



# Metal thin film chip resistors (Ultra-precision)

■ RG series (This series now includes the former RGH series.)

## Features

- Ultimate chip resistors: the result of all of our thin film technology expertise including inorganic passivation
- Resistance drift: less than  $\pm 0.1\%$  after 10000 hour accelerated reliability test
- $\pm 0.02\%$  of resistance tolerance and  $\pm 5\text{ppm}/^\circ\text{C}$  of temperature coefficient of resistance
- Excellent tolerance to power surges

## Applications

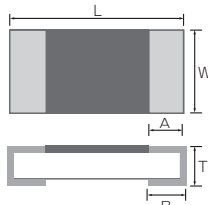
- Any applications that require precision resistors such as automotive electronics, industrial test and measurement equipment, and consumer electronics

## Specifications

\* Standard stock item: E-24 series with TCR P, Q, and R grades, as well as tolerance D and B grades. Other E-24 grades and E-96 series are made to order

unit : mm

### Dimensions



| Dimension (inch) | RG1005 (0402)<br>OLD:RGH1005 included | RG1608 (0603)<br>OLD:RGH1608 included | RG2012 (0805)<br>OLD:RGH2012 included | RG3216 (1206)  |
|------------------|---------------------------------------|---------------------------------------|---------------------------------------|----------------|
| L                | $1.0 \pm 0.05$                        | $1.6 \pm 0.2$                         | $2.0 \pm 0.2$                         | $3.2 \pm 0.2$  |
| W                | $0.5 \pm 0.05$                        | $0.8 \pm 0.2$                         | $1.25 \pm 0.2$                        | $1.6 \pm 0.2$  |
| A                | $0.2 \pm 0.10$                        | $0.3 \pm 0.2$                         | $0.4 \pm 0.2$                         | $0.5 \pm 0.25$ |
| B                | $0.25 \pm 0.05$                       | $0.3 \pm 0.2$                         | $0.4 \pm 0.2$                         | $0.5 \pm 0.2$  |
| T                | $0.35 \pm 0.05$                       | $0.4 \pm 0.1$                         | $0.4 \pm 0.1$                         | $0.4 \pm 0.1$  |

**NOTE** Obsolete : RGH1005 (0402) RGH:1608-2C (0603) RGH2012 (0805)  
Alternative P/N : RG1005 (0402) RG1608(0603) RG2012 (0805)

### Electrical characteristics

| Series name                                    |                           | RG1005                  |           |             |           | RG1608                  |           |             |             |            |            |
|------------------------------------------------|---------------------------|-------------------------|-----------|-------------|-----------|-------------------------|-----------|-------------|-------------|------------|------------|
| Rated power*1                                  | High power application    | 1/8W (OLD : RGH1005-2B) |           |             |           | 1/6W (OLD : RGH1608-2C) |           |             |             |            |            |
|                                                | Regular power application | 1/16W                   |           |             |           | 1/10W                   |           |             |             |            |            |
|                                                | High precision            | 1/32W                   |           |             |           | 1/16W                   |           |             |             |            |            |
| E series offered                               |                           | E-24, E-96              |           |             |           |                         |           |             |             |            |            |
| Resistance range (Ω)                           |                           | 10 ~ 46.4               | 47 ~ 97.6 | 100 ~ 2.94k | 3k ~ 100k | 10 ~ 46.4               | 47 ~ 97.6 | 100 ~ 4.99k | 5.1k ~ 270k | 274 ~ 332k | 340 ~ 360k |
| Resistance tolerance (%)                       | ±0.02% (P)                | —                       | —         | ○           | —         | —                       | —         | ○           | —           | —          | —          |
|                                                | ±0.05% (W)                | —                       | ○         | ○           | ○         | —                       | ○         | ○           | ○           | —          | —          |
|                                                | ±0.1% (B)                 | —                       | ○         | ○           | ○         | —                       | ○         | ○           | ○           | ○          | —          |
|                                                | ±0.25% (C)                | —                       | ○         | ○           | ○         | —                       | ○         | ○           | ○           | ○          | —          |
|                                                | ±0.5% (D)                 | ○                       | ○         | ○           | ○         | ○                       | ○         | ○           | ○           | ○          | ○          |
| Temperature coefficient of resistance (ppm/°C) | ±5 (V)                    | —                       | —         | ○           | —         | —                       | —         | ○           | —           | —          | —          |
|                                                | ±10 (N)                   | —                       | ○         | ○           | ○         | —                       | ○         | ○           | ○           | —          | —          |
|                                                | ±25 (P)                   | —                       | ○         | ○           | ○         | —                       | ○         | ○           | ○           | ○          | ○          |
|                                                | ±50 (Q)                   | —                       | —         | —           | —         | ○                       | —         | —           | —           | —          | —          |
|                                                | ±100 (R)                  | ○                       | —         | —           | —         | —                       | —         | —           | —           | —          | —          |
| Maximum voltage                                |                           | 25V                     |           |             |           | 75V                     |           |             |             |            |            |
| Operating temperature                          |                           | -55℃~155℃               |           |             |           | -55℃~155℃               |           |             |             |            |            |
| Packaging                                      | 5,000pcs                  | CodeT5                  |           |             |           | CodeT5                  |           |             |             |            |            |
|                                                | 10,000pcs                 | CodeT10                 |           |             |           | —                       |           |             |             |            |            |

| Series name                                    |                           | RG2012                 |           |           |              |           | RG3216      |           |             |          |
|------------------------------------------------|---------------------------|------------------------|-----------|-----------|--------------|-----------|-------------|-----------|-------------|----------|
| Rated power*1                                  | High power application    | 1/4W(OLD : RGH2012-2E) |           |           |              |           | —           |           |             |          |
|                                                | Regular power application | 1/8W                   |           |           |              |           | 1/4W        |           |             |          |
|                                                | High precision            | 1/10W                  |           |           |              |           | 1/8W        |           |             |          |
| E series offered                               |                           | E-24, E-96             |           |           |              |           |             |           |             |          |
| Resistance range(Ω)                            |                           | 10 ~ 46.4              | 47 ~ 97.6 | 100 ~ 10k | 10.2k ~ 475k | 487k ~ 1M | 10 ~ 46.4   | 47 ~ 97.6 | 100 ~ 33.2k | 34k ~ 1M |
| Resistance tolerance (%)                       | ±0.02% (P)                | —                      | —         | ○         | —            | —         | —           | —         | ○           | —        |
|                                                | ±0.05% (W)                | —                      | —         | ○         | ○            | —         | —           | ○         | ○           | ○        |
|                                                | ±0.1% (B)                 | —                      | ○         | ○         | ○            | ○         | —           | ○         | ○           | ○        |
|                                                | ±0.25% (C)                | —                      | ○         | ○         | ○            | ○         | —           | ○         | ○           | ○        |
|                                                | ±0.5% (D)                 | ○                      | ○         | ○         | ○            | ○         | ○           | ○         | ○           | ○        |
| Temperature coefficient of resistance (ppm/°C) | ±5 (V)                    | —                      | —         | ○         | —            | —         | —           | —         | ○           | —        |
|                                                | ±10 (N)                   | —                      | ○         | ○         | ○            | —         | —           | ○         | ○           | ○        |
|                                                | ±25 (P)                   | —                      | ○         | ○         | ○            | ○         | —           | ○         | ○           | ○        |
|                                                | ±50 (Q)                   | ○                      | —         | —         | —            | —         | ○           | —         | —           | —        |
|                                                | Maximum voltage           |                        | 100V      |           |              |           |             | 150V      |             |          |
| Operating temperature                          |                           | -55℃ ~ 155℃            |           |           |              |           | -55℃ ~ 155℃ |           |             |          |
| Packaging                                      | 5,000pcs                  | CodeT5                 |           |           |              |           | CodeT5      |           |             |          |

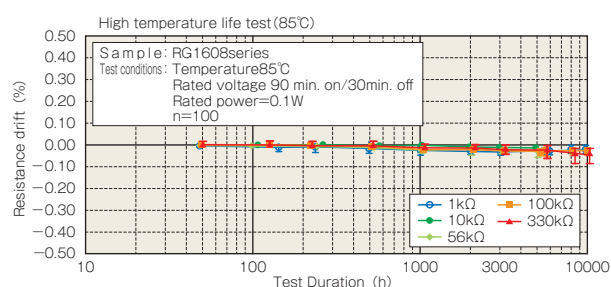
\*1 Depending on customer's reliability requirements, power rating between high power and regular power can be selected.  
· Contact us for RG3225 with 1/2W rated power.

## Reliability characteristics

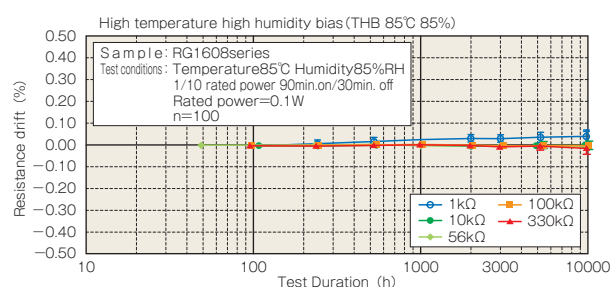
| Item                      | Test Method                                                                                                                                | Specification: drift limits for each power rating |        |         |        |      |       | (Typical) |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|--------|---------|--------|------|-------|-----------|
|                           |                                                                                                                                            | Low                                               |        | Regular |        | High |       |           |
|                           |                                                                                                                                            | ≤47Ω                                              | ≥47Ω   | ≤47Ω    | ≥47Ω   | ≤47Ω | ≥47Ω  |           |
| Short time Overload       | Applied voltage : 2.5Xrated voltage or 2 X Maximum operating voltage<br>which ever is less test duration: 5 seconds                        | ±0.1%                                             | ±0.05% | ±0.1%   | ±0.05% | —    | ±0.1% | ±(0.01%)  |
| Load Life                 | Test Temperature : 85℃      Applied voltage: rated voltage<br>Test period : repeat 1000 cycle as follow : 90 min./30 min. off cycled       | ±0.25%                                            | ±0.1%  | ±0.5%   | ±0.25% | —    | ±0.5% | ±(0.01%)  |
| Moisture load life        | Test condition : 85℃ 85% RH      Applied power: 1/10 rated Power<br>Test period : repeat 1000 cycle as follow : 90 min./30 min. off cycled | ±0.25%                                            | ±0.1%  | ±0.5%   | ±0.25% | —    | ±0.5% | ±(0.05%)  |
| Temperature Cycle         | Repeat 1000 cycle as follow :<br>—55℃ (30 min.)/Room Temp.(2 min.) / +125℃ (30min.)/Room Temp.(2min.)                                      | ±0.25%                                            | ±0.1%  | ±0.25%  | ±0.1%  | —    | ±0.1% | ±(0.01%)  |
| High temperature Exposure | +155℃ for 1000 hours with no load                                                                                                          | ±0.25%                                            | ±0.1%  | ±0.25%  | ±0.1%  | —    | ±0.1% | ±(0.01%)  |

## 10000 hour reliability test data

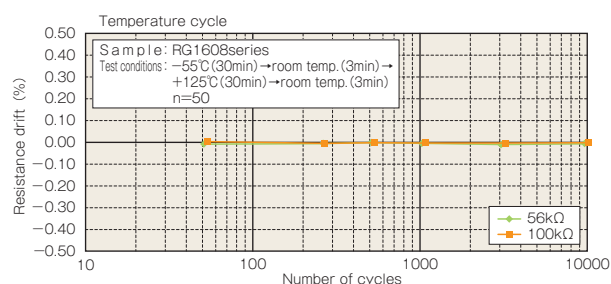
## Life test



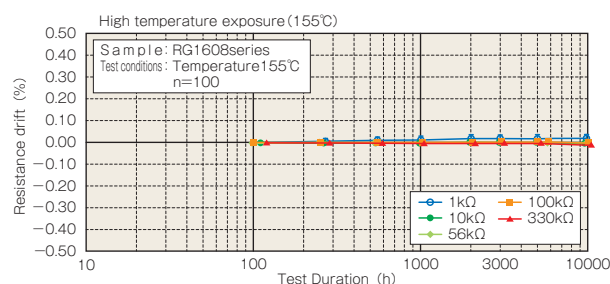
## High temperature high humidity bias test



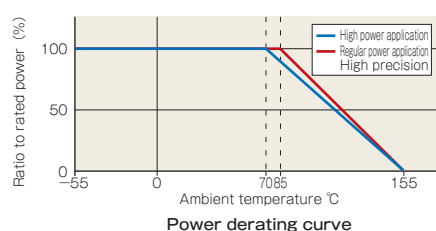
## Temperature cycle test



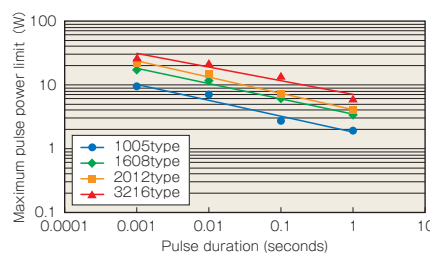
## High temperature exposure test



## Power derating characteristics



## Maximum pulse power limit



## Test procedure

Voltage pulse is applied to the test samples mounted on the test board.

After each pulse, resistance drift is measured. Pulse voltage is increased until the drift exceeds  $\pm 0.5\%$ . The power at that voltage is defined as the maximum pulse power.

## Part numbering system

(New name) **RG 1608**

**N-102-B-T5**

Packaging: T5 (5000pcs) T10 (10000pcs)  
Resistance tolerance

Resistance value  
(E-24:3digit, E-96:4digit, RG3216:all 4 digit)

Temperature coefficient of resistance  
Power (2B:1/8W, 2C:1/6W, 2E:1/4W)

Size

Series code

(Old name) **RGH 1608 2C-N-102-B-T5**