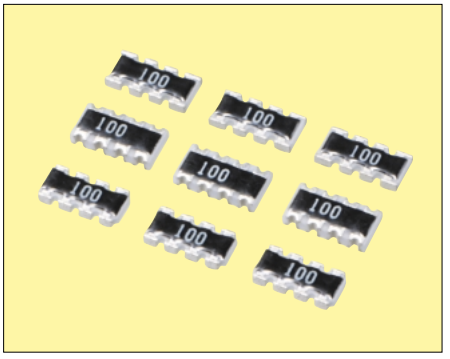
Chip Resistor Arrays
(CRA3A, CRB3A, CRC3A Series)



Features

- Reduction in mounting process & costs
- Save PCB space.
- Reduction of inventory control costs.

Applications

- Computer
- Printer
- Hard Disk Drive
- CD-ROM

Chip Resisitor Arrays have several resistor elements integrated as a single component.

- 4 Elements Array
  - CRA3A4E series — Convex Scallop type
  - CRB3A4E series — Concave type
  - CRC3A4E series — Convex Corner type

How to Order

CRA3A 4E 103 J T
① ② ③ ④ ⑤

①Series
②Number of elements(4E : 4 elements)
③Resistance value (3 digits),
Chip Jumper Arrays : 000
④Tolerance

J	±5%
Blank	Chip Jumper Arrays

⑤Packaging

T	Paper Taping, 5,000pcs/reel

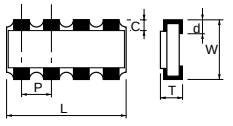
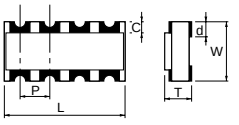
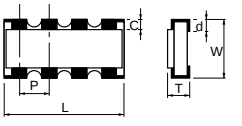
Rating

Chip resistor arrays		Chip jumper arrays	
Item	**Rating**	**Item**	**Rating**
Rated power(70°C)*	1/16W element	**Rated current**	1A
Max working voltage	50V		
Max Over-load voltage	100V		
Resistance value	J : 10Ω to 2.2MΩ	**Conductive resistance value**	50mΩmax
Tolerance	J ±5%		
Working Temperature	–55 to +125°C		
Number of elements	4E: 4 Elements		

*Rated Voltage : 50V or $\sqrt{\text{Rated power} \times \text{Resistance value}}$, whichever is less.
*Standard Resistance Value: E-12 Series
*For non standard value, optional please contact us.

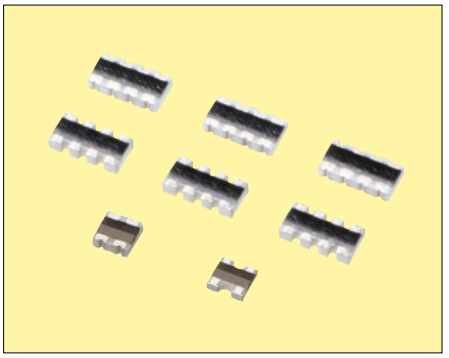
Dimensions

(Unit : mm)

		4 elements CRA3A4E series	4 elements CRB3A4E series	4 elements CRC3A4E series
Shape				
Dimensions (mm)	**W**	1.60±0.15	1.60±0.15	1.60±0.15
	L	3.20±0.15	3.20±0.15	3.20±0.15
	c	0.30±0.20	0.30±0.20	0.30±0.20
	d	0.20±0.15	0.40±0.15	0.20±0.15
	T	0.50±0.10	0.60±0.10	0.50±0.10
	p	0.8typ	0.8typ	0.8typ

• Detailed specifications are available on request.

Chip Resistor Arrays
(CRB 2A4E, CRC 2A4E, CRB11A2E, CRC11A2E Series)



Miniature chip resistor arrays have 4 and 2 resistor elements integrated as a single component.

Features

- Miniture (2.0×1.0mm) Resistor Arrays
  Max 60% space saving compared with the use of standard chip array (3.2×1.6mm)
- 0.5mm Termination pitch (Same as IC lead-pin pitch)
  Easy designing of pattern layout and improve electrical characteristics for curcuit

- 4 element chip Resistors Array
  - CRB2A4E series (⊔ Termination)
  - CRC2A4E series (⊓ Termination)
- 2 element chip Resistors Array
  - CRB11A2E series (⊔ Termination)
  - CRC11A2E series (⊓ Termination)

How to Order

CRB2A ① 4E ② 103 ③ J ④ H ⑤

①Series(CRB2A: 2.0×1.0mm, ⊔ termination)
(CRC2A: 2.0×1.0mm, ⊓ termination)
(CRB11A: 1.0×1.0mm, ⊔ termination)
(CRC11A: 1.0×1.0mm, ⊓ termination)

②Number of elements(4E: 4 elements)
(2E: 2 elements)

③Resistance Value(3 digits numbering)
472 = 4.7kΩ, 103 = 10kΩ
000 = 0Ω(Chip Jumper Array)

④Tolerance

J	±5%	**Blank**	Chip Jumper Array

⑤Packaging

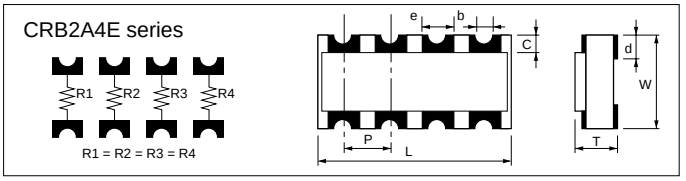
Code	Form	Material	Packing unit
H	Taping	Paper	10000pcs/reel

• 2mm pitch taping

Dimensions

(Unit : mm)

CRB2A4E series

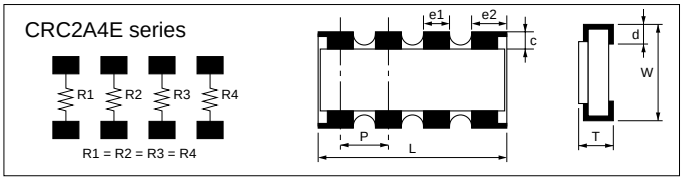


Code	L	W	T	P	b
Dimensions	2.0 +0.10 −0.10	1.0 +0.10 −0.10	0.4 +0.10 −0.10	0.5typ	ϕ0.15typ
Code	**c**	**d**	**e**		
Dimensions	0.2 +0.15 −0.15	0.25 +0.15 −0.15	0.25typ		

• Non-marking on chips

(Unit : mm)

CRC2A4E series

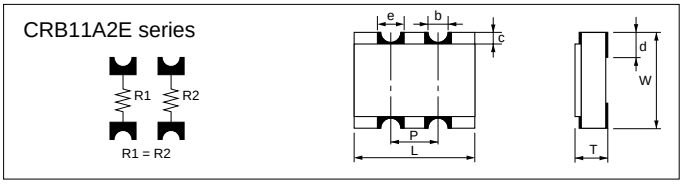


Code	L	W	T	P
Dimensions	2.0 +0.10 −0.10	1.0 +0.10 −0.10	0.4 +0.10 −0.10	0.5typ
Code	**c**	**d**	**e1**	**e2**
Dimensions	0.15 +0.15 −0.15	0.25 +0.15 −0.15	0.3 +0.10 −0.10	0.4 +0.10 −0.10

• Non-marking on chips

(Unit : mm)

CRB11A2E series

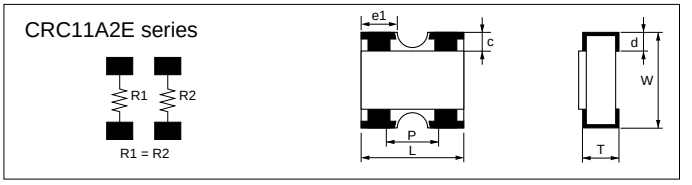


Code	L	W	T	P	b
Dimensions	1.00 +0.10 −0.10	1.00 +0.10 −0.10	0.40 +0.10 −0.10	0.50typ	ϕ0.15typ
Code	**c**	**d**	**e**		
Dimensions	0.20 +0.15 −0.15	0.25 +0.15 −0.15	0.25typ		

• Non-marking on chips

(Unit : mm)

CRC11A2E series



Code	L	W	T	P
Dimensions	1.00 +0.10 −0.10	1.00 +0.10 −0.10	0.35 +0.05 −0.05	0.65typ
Code	**c**	**d**	**e1**	
Dimensions	0.20 +0.15 −0.15	0.20 +0.15 −0.15	0.33 +0.10 −0.10	

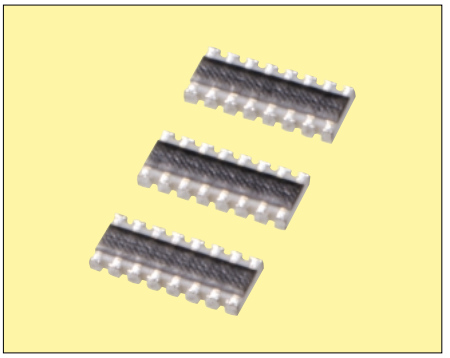
• Non-marking on chips

Rating

Chip resistor arrays		Chip jumper array	
Item	**Rating**	**Item**	**Rating**
Rated power(70°C)	1/32W/element	Rated current	1A
Max working ∗ voltage	25V		
Max Over-load voltage	50V		
Resistance value	10Ω to 1MΩ	Conductive resistance value	50mΩmax
Tolerance	J : ±5%		
Working Temperature	−55 to +125°C		
Number of elements	4E : 4Elements, 2E : 2Elements		

∗ Rated Voltage : $\sqrt{\text{Rated power} \times \text{Resistance value}}$, whichever is less.
∗ Standard Resistance Value: E-6 Series
∗ Please contact sales engineer for any other requirements of the nominal resistance value and the tolerance.

Chip Resistor Arrays (CRC4A8E Series)



Features

- 0.5mm termination pitch(same as IC lead-pin pitch).
  Easy designing of pattern layout and improve electrical characteristics for circuit.
  3.8mm length of the chip makes the assembly of the next chip possible without changing the pattern pitch.

- 8 element chip Resistor Array ——— CRC4A8E series (⊔ Termination)

How to Order

CRC4A ① 8E ② 103 ③ J ④ T ⑤

①Series CRC4A
②Number of elements
8E = 8 elements
③Resistance value
3 digits numbering
④Tolerance

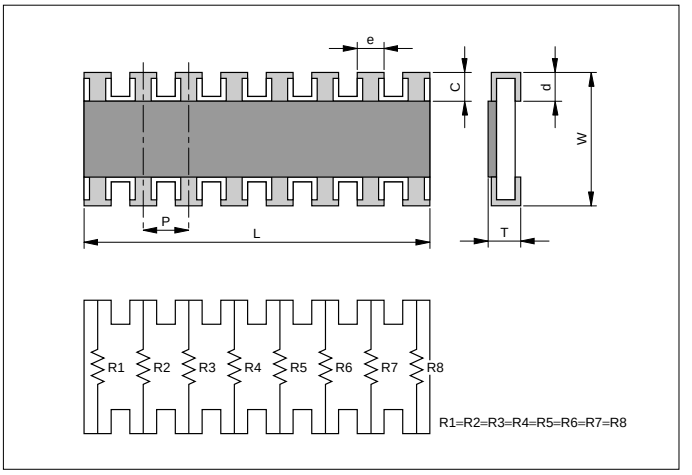
J	±5%

⑤Packaging

T	Taping paper 5,000pcs/reel

Dimensions

(Unit : mm)



Code	L	W	T	P	c
Dimensions	3.8±0.1	1.6±0.1	0.45±0.1	0.5typ	0.3±0.2

Code	d	e
Dimensions	0.3±0.15	0.3±0.1

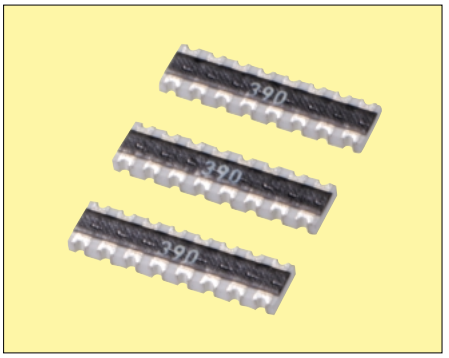
- No marking on chips.

Rating

Chip Resistor Arrays	
Item	**Rating**
Rated power(70°C)	1/16W/element 1/4W/packege
Max working voltage*	25V
Max over-load voltage	50V
Resistance value	10Ω to 1MΩ
Torerance	J:±5%
Working temperature	–55 to +125°C
Number of elements	8E:8elements

* Rated Voltage : $\sqrt{\text{Rated power} \times \text{Resistance value}}$, whichever is less.
* Standard Resistance Value: E-6 Series
* Please contact sales engineer for any other requirements of the nominal resistance value and the tolerance.

Chip Resistor Arrays (CRB6A8E Series)



Features

- Equal length conductors can be traced out from 0.8mm pitch termination.
  Also, good matching at low impedance.

How to Order

CRB6A 8E 390 G U
① ② ③ ④ ⑤

①Series CRB6A
②Number of elements
8E = 8 elements
③Resistance value
3 digits numbering
④Tolerance

G	±2%

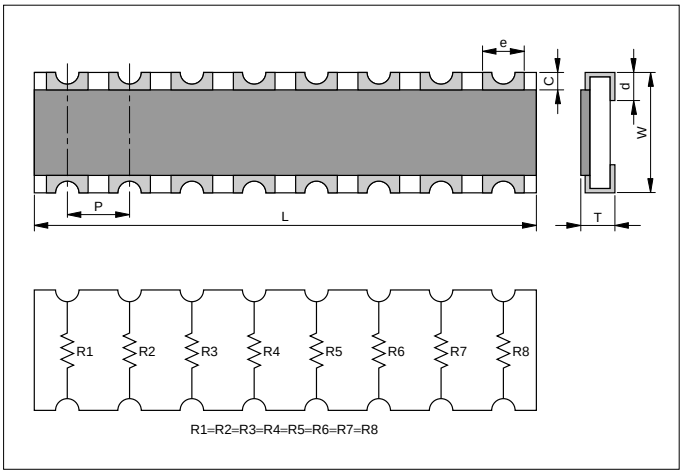
⑤Packaging

U	Taping plastic 4,000pcs/reel

• 8 element chip Resistor Array ——— CRB6A8E series (⊔ Termination)

Dimensions

(Unit : mm)



Code	L	W	T	P	c
Dimensions	6.4±0.2	1.6±0.2	0.6±0.1	0.8typ	0.3±0.2
Code	**d**	**e(Top side)**	**e(Bottom side)**		
Dimensions	0.4±0.15	0.5±0.1	0.4±0.15		

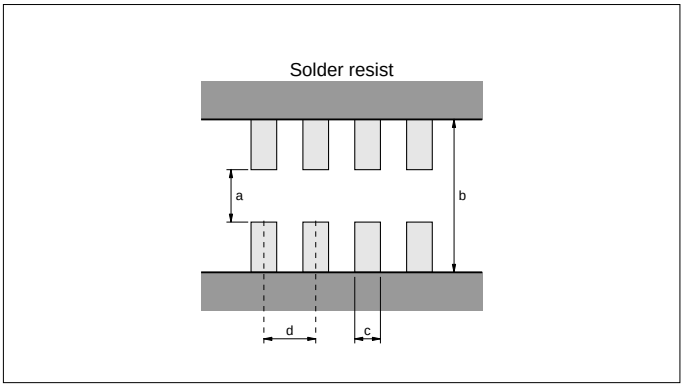
Rating

Chip Resistor Arrays	
Item	**Rating**
Rated power(70°C)	1/16W/element
Max working voltage*	50V
Max over-load voltage	100V
Resistance value	10Ω to 1MΩ
Torerance	G:±2%
Working temperature	–55 to +125°C
Number of elements	8E:8elements

* Rated Voltage : $\sqrt{\text{Rated power} \times \text{Resistance value}}$, whichever is less.
* Standard Resistance Value: E-6 Series
* Please contact sales engineer for any other requirements of the nominal resistance value and the tolerance.

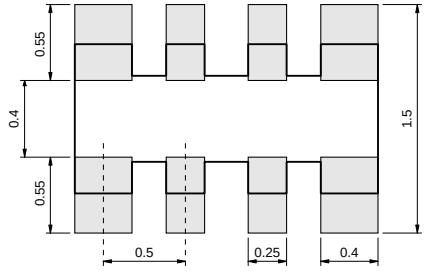
Recommended Land Patterns is referred the following for example

(Unit : mm)

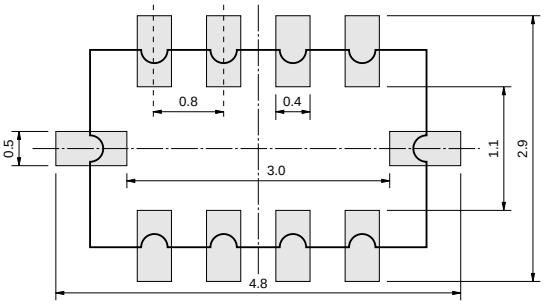


Series	a	b	c	d
CRA3A4E	0.8	2.4	0.4	0.8
CRB3A4E	0.7	2.3	0.4	0.8
CRC3A4E	0.8	2.4	0.4	0.8
CRB2A4E	0.4	1.5	0.25	0.5
CRB11A2E	0.4	1.5	0.25	0.5
CRC11A2E	0.5	1.5	0.4	0.65
CRC4A8E	0.8	2.4	0.3	0.5
CRB6A8E	0.7	2.3	0.4	0.8
ATC1A	0.5	1.5	0.4	0.65

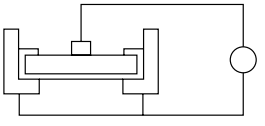
CRC2A4E Series



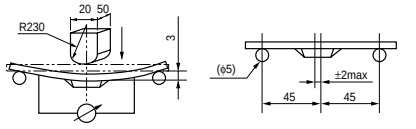
RNA4A8E Series



Electrical Characteristics

<table>
<tr><th colspan="2" rowspan="2">Item</th><th colspan="2">Standard</th><th colspan="2">Test Conditions</th></tr>
<tr><th>Resistor</th><th>Jumper</th><th>Resistor</th><th>Jumper</th></tr>
<tr><td colspan="2">DC Resistance</td><td>Within Initial Tolerance</td><td>50mΩmax</td><td colspan="2">Power Contdition A
(20°C, 65%RH)</td></tr>
<tr><td colspan="2">Temperature Characteristics</td><td><table><tr><th>Resistance(Ω)</th><th>TCR(ppm/°C)</th></tr><tr><td>*D, F
10≤R≤1M</td><td>–100 to +100</td></tr><tr><td>J, CR05:F
R <10
10≤ R ≤1M
1M< R</td><td>
–100 to +600
–250 to +250
–500 to +300</td></tr></table>*Except CR05</td><td></td><td>Test Temperature: 25,125(°C)
$\Delta R/R=R_2-R_1/R_1\times1/T_2-T_1\times10^6$
ΔR/R: Temp. Coefficient (ppm/°C)
T_1: 25(°C)
T_2: 125(°C)
R_1: T_1 Resistance at (Ω)
R_2: T_2 Resistance at (Ω)</td><td></td></tr>
<tr><td rowspan="2">Short-time Overload</td><td>ΔR/R</td><td>±(2.0%+0.10Ω)max
of the intial value</td><td>50mΩmax</td><td rowspan="2">(1) Apply 2.0×rated voltage for 5sec. (2.5×rated voltage for Arrays)
(2) Wait 30minutes
(3) Measure resistance
CR03: 30Vmax
CR05: 50Vmax
CR10: 100Vmax
CR21: 200Vmax
CR32: 400Vmax
CRA3A, CRB3A, CRC3A : 100V max</td><td rowspan="2">(1) 2A for 5sec. (CJ03: 1A)
(2) Wait 30minutes
(3) Measure resistance</td></tr>
<tr><td>Visual</td><td colspan="2">No evidence of mechanical damage
intermittent overload</td></tr>
<tr><td rowspan="2">Intermittent Overload</td><td>ΔR/R</td><td>±(5%+0.1Ω)max
of the intial value</td><td>50mΩmax</td><td rowspan="2">(1) Perform 10000voltage cycles as follows:
ON(2.0×rated voltage, 2.5×for Arrays) 1sec.
OFF 25sec.
(2) Stabilization time 30min without loading
(3) Measure resistance
CR03: 30Vmax
CR05: 50Vmax
CR10: 100Vmax
CR21: 200Vmax
CR32: 400Vmax
CRA3A, CRB3A, CRC3A : 100V max</td><td rowspan="2">(1) Perform 10000 current cycles as follows:
ON(2A) 1sec.
OFF 25sec.
(2) Wait 30minutes
(3) Measure resistance
CJ03: 1A max</td></tr>
<tr><td>Visual</td><td colspan="2">No evidence of mechanical damage</td></tr>
<tr><td colspan="2">Dielectric Withstanding Voltage</td><td colspan="2">No evidence of mechanical damage</td><td colspan="2" rowspan="2">Apply 500VAC for 1min (CR10 300VAC)
(CR05, CRA3A, CRB3A, CRC3A 300VAC/1sec.
CR03 50VAC/1min.)
 
Apply 500V DC.
(CR05, CRA3A, CRB3A, CRC3A 100V DC
CR03 50VDC)</td></tr>
<tr><td colspan="2">Insulation Resistance</td><td colspan="2">■CR03, CJ03 : 10^8Ωmin
■CR05, CJ05 : 10^8Ωmin
■CR10, CJ10 : 10^9Ωmin
■CR21, CJ21 : 10^{10}Ωmin
■CR32, CJ32 : 10^{12}Ωmin
■CRA3A, CRB3A, CRC3A : 10^9Ωmin</td></tr>
</table>

Mechanical Characteristics

Item		Standard		Test Conditions	
		Resistor	Jumper	Resistor	Jumper
Terminal Strength	ΔR/R	±(1%+0.05Ω)max of the intial value	50mΩmax	Apply the load as show: Measure resistance during load application Unit: mm Bending in 10seconds  PC board: Glass epoxy t=1.6	
	Visual	No evidence of mechanical damage after loading			
Soldering Heat Resistance	ΔR/R	±(1%+0.05Ω)max of the intial value	50mΩmax	Immerse into molten solder at 260±5°C for 10±1sec. Stabillize component at room temperature for 1hr. Measure resistance.	
	Visual	No evidence of leaching			
Solderability		Coverage ≥95% each termination end		Immerse in Rogin Flux for 2±0.5 sec. and in SN62 solder at 235±5°C for 2±0.5 sec.	
Anti-Vibration Test	ΔR/R	±(1%+0.1Ω)max of the intial value	50mΩmax	2 hrs. each in X, Y and Z axis. (TTL 6hrs.)10 to 55 Hz sweep in 1min.at 1.5mm amplitude.	
	Visual	No evidence of mechanical damage			
Solvent Resistance	ΔR/R	±(0.5%+0.05Ω)max of the intial value	50mΩmax	Immerse in static state butyl acetate at 20°C to 25°C for 30±5sec. Stabillize component at room temperature for 30min then measure Value.	
	Visual	No evidence of mechanical damage			

Environmental Characteristics

Item		Standard		Test Conditions	
		Resistor	Jumper	Resistor	Jumper
Temperature Cycle	ΔR/R	±(1%+0.05Ω)max of the intial value	50mΩmax	1) Run 5cycles as follows: –55±3°C for 30min. 125±3°C for 30min. Room temp for 10-15min. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			
Low Temperature Storage	ΔR/R	±(2%+0.1Ω)max of the intial value	50mΩmax	1) Dwell in –55°C chamber without loading for 1000^{+48}_{-0} hrs. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			
High Temperature Storage	ΔR/R	±(3%+0.1Ω)max of the intial value	50mΩmax	1) Dwell in 125°C chamber without loading for 1000^{+48}_{-0} hrs. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			
Moisture Resistance	ΔR/R	±(3%+0.1Ω)max of the intial value	50mΩmax	1) Dwell in temp: 65°C RH90 to 95%RH chamber without loading for 1000^{+48}_{-0} hrs. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			
Life Test	ΔR/R	±(3%+0.1Ω)max of the intial value	50mΩmax	1) Temp: 70±3°C Voltage: (rated voltage) on 90 min off 30min. Duration: 1000^{+48}_{-0} hrs. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			
Loading Life in Moisture	ΔR/R	±(3%+0.1Ω)max of the intial value	50mΩmax	1) Temp: 40±2°C RH: 90-95% Voltage Cycle: on 90 min(rated voltage) off 30min. Duration: 1000^{+48}_{-0} hrs. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			

Circuit design

1) Once application and assembly environments have been checked, the resistors may be used in conformance with the catalog and the specifications.

2) Please consult the manufacturer in advance when the resistors is used in devices such as: devices which deal with human life, I.e. medical devices; devices which are highy public orientated; and devices which demand a high standerd of liability.

3) Please use the resistors in conformance with the operating temperature provided in both the catalog and the specifications.

4) Please keep voltage under the rated voltage which is applied to the resistor.

5) Do not use the resistor in an environment where it might easily exceed the respective provisions concerning shock and vibration specified in the catalog and specifications.

6) Please do not use the resistor in the following environments.
   ①State that water, oil, and solvent hang in resistor
   ②State where poisonous gas (sulfur and chlorine, etc.) exists
   ③State that direct sunshine, radiation, and ultraviolet, etc. are irradiated

7) There is a thing that resistance changes according to the stuff of the resin when the coating with the resin is given.
   Please use resin coating after confirming the characteristic.

8) There is a thing that resistance changes according to flux and cleaner.
   Please use flux and cleaner after confirming the characteristic.

9) Please consult about a lead free products.

Storage

1) Keep storage place temperature +5 to +35˚C, humidity 45 to 75% RH.

2) Please keep parts out of poisonous gas such as sulfur or chlorine in the air, and out of salty moisture. Or they may cause rust of terminal, and poor solderability. and, please consider the above-mentioned item after mounting your company.

4) Soldering iron

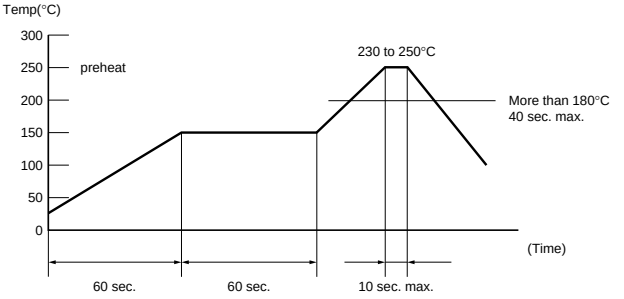
Temperature	soldering iron 300±5°C *
Time	3 sec. max. *

*Do not place the soldering iron on the chip. Soldering iron is 30W max.

Soldering method

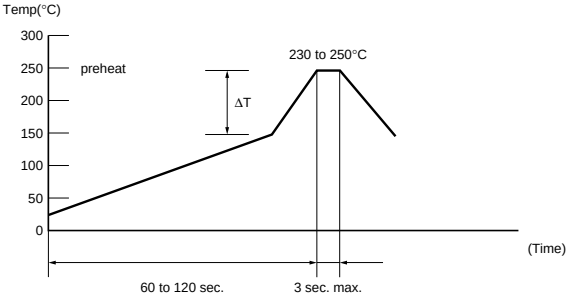
1) Recommendable temperature profile

reflow



2) Recommendable temperature profile

wave



(Caution) Cooling after soldering should be as slow as possible.
Ensure that the chip Resistor is preheated adequately.
Ensure that the temperature difference(ΔT) does not exceed 130˚C.

3) pb-free recommendable temperature profile

reflow