

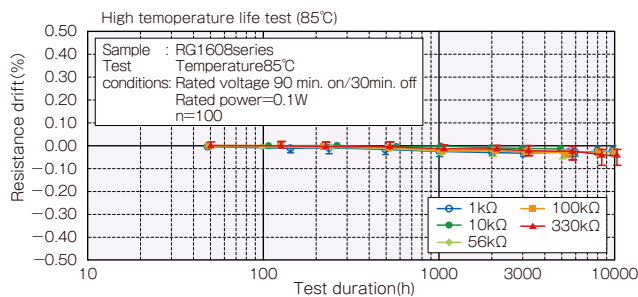
## ◆ Reliability specification

| Test Items                     | Condition (test methods)                                         | Low             |                 | Regular         |                 | High            |                 | Typical        |
|--------------------------------|------------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|
|                                |                                                                  | $\leq 47\Omega$ | $\geq 47\Omega$ | $\leq 47\Omega$ | $\geq 47\Omega$ | $\leq 47\Omega$ | $\geq 47\Omega$ | Low            |
| Short time overload            | 2.5 x rated voltage, <sup>*1</sup> 5 seconds                     | $\pm 0.10\%$    | $\pm 0.05\%$    | $\pm 0.10\%$    | $\pm 0.05\%$    | —               | $\pm 0.10\%$    | $\pm (0.01\%)$ |
| Life (biased)                  | 70°C, rated voltage, <sup>*1</sup> 90min on 30min off, 1000hours | $\pm 0.25\%$    | $\pm 0.10\%$    | $\pm 0.50\%$    | $\pm 0.25\%$    | —               | $\pm 0.50\%$    | $\pm (0.01\%)$ |
| High temperature high humidity | 85°C, 85%RH, 1/10 of rated power, 90min on 30min off, 1000hours  | $\pm 0.25\%$    | $\pm 0.10\%$    | $\pm 0.50\%$    | $\pm 0.25\%$    | —               | $\pm 0.50\%$    | $\pm (0.05\%)$ |
| Temperature shock              | -55°C (30min) ~ 125°C (30min) 1000cycles                         | $\pm 0.25\%$    | $\pm 0.10\%$    | $\pm 0.25\%$    | $\pm 0.10\%$    | —               | $\pm 0.10\%$    | $\pm (0.01\%)$ |
| High temperature exposure      | 155°C, no bias, 1000hours                                        | $\pm 0.25\%$    | $\pm 0.10\%$    | $\pm 0.25\%$    | $\pm 0.10\%$    | —               | $\pm 0.10\%$    | $\pm (0.01\%)$ |
| Resistance to soldering heat   | 260 $\pm 5$ °C, 10 seconds (reflow)                              | $\pm 0.1\%$     | $\pm 0.1\%$     | $\pm 0.1\%$     | $\pm 0.1\%$     | —               | $\pm 0.1\%$     | $\pm (0.01\%)$ |

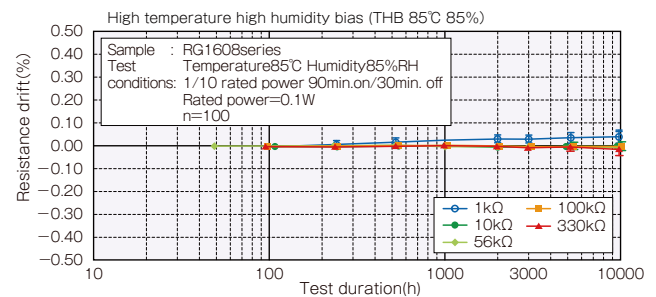
\*1 Rated voltage is given by  $E = \sqrt{R \times P}$  E= rated voltage (V), R=nominal resistance value( $\Omega$ ), P=rated power(W)  
If rated voltage exceeds maximum voltage /element, maximum voltage/element is the rated voltage.

## ◆ 10000 hour reliability test data

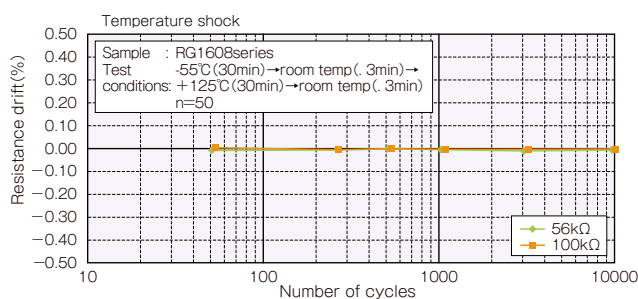
### ○ Biased life test



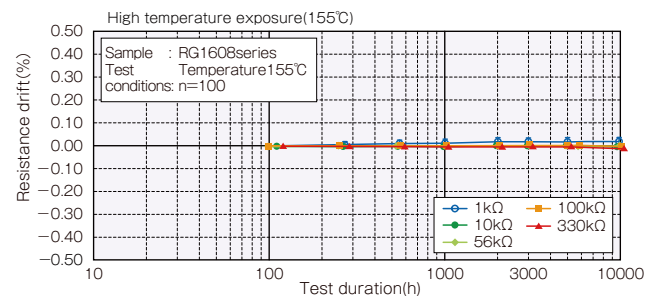
### ○ High temperature high humidity (biased)



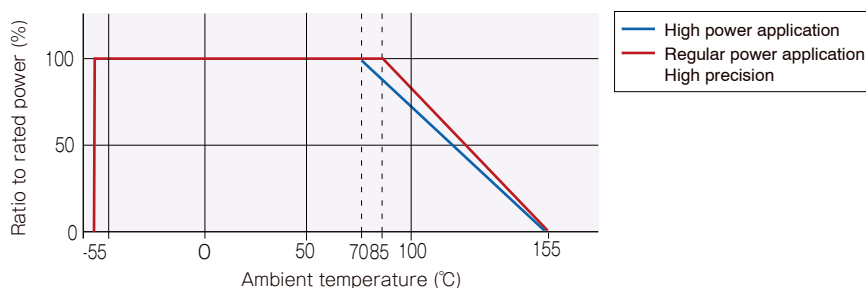
### ○ Temperature shock



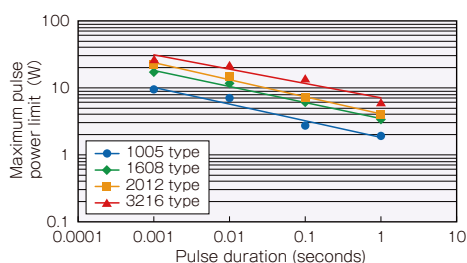
### ○ High temperature exposure



## ◆ Derating Curve



## ◆ 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.