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# Metal thin film chip resistors (the highest precision)

■ RG series

AEC-Q200 Compliant

## Features

- Long term stability with inorganic passivation
- Less than  $\pm 0.1\%$  drift after 10000 hours of reliability test
- High precision resistance tolerance:  $\pm 0.05\%$ , very small TCR:  $\pm 5\text{ppm}/^\circ\text{C}$
- Thin film structure enabling low noise and anti-sulfur

## Applications

- Automotive electronics
- Industrial measurement instrumentation, industrial machines
- Various sensors, medical electronics



Thin film surface mount resistors



RG series

## ◆ Part numbering system

**RG 1608 N - 102 - B - T5**

Series code

Size: RG1005, RG1608, RG2012, RG3216

Temperature coefficient of resistance

Packaging quantity:  
T5(5,000pcs), T10(10,000pcs)

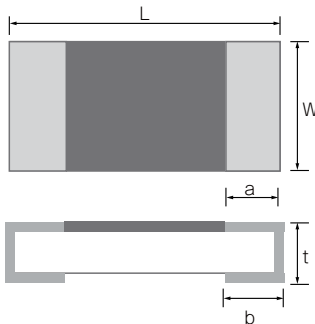
Resistance tolerance

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

## ◆ Electrical Specification

Type	Power ratings			Temperature coefficient of resistance (ppm/°C)	Resistance range (Ω) Resistance tolerance (%)				Maximum voltage	Resistance value series	Operating temperature	Packaging quantity	
	Low	Regular	High		$\pm 0.02\%$ (P)	$\pm 0.05\%$ (W)	$\pm 0.1\%$ (B)	$\pm 0.5\%$ (D)					
RG1005	1/32W	1/16W	1/8W	$\pm 5$ (V)	100 $\leq$ R<3k				75V			T5 T10	
				$\pm 10$ (N)	100 $\leq$ R<3k	47 $\leq$ R<100k							
				$\pm 25$ (P)	100 $\leq$ R<3k	47 $\leq$ R<100k		47 $\leq$ R<150k					
				$\pm 100$ (R)	—	—	—	10 $\leq$ R<47					
RG1608	1/16W	1/10W	1/6W	$\pm 5$ (V)	100 $\leq$ R<5.1k				100V			T5	
				$\pm 10$ (N)	100 $\leq$ R<5.1k	47 $\leq$ R $\leq$ 270k							
				$\pm 25$ (P)	100 $\leq$ R<5.1k	47 $\leq$ R $\leq$ 270k	47 $\leq$ R $\leq$ 332k	47 $\leq$ R $\leq$ 1M					
				$\pm 50$ (Q)	—	—	—	10 $\leq$ R<47					
RG2012	1/10W	1/8W	1/4W	$\pm 5$ (V)	100 $\leq$ R<10.2k				150V			T5	
				$\pm 10$ (N)	100 $\leq$ R<10.2k	47 $\leq$ R $\leq$ 475k							
				$\pm 25$ (P)	100 $\leq$ R<10.2k	47 $\leq$ R $\leq$ 475k	47 $\leq$ R $\leq$ 2.7M						
				$\pm 50$ (Q)	—	—	—	10 $\leq$ R<47					
RG3216	1/8W	1/4W	—	$\pm 5$ (V)	100 $\leq$ R<33.2k				200V				
				$\pm 10$ (N)	100 $\leq$ R<33.2k	47 $\leq$ R $\leq$ 1M							
				$\pm 25$ (P)	100 $\leq$ R<33.2k	47 $\leq$ R $\leq$ 1M	47 $\leq$ R $\leq$ 5.1M						
				$\pm 50$ (Q)	—	—	—	10 $\leq$ R<47					

## ◆ Dimensions



Type	Size (inch)	L	W	a	b	t
RG1005	0402	1.00 $\pm$ 0.1/-0.05	0.50 $\pm$ 0.05	0.20 $\pm$ 0.10	0.25 $\pm$ 0.05	0.35 $\pm$ 0.05
RG1608	0603	1.60 $\pm$ 0.20	0.80 $\pm$ 0.20	0.30 $\pm$ 0.20	0.30 $\pm$ 0.20	0.40 $\pm$ 0.10
RG2012	0805	2.00 $\pm$ 0.20	1.25 $\pm$ 0.20	0.40 $\pm$ 0.20	0.40 $\pm$ 0.20	0.40 $\pm$ 0.10
RG3216	1206	3.20 $\pm$ 0.20	1.60 $\pm$ 0.20	0.50 $\pm$ 0.25	0.50 $\pm$ 0.20	0.40 $\pm$ 0.10

(unit : mm)

## ◆ Reliability specification

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

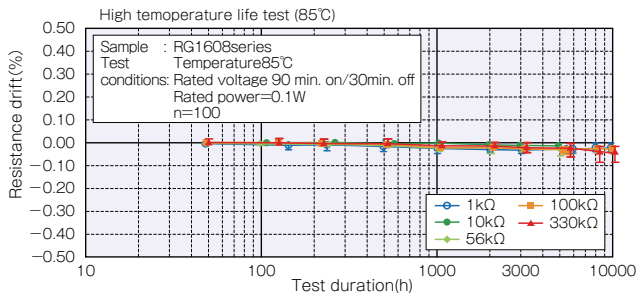
\*1 Rated voltage is given by  $E = \sqrt{R \times P}$  E= rated voltage (V), R=nominal resistance value(Ω), P=rated power(W)  
If rated voltage exceeds maximum voltage /element, maximum voltage/element is the rated voltage.

Thin film surface mount resistors

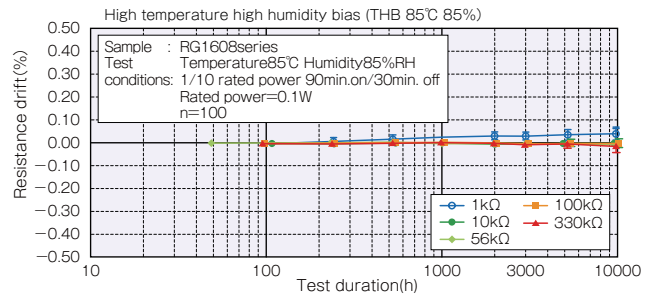
RG series

## ◆ 10000 hour reliability test data

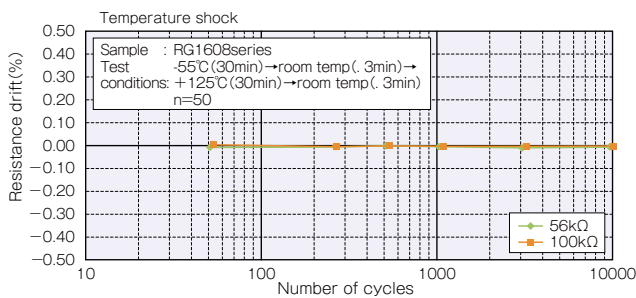
### ○ Biased life test



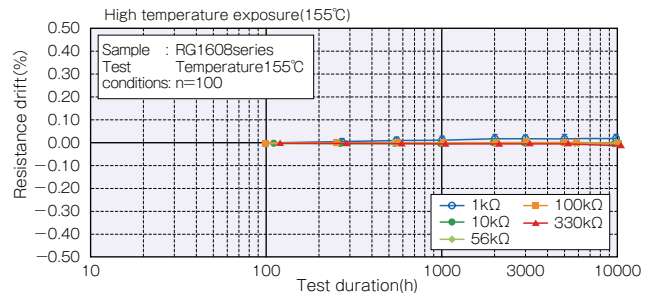
### ○ High temperature high humidity (biased)



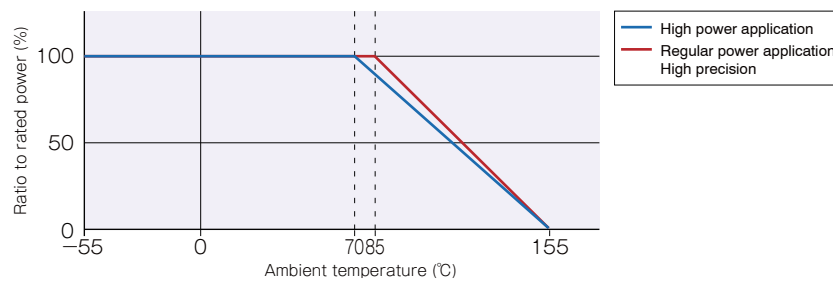
### ○ Temperature shock



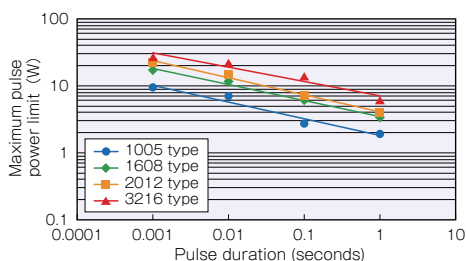
### ○ High temperature exposure



## ◆ 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 +/-0.5%.  
The power at that voltage is defined as the maximum pulse power.