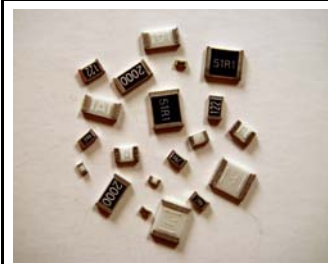




**Product Family:** [Ultra Reliable Chip Resistor](#)

**Part Number Series:** [CR Series](#)



**Construction:**

- High Purity Alumina Substrate
- Ni alloy thin-film resistive element
- SiO<sub>2</sub> protective barrier
- Wrap around electrodes
- 100% matte tin over Ni terminations

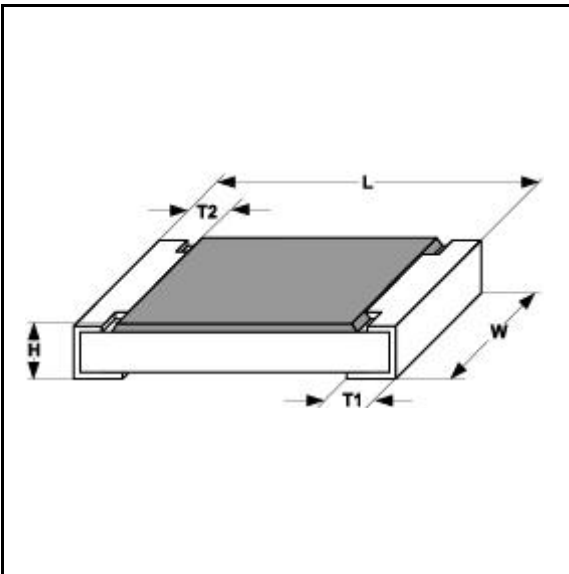
**Features:**

- 0402, 0603, 0805 and 1206 sizes
- TCR's down to  $\pm 5$  ppm/ $^{\circ}$ C
- Resistance down to 10 $\Omega$  available
- SiO<sub>2</sub> barrier provides exceptional stability and reliability
- High volume production suitable for commercial and special applications

**Description:**

These highly stable precision chip resistors are perfect for demanding applications where high reliability is a must, such as automotive applications. The incorporation of a SiO<sub>2</sub> protective barrier protects the products and allows for a very stable product with excellent long term reliability.

**Product Dimensions:**



Dimension	CR0402 (1005)	CR0603 (1608)	CR0805 (2012)	CR1206 (3216)
L	0.040 $\pm 0.002$	0.063 $\pm 0.008$	0.079 $\pm 0.008$	0.126 $\pm 0.008$
W	0.020 $\pm 0.002$	0.031 $\pm 0.008$	0.049 $\pm 0.008$	0.063 $\pm 0.008$
H	0.014 $\pm 0.002$	0.016 $\pm 0.004$	0.016 $\pm 0.004$	0.016 $\pm 0.004$
T1	0.010 $\pm 0.004$	0.012 $\pm 0.008$	0.016 $\pm 0.008$	0.018 $\pm 0.008$
T2	0.008 $\pm 0.004$	0.012 $\pm 0.008$	0.016 $\pm 0.008$	0.016 $\pm 0.008$

All dimensions are shown in inches. Metric case sizes are shown in parenthesis.

**Part Numbering:** Ex: CR0603E2002B-T5

Product Designator	Size W x L (English)	Temp. Coefficient of Resistance (TCR)	Resistance Value	Resistance Tolerance	T&R Packaging Quantity
CR	0402 0603 0805 1206	M = $\pm 5$ ppm/ $^{\circ}$ C Y = $\pm 10$ ppm/ $^{\circ}$ C E = $\pm 25$ ppm/ $^{\circ}$ C Q = $\pm 50$ ppm/ $^{\circ}$ C	4 digits with the first 3 being significant. The last digit specifies the number of zeros. "R" denotes decimal position as necessary	Q = $\pm 0.02\%$ A = $\pm 0.05\%$ B = $\pm 0.10\%$ D = $\pm 0.50\%$	-T1 = 1,000 -T5 = 5,000 -T10 = 10,000 (see note)

Note: Refer to available package sizes in the Electrical Specifications section of this document. When requesting quotes or ordering parts, it is not necessary to add the T&R package quantity (-T#) to the end of the part number. This will be added by us based on the quantity ordered.

**Electrical Specifications:**

Type		CR0402				CR0603					
Power	High power	1/8 Watt (Old RGH1005-2B)				1/6 Watt (Old RGH1608-2C)					
	Normal power	1/16 Watt				1/10 Watt					
	Ultra-reliability	1/32 Watt				1/16 Watt					
Tolerance% (code)		±0.5(D)	±0.05(A), ±0.1(B), ±0.5(D)	±0.02(Q), ±0.05(A), ±0.1(B), ±0.5(D)	±0.05(A), ±0.1(B), ±0.5(D)	±0.5(D)	±0.05(A), ±0.1(B), ±0.5(D)	±0.02(Q), ±0.05(A), ±0.1(B), ±0.5(D)	±0.05(A), ±0.1(B), ±0.5(D)	±0.1(B), ±0.5(D)	±0.5(D)
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 Offering		E-24, E-96 Values									
TCR ppm/°C (code)		±100 (R)	±10 (Y) ±25 (E)	±5 (M) ±10 (Y) ±25 (E)	±10 (Y) ±25 (E)	±50 (Q)	±10 (Y) ±25 (E)	±5 (M) ±10 (Y) ±25 (E)	±10 (Y) ±25 (E)	±25 (E)	±25 (E)
Max Operating Voltage		25 V				75 V					
Operating Temp. Range		-55°C ~ 155°C									
Packaging		1,000pcs/reel (T1: 0.02% tolerance, 5ppm TCR only) 5,000 pcs/reel (T5) or 10,000pcs/reel (T10): All tolerance/TCR combinations other than 0.02% tolerance, 5ppm TCR )				1,000pcs/reel (T1: 0.02% tolerance, 5ppm TCR only) 5,000pcs/reel (T5: All tolerance/TCR combinations other than 0.02% tolerance, 5ppm TCR )					

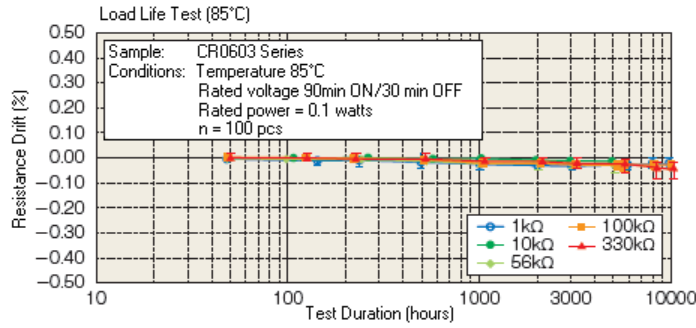
Type		CR0805					CR1206				
Power	High power	1/4 Watt (Old RGH2012-2E)					-----				
	Normal power	1/8 Watt					1/4 Watt				
	Ultra-reliability	1/10 Watt					1/8 Watt				
Tolerance% (code)		±0.5(D)	±0.05(A), ±0.1(B), ±0.5(D)	±0.02(Q), ±0.05(A), ±0.1(B), ±0.5(D)	±0.05(A), ±0.1(B), ±0.5(D)	±0.1(B), ±0.5(D)	±0.5(D)	±0.05(A), ±0.1(B), ±0.5(D)	±0.02(Q), ±0.05(A), ±0.1(B), ±0.5(D)	±0.05(A), ±0.1(B), ±0.5(D)	
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 Offering		E-24, E-96 Values									
TCR ppm/°C (code)		±50 (Q)	±10 (Y) ±25 (E)	±5 (M) ±10 (Y) ±25 (E)	±10 (Y) ±25 (E)	±25 (E)	±50 (Q)	±10 (Y) ±25 (E)	±5 (M) ±10 (Y) ±25 (E)	±10 (Y) ±25 (E)	
Max Operating Voltage		100 V					150 V				
Operating Temp. Range		-55°C ~ 155°C									
Packaging		1,000pcs/reel (T1: 0.02% tolerance, 5ppm TCR only) 5,000pcs/reel (T5: All tolerance/TCR combinations other than 0.02% tolerance, 5ppm TCR )					1,000pcs/reel (T1: 0.02% tolerance, 5ppm TCR only) 5,000pcs/reel (T5: All tolerance/TCR combinations other than 0.02% tolerance, 5ppm TCR )				

**Reliability Specifications:**

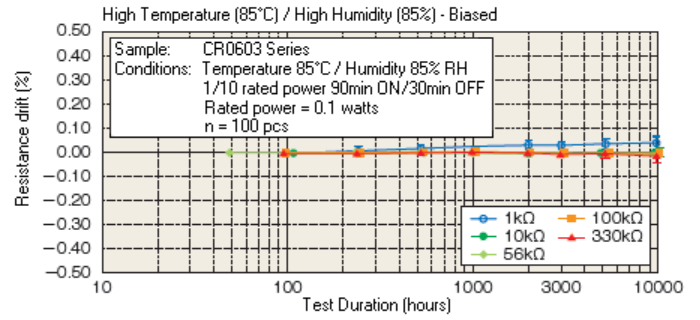
Test	Test Method	Specification: drift limits for each power rating						Typical
		Low Power (Ultra Reliable)		Regular Power		High Power		
		≤ 47Ω	≥ 47Ω	≤ 47Ω	≥ 47Ω	≤ 47Ω	≥ 47Ω	
Short Time Overload	Applied voltage: 2.5X rated voltage or 2X maximum operating voltage, whichever is less. Test duration: 5 seconds	± 0.1%	± 0.05%	± 0.1%	± 0.05%	---	± 0.1%	± (0.01%)
Load Life	Test Temperature: 85°C Applied voltage: rated voltage Test period: 1000 hours with power cycling as follows: 90 min. power ON/30 min. power OFF,	± 0.25%	± 0.1%	± 0.5%	± 0.25%	---	± 0.5%	± (0.01%)
Moisture Load Life	Test Condition: 85°C/85% RH Applied voltage: 1/10 rated power Test period: 1000 hours with power cycling as follows: 90 min. power ON/30 min. power OFF	± 0.25%	± 0.1%	± 0.5%	± 0.25%	---	± 0.5%	± (0.05%)
Temperature Cycle	Repeat 1000 cycles as follows: -55°C(30 min.) / Room temp (2 min) / +125°C(30 min.) / Room temp (2 min)	± 0.25%	± 0.1%	± 0.25%	± 0.1%	---	± 0.1%	± (0.01%)
High Temperature Exposure	+155°C for 1000 hours with no load	± 0.25%	± 0.1%	± 0.25%	± 0.1%	---	± 0.1%	± (0.01%)

## Reliability Testing Graphs:

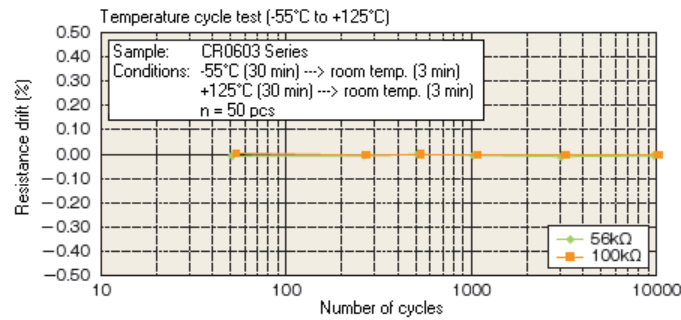
### Load Life



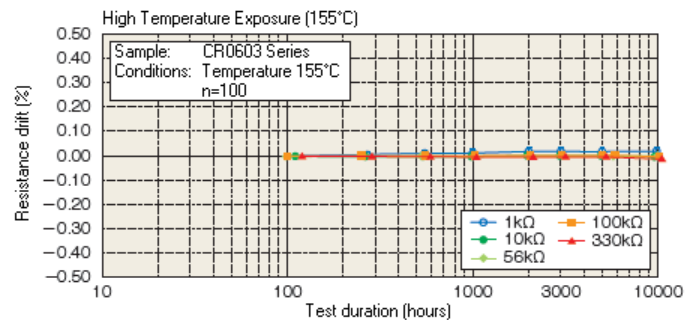
### Moisture Load Life (85/85)



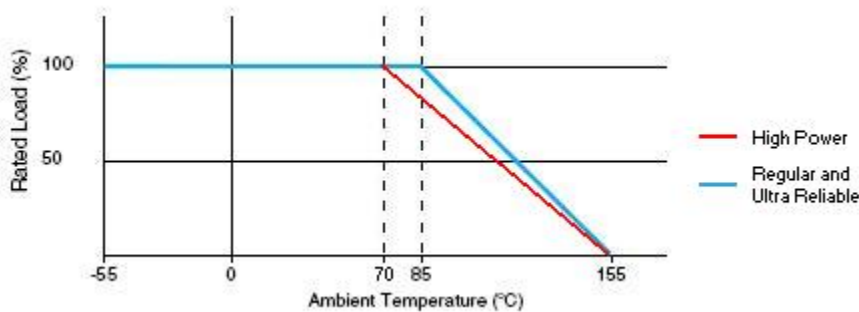
### Temperature Cycle



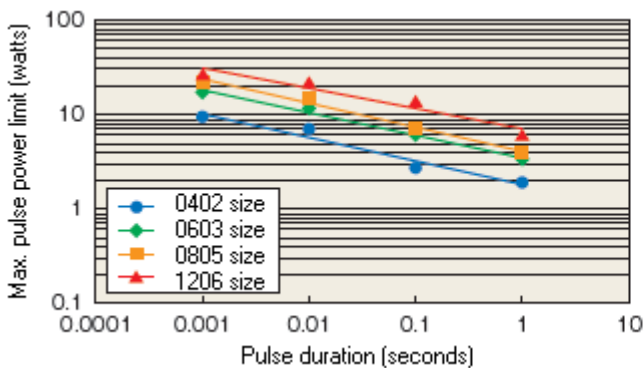
### High Temperature Exposure



### Power Derating Curve:



### Pulse Power Limits:



### Test Procedure

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

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