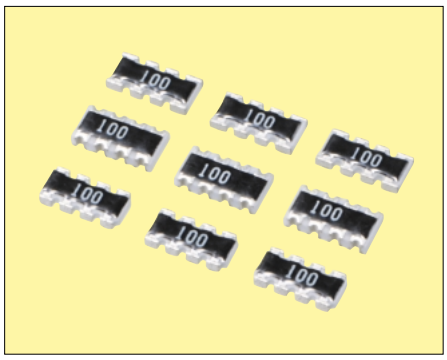
# Chip Resistor Arrays
# (CRA3A, CRB3A, CRC3A Series)



## 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 |

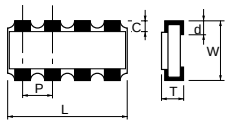
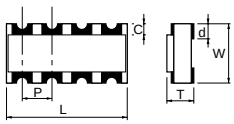
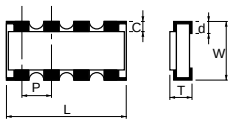
## Rating

| 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.

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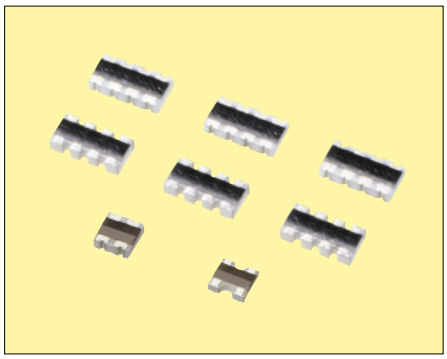
# Chip Resistor Arrays
# (CRB 2A4E, CRC 2A4E, CRB11A2E, CRC11A2E Series)



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 4E 103 J H
① ② ③ ④ 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

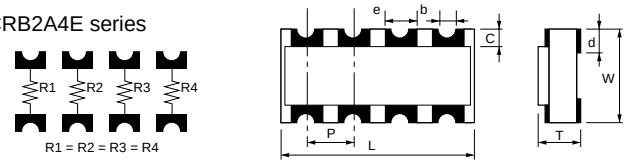
| Code | Form | Material | Packing unit |
|---|---|---|---|
| **H** | Taping | Paper | 10000pcs/reel |

• 2mm pitch taping

## Dimensions

(Unit : mm)

CRB2A4E series

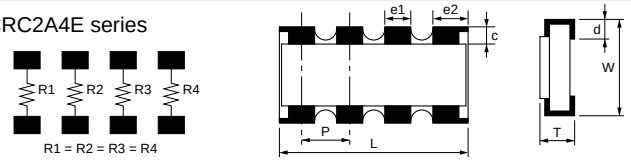



| Code | L | W | T | P | b |
|---|---|---|---|---|---|
| Dimensions | $2.0^{+0.10}_{-0.10}$ | $1.0^{+0.10}_{-0.10}$ | $0.4^{+0.10}_{-0.10}$ | 0.5typ | ϕ0.15typ |
| **Code** | **c** | **d** | **e** | | |
| Dimensions | $0.2^{+0.15}_{-0.15}$ | $0.25^{+0.15}_{-0.15}$ | 0.25typ | | |

• Non-marking on chips

(Unit : mm)

CRC2A4E series

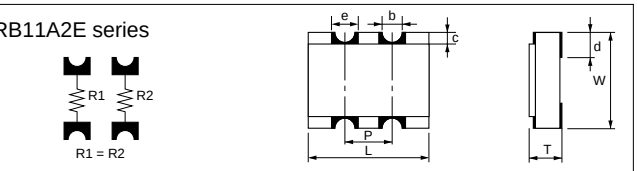



| Code | L | W | T | P |
|---|---|---|---|---|
| Dimensions | $2.0^{+0.10}_{-0.10}$ | $1.0^{+0.10}_{-0.10}$ | $0.4^{+0.10}_{-0.10}$ | 0.5typ |
| **Code** | **c** | **d** | **$e_1$** | **$e_2$** |
| Dimensions | $0.15^{+0.15}_{-0.15}$ | $0.25^{+0.15}_{-0.15}$ | $0.3^{+0.10}_{-0.10}$ | $0.4^{+0.10}_{-0.10}$ |

• Non-marking on chips

(Unit : mm)

CRB11A2E series

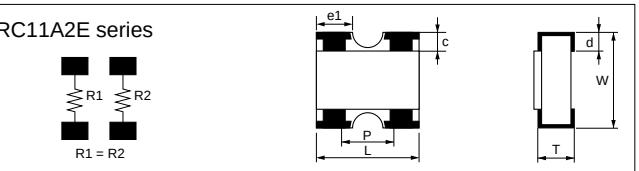



| Code | L | W | T | P | b |
|---|---|---|---|---|---|
| Dimensions | $1.00^{+0.10}_{-0.10}$ | $1.00^{+0.10}_{-0.10}$ | $0.40^{+0.10}_{-0.10}$ | 0.50typ | ϕ0.15typ |
| **Code** | **c** | **d** | **e** | | |
| Dimensions | $0.20^{+0.15}_{-0.15}$ | $0.25^{+0.15}_{-0.15}$ | 0.25typ | | |

• 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** | **$e_1$** | |
| 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.

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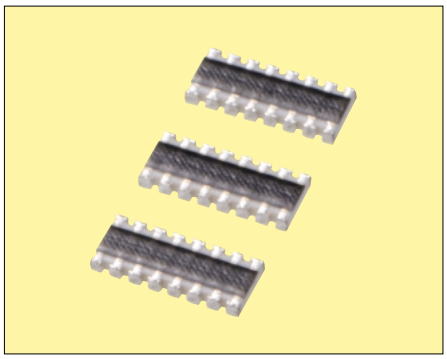
# Chip Resistor Arrays
# (CRC4A8E Series)



## 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.

## How to Order

CRC4A 8E 103 J T
① ② ③ ④ ⑤

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

| | |
|---|---|
| J | ±5% |

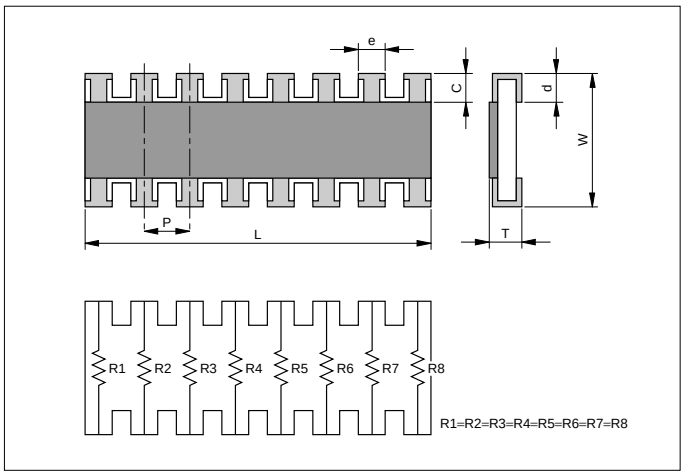
⑤Packaging

| | |
|---|---|
| T | Taping paper 5,000pcs/reel |

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

## 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<br>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.

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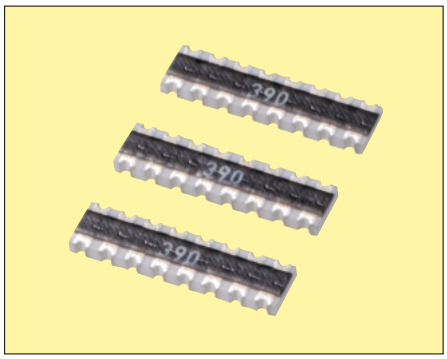
# Chip Resistor Arrays
# (CRB6A8E Series)



## Features

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

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

## 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

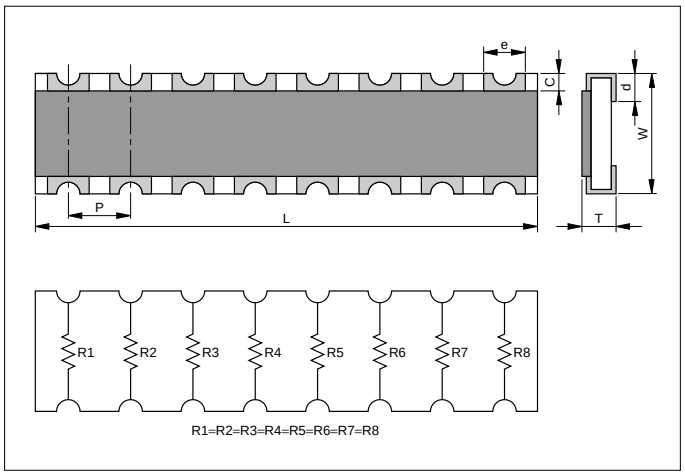
| | |
|---|---|
| G | ±2% |

⑤Packaging

| | |
|---|---|
| U | Taping plastic 4,000pcs/reel |

## 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.

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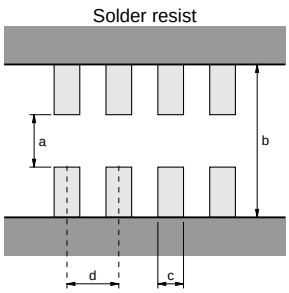
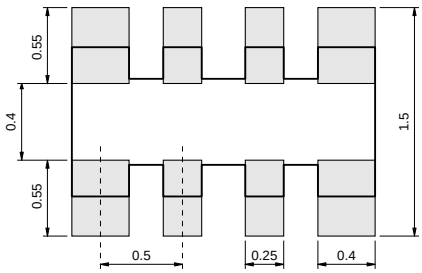
## Recommended Land Patterns is referred the following for example

(Unit : mm)

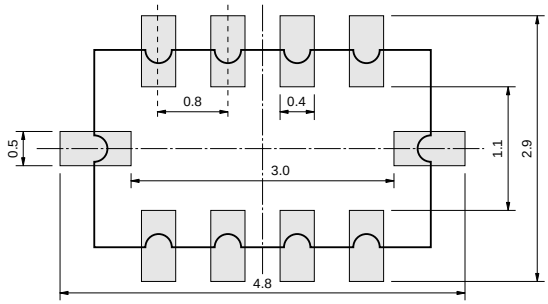



| Series | a | b | c | d |
|---|---|---|---|---|
| CRA3A4E | 0.8 | 2.4 | 0.4 | 0.8 |
| CRB3A4E | 0.7 | 2.3 | 0.4 | 0.8 |
| CRC3A4E | 0.8 | 2.4 | 0.4 | 0.8 |
| CRB2A4E | 0.4 | 1.5 | 0.25 | 0.5 |
| CRB11A2E | 0.4 | 1.5 | 0.25 | 0.5 |
| CRC11A2E | 0.5 | 1.5 | 0.4 | 0.65 |
| CRC4A8E | 0.8 | 2.4 | 0.3 | 0.5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

CRC2A4E Series




RNA4A8E Series

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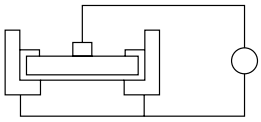
## Electrical Characteristics

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

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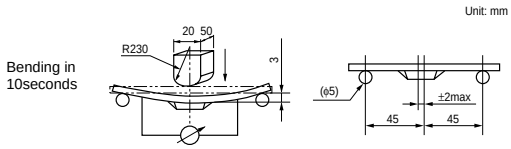
## Mechanical Characteristics

| 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   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 | | | |

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## 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

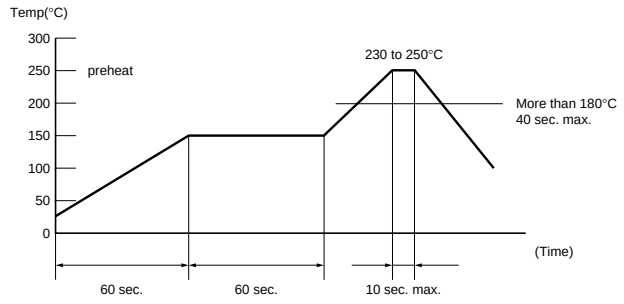
| | |
|---|---|
| **Temperature** | soldering iron 300±5°C * |
| **Time** | 3 sec. max. * |

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

## Soldering method

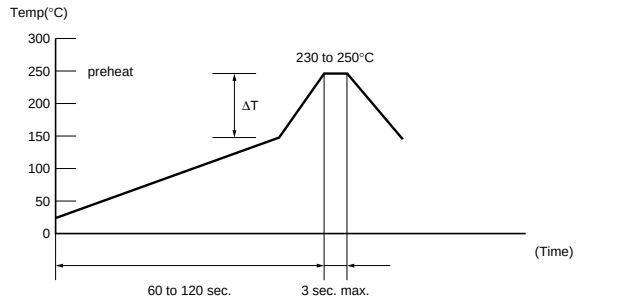
1) Recommendable temperature profile

reflow




2) Recommendable temperature profile

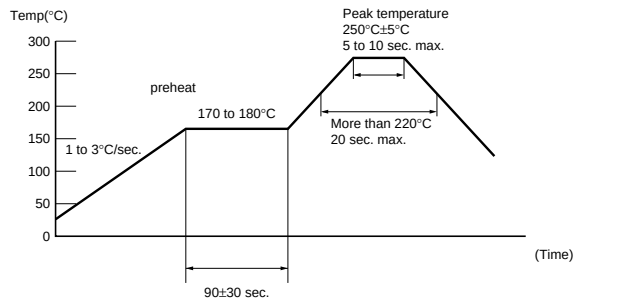
wave




(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

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