1\%$ , (47 $\Omega$ to 220k $\Omega$ ), $\pm 2\%$ (22 $\Omega$ Over), J : $\pm 5\%$ |                         |             |                          |
| Resistance Value Ratio        | $\pm 0.5\%$ , $\pm 1\%$ , $\pm 2\%$ (Per customer's specifications)  |                         |             |                          |
| Temp. Coeff. of Resistance    | $\pm 200\text{ppm}/^\circ\text{C}$ ( $\pm 100\text{ppm}/^\circ\text{C}$ is also available)   |                         |             |                          |
| Max. Operating Voltage        | to 500V  |                         |             |                          |
| Operating Temperature         | -55 to +125 $^\circ\text{C}$   |                         |             |                          |

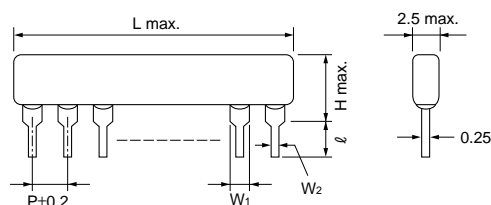
\*1 Derating Curve

The rated power per element and the total rated power are derated according to the following curve.



\*2 When rated voltage exceeds the max. operating voltage, the max. operating voltage shall be regarded as the rated voltage.

### Dimensions



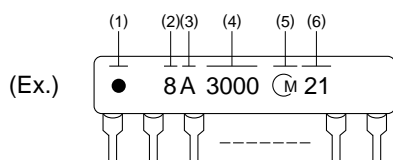
| Series    | RGHD          | RGSD | RGLD | RGLE |
|-----------|---------------|------|------|------|
| Dimension |               |      |      |      |
| H         | 9.0           | 6.5  | 5.0  | 5.0  |
| l         | 3.5 $\pm 0.5$ |      |      |      |

| Dimension | P    | W1  | W2  |
|-----------|------|-----|-----|
| Series    |      |     |     |
| RGLE      | 1.78 | 1.0 | 0.4 |
| Others    | 2.54 | 1.2 | 0.5 |

| Series | Number of Pins | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   |
|--------|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| L      | RGLE           | 7.7  | 9.5  | 11.2 | 12.9 | 14.6 | 16.4 | 18.2 | 20.0 | 21.8 | 23.5 | 25.3 | 27.1 | 28.9 |
|        | Others         | 10.1 | 12.6 | 15.1 | 17.6 | 20.2 | 22.7 | 25.3 | 27.8 | 30.5 | 33.0 | 35.5 | —    | —    |

(in mm)

### Marking



- (1) Pin 1 identification
- (2) Number of Resistors
- (3) Type (Circuit) Designation

- (4) Murata's design No.
- (5) Manufacturer's Code
- (6) Date Code (Year, Month)

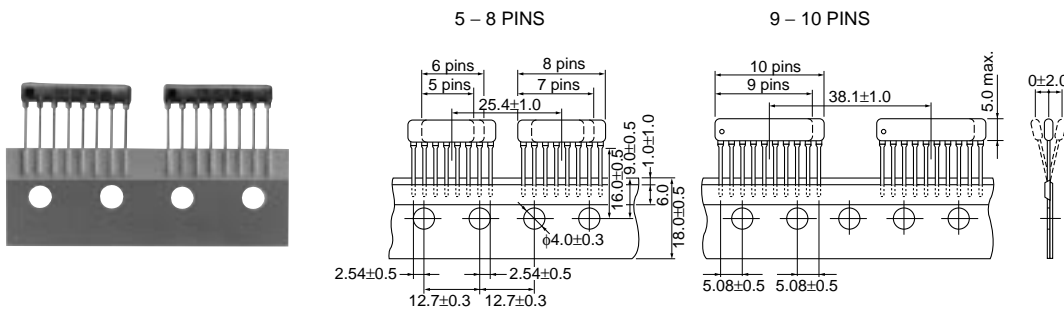
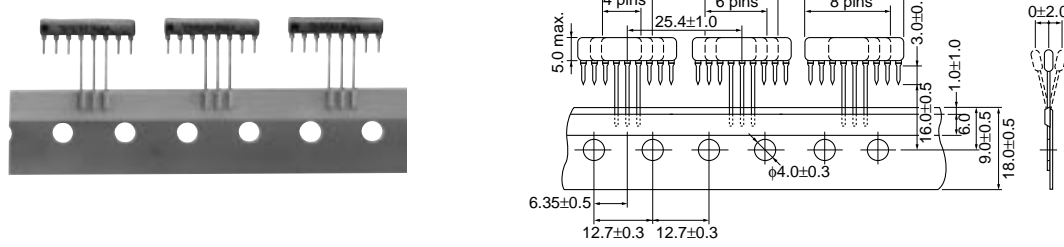
## Performance and Test Method

| Test Item                             |                          | Performance  | Test Method  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
|---------------------------------------|--------------------------|--|--|-----------------------------|--------------------------|---------|-----|----------|----------------------------------|----------|------------|------------|------------|-------------|-----------------------------------|--------|-------|--------|
| DC Resistance value                   |                          | Within the specified Value   | <p>Based on JIS C 5202 5.1. Maximum applied voltage is shown in the table below.</p> <table border="1"> <thead> <tr> <th>Nominal Resistance Range(Ω)</th> <th>Max. Applied Voltage (V)</th> </tr> </thead> <tbody> <tr> <td>&lt;100</td> <td>0.3</td> </tr> <tr> <td>100≤R&lt;1k</td> <td>1</td> </tr> <tr> <td>1k≤R&lt;10k</td> <td>3</td> </tr> <tr> <td>10k≤R&lt;100k</td> <td>10</td> </tr> <tr> <td>100k≤R&lt;1M</td> <td>25</td> </tr> <tr> <td>≥1M</td> <td>50</td> </tr> </tbody> </table>   | Nominal Resistance Range(Ω) | Max. Applied Voltage (V) | <100    | 0.3 | 100≤R<1k | 1                                | 1k≤R<10k | 3          | 10k≤R<100k | 10         | 100k≤R<1M   | 25                                | ≥1M    | 50    |        |
| Nominal Resistance Range(Ω)           | Max. Applied Voltage (V) |  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| <100                                  | 0.3                      |  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| 100≤R<1k                              | 1                        |  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| 1k≤R<10k                              | 3                        |  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| 10k≤R<100k                            | 10                       |  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| 100k≤R<1M                             | 25                       |  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| ≥1M                                   | 50                       |  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Temperature Coefficient of Resistance |                          | Within ±200ppm/°C  | <p>Based on JIS C 5202 5.2. Measure after maintaining for over 30 minutes at each stage shown in the table below, Calculation shall be made with the formula shown below.</p> <table border="1"> <thead> <tr> <th>Stage</th> <th>Temp. °C</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20±5</td> <td>Standard temp. on low-temp. side</td> </tr> <tr> <td>2</td> <td>-55±3</td> <td></td> </tr> <tr> <td>3</td> <td>20±5</td> <td>Standard temp. on high-temp. side</td> </tr> <tr> <td>4</td> <td>125±3</td> <td></td> </tr> </tbody> </table> <p>R : Actual measured resistance value(Ω) at t °C<br/> R<sub>0</sub> : Actual measured resistance value(Ω) at t<sub>0</sub> °C<br/> t : Actual measured value of test temperature (°C)<br/> t<sub>0</sub> : Actual measured value of standard temperature (°C)</p> $TCR(ppm/°C) = \frac{R-R_0}{R_0} \times \frac{1}{t-t_0} \times 10^6$ | Stage                       | Temp. °C                 | Remarks | 1   | 20±5     | Standard temp. on low-temp. side | 2        | -55±3      |            | 3          | 20±5        | Standard temp. on high-temp. side | 4      | 125±3 |        |
| Stage                                 | Temp. °C                 | Remarks  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| 1                                     | 20±5                     | Standard temp. on low-temp. side   |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| 2                                     | -55±3                    |  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| 3                                     | 20±5                     | Standard temp. on high-temp. side  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| 4                                     | 125±3                    |  |  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Short Time Overload                   |                          | No noticeable abnormalities in appearance.<br>ΔR : Within ±1.0%                                    | Apply 2.5 times the rated voltage for 5 seconds to each resistor in the network, one at a time. Maintain at room temperature for 30 minutes after remove the voltage, then measure.  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Terminal Strength                     | Pull Test                | There shall be no broken or loose pins.  | Fix the sample body and apply a load of 10N gradually to the pin in the axial direction. Maintain the force for 10 seconds.  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
|                                       | Bend Test                |  | Bend the pin by 90° in the vertical direction and return to the previous position under applying a load of 5N. And repeat a similar operation in the opposite direction.   |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Resistance to Soldering Heat          |                          | There shall be neither mechanical damage nor noticeable change in appearance.<br>ΔR : Within ±0.5% | Immerse the pin in melted solder at 260±5°C up to the level of the seating plane of pin for 10±1 second and raise. Then maintain at room temperature for over 1 hour and measure.  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Solderability                         |                          | Over 95% of the immersed part of the pins is covered with new solder.                              | Immerse the pin in a flux comprising methanol and resin (weight ratio 25%) up to the level of the seating plane of pin for 5–10seconds. Then, immerse in melted solder at 235±5°C for 2±0.5 second and raise slowly.   |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Temperature Cycling                   |                          | There shall be no mechanical damage.<br>ΔR : Within ±0.5%  | <p>Based on JIS C 5202 7.4 After repeating the 5 cycles shown in the table below, maintain at room temperature for 1–2 hours, then measure.</p> <table border="1"> <thead> <tr> <th>Stage</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp.(°C)</td> <td>-55±3</td> <td>Room Temp.</td> <td>125±2</td> <td>Room Temp.</td> </tr> <tr> <td>Time (min.)</td> <td>30</td> <td>2 to 3</td> <td>30</td> <td>2 to 3</td> </tr> </tbody> </table>  | Stage                       | 1                        | 2       | 3   | 4        | Temp.(°C)                        | -55±3    | Room Temp. | 125±2      | Room Temp. | Time (min.) | 30                                | 2 to 3 | 30    | 2 to 3 |
| Stage                                 | 1                        | 2  | 3  | 4                           |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Temp.(°C)                             | -55±3                    | Room Temp.   | 125±2  | Room Temp.                  |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Time (min.)                           | 30                       | 2 to 3   | 30   | 2 to 3                      |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Humidity                              |                          | There shall be no noticeable abnormalities in appearance.<br>ΔR : Within ±2.0%                     | Maintain without load at a constant temperature 40±2°C and constant humidity of 90–95% for 1000±48 hours. Remove and maintain at room temperature for over 1 hour, then measure.   |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Humidity Load                         |                          | There shall be no noticeable abnormalities in appearance.<br>ΔR : Within ±2.0%                     | Apply the rated voltage intermittently, 1.5 hours on and 0.5 hours off in a chamber at a constant temperature of 40±2°C and constant humidity of 90–95% for 1000±48 hours. Remove and maintain at room temperature for over 1 hour, then measure.  |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |
| Load Life                             |                          | There shall be no noticeable abnormalities in appearance.<br>ΔR : Within ±2.0%                     | Apply the rated voltage intermittently, 1.5 hours on and 0.5 hours off in a high-temperature chamber at 70±3°C for 1000±48 hours. Remove and maintain at room temperature for over 1 hour, then measure.   |                             |                          |         |     |          |                                  |          |            |            |            |             |                                   |        |       |        |

## Packaging

1. R-networks are available in two types of taping : 3-pin taping and all-pin taping.
2. 3-pin taping type is applicable to automatic insertion equivalent to 5mm pitch radial taping parts. The tips of untaped terminals are shaped by a V-cut for high accuracy insertion.

### ■Taping Dimensions

| Series | Taping Type Code | Taping Dimensions (in mm)   |
|--------|------------------|---|
| RGLD   | T1               |  <p>5 – 8 PINS                      9 – 10 PINS</p> <p>6 pins, 5 pins, 8 pins, 7 pins, 10 pins, 9 pins, 38.1±1.0, 5.0 max., 0±2.0, 25.4±1.0, 16.0±0.5, 1.0±1.0, 6.0, 18.0±0.5, 2.54±0.5, 12.7±0.3, 12.7±0.3, 5.08±0.5, 5.08±0.5, φ4.0±0.3</p> |
|        | T2               |  <p>4 – 9 PINS</p> <p>5 pins, 4 pins, 7 pins, 6 pins, 9 pins, 8 pins, 5.0 max., 25.4±1.0, 3.0±0.3, 1.0±1.0, 16.0±0.5, 6.0, 9.0±0.5, 18.0±0.5, 6.35±0.5, 12.7±0.3, 12.7±0.3, φ4.0±0.3</p>   |

### ■Standard Ammo Pack Package Quantity

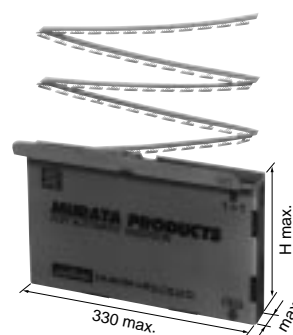
1000pcs./case

### ■Package and Marking

- H, L (Height and Length)

| Type | Number of pins | H   | L  |
|------|----------------|-----|----|
| T1   | 5 to 8         | 200 | 40 |
|      | 9 to 10        | 290 |    |
| T2   | 4 to 9         | 210 | 45 |

(in mm)



### ■Minimum Quantity

1000pcs.



## Caution/Notice

### ■ Caution

Use within rated voltage

To avoid resistor burning or breakdown, do not use beyond the rated voltage calculated by taking the square root of the product of rated power and nominal resistance value.

### ■ Notice

#### 1. Handling after mounting to PCB

Do not bend the product after mounting and soldering the product. If subjected to mechanical stress, the resistor may become damaged.

#### 2. Confirmation of resistor operation in application

Ensure proper performance of the product in your application.

#### 3. Environmental conditions

Do not use or store the product in locations containing corrosive gasses (Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>x</sub>, etc.) or having such high humidity as will dew as the product's resin coating does not form a perfect seal.

## ISO 9000 Certifications

Manufacturing plants of these products in this catalog have obtained the ISO9002 quality system certificate.

| Plant                                    | Certified Date | Organization | Registration No. |
|--|----------------|--------------|------------------|
| Kanazu Murata<br>Manufacturing Co., Ltd. | July. 1. 1998  | UL*          | A6734            |

\* UL : Underwriters Laboratories Inc.

**⚠ Note:**

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⟨For customers outside Japan⟩

Murata products should not be used or sold for use in the development, production, stockpiling or utilization of any conventional weapons or mass-destructive weapons (nuclear weapons, chemical or biological weapons, or missiles), or any other weapons.

⟨For customers in Japan⟩

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2. Please contact our sales representatives or product engineers before using our products listed in this catalog for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property, or when intending to use one of our products for other applications than specified in this catalog.

- ① Aircraft equipment
- ② Aerospace equipment
- ③ Undersea equipment
- ④ Power plant equipment
- ⑤ Medical equipment
- ⑥ Transportation equipment (vehicles, trains, ships, etc.)
- ⑦ Traffic signal equipment
- ⑧ Disaster prevention / crime prevention equipment
- ⑨ Data-processing equipment
- ⑩ Application of similar complexity and/or reliability requirements to the applications listed in the above

3. Product specifications in this catalog are as of November 2001. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before your ordering. If there are any questions, please contact our sales representatives or product engineers.

4. Please read CAUTION and Notice in this catalog for safety. This catalog has only typical specifications. Therefore you are requested to approve our product specification or to transact the approval sheet for product specification, before your ordering.

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