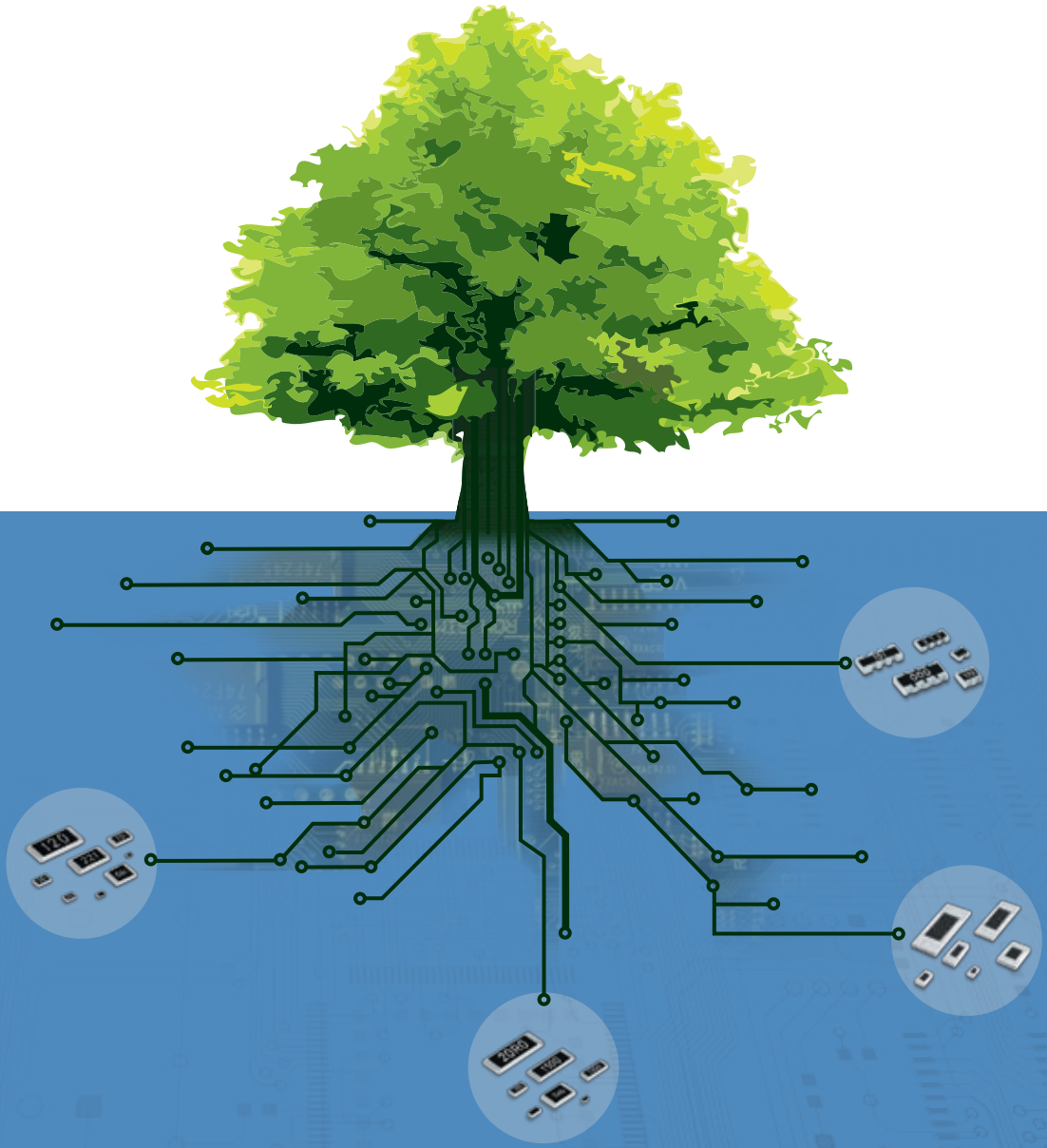
December 2014

RoHs+Halogen Compliant
ecoparts

# THICK-FILM CHIP RESISTOR



SAMSUNG ELECTRO-MECHANICS

SAMSUNG




## We, Samsung, declare that our component Chip Resistor is produced in accordance with EU RoHS directive.

**1.RoHS Compliance and restriction of Br**

The following restricted materials are not used in packaging materials as well as products in compliance with the law and restriction.

- Cd, Pb, Hg, Cr6+, As, Br and the compounds, PCB, asbestos
- Bromic materials : PBBs, PBBOs, PBDO, PBDE, PBB

**2.No use of materials breaking Ozone layer**

The following ODS materials are not used in our fabrication process.

- ODS material : Freon, Haron, 1-1-1 TCE, CCl4, HCFC

If you want more detailed Information,Please Visit Samsung Electro-mechanics Website
[http://www.sem.samsung.com, http://www.semlcr.com]

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# Operation Notes

## Applications

• Chip resistors are designed for general electronic devices such as home appliances, computer, mobile communications, digital circuit, etc. If you require our products with high reliability-performing at more than 125℃ or below -55℃ - for medical equipments, aircrafts, high speed machines, military usage, and items that can affect human life or if you need to use in specific conditions (corrosive gas atmosphere like $H_2S$ etc.), please contact us beforehand.

• Normal operation temperature ranges (℃ ): -55℃ ~+155℃
• Others (small sizes and flat type arrays) : -55℃ ~+125℃

• Although resistor body is coated, sharp excessive impact should be avoided to prevent damages and adverse effects on characteristics (resistor value, open circuited, T.C.R.).

## Mounting

Please give more attention not to press the chip owing to the nozzle's improper height when it is mounted on PCB.
(Excessive pressure may cause exterior damage, change in resistance, circuit open, etc.)

## Safety precautions

• These products are designed and produced for applying to the ordinary electronic equipments.
(AV equipment, OA equipment,Telecommunication equipment, etc)
• Consult with our sales department before applying in the devices that require extremely high reliability such as medical equipments, transport equipments, aircrafts/spacecrafts, nuclear power controllers, fuel controllers, car equipments including car accessories and other safety devices.
• Following special environments, and such environmental conditions may affect the performance of the product. Please verify the performance and reliability thoroughly prior to use.

a) Using in various type of Liquid including water, oil, organic solvent and other chemicals.
b) Using in the places where the products are exposed to direct sunlight, sea wind, corrosive gases (including $Cl_2$, $H_2S$, $NH_3$, $SO_2$, $NO_2$), static electricity, electromagnetic waves and dusty air.
c) Using close to heat generating components or other flammable items.
d) Using in the places that is sealed or coated with resins or other coating materials after soldering.
e) Using in places subject to dew condensation.

• These products are not radiation resistant.
• The company is not responsible for any problems resulting from using of the products under the conditions not recommended herein.
• The company should notify any safety issues of the products to the customer. And the safety of the products should be monitored by the customer periodically.

## Storage

To maintain proper quality of chip components, the following precautions are required for storage environment, method and period.

•Storage Environment
- Make sure that the ambient temperature is within 5℃ ~40℃ and the ambient humidity is within 20~70%RH.
- Chip components may be deformed, if the temperature of packaged components exceeds 40℃ .
- Do not store where the soldering properties can be deteriorated by harmful gas such as sulphurous gas, chlorine gas, etc.
- Bulk packed chip components should be used as soon as the seal is opened, thus preventing the solderability from deteriorating.
- The remaining unused chips should be put in the original bag and sealed again or store in a desiccator containing a desiccating agent.

•Storage Time Period
Stored chip components should be used within 6 months after receiving the components. If 6 months or more have elapsed, please check the solderability before actually using.

## Cleaning

After Soldering Cleaning, soldering flux & Ionic cleaning liquid should be avoided on product.
If any possibility on product, please take a test before usage.

## Caution for Chip Resistor Seperation from PCB.

Chip resistor installation on PCB is a similar phenomenon on to a chocolate chip on top of a cake.
PCB has enough flexibility on outer force but Chip resistor can be defected without any bending.
(By chip resistor use of Ceramic, solder, metal)
Therefore, when separating a Chip resistor from a PCB, beware of any crack on the chip.

## Others

• Manual work
Whenever separating chip resistor from PCB, do not re-use the chip resistor for circuit safety.
Electrical specification of chip resistors can be changed by soldering iron after separation.
Re-use of separated chip resistor should be prohibited.

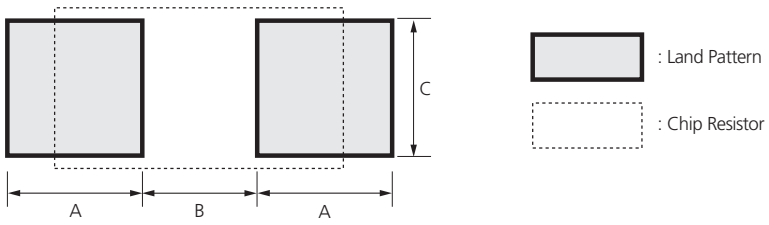
• Do not use more than rated voltage.
(Please check the contents of each product)

## Example of Land Pattern Design

• When designing P.C.B, the shape and size of the solder lands must allow a proper amount of solder to form under the resistor.
The amount of solder formed at the end terminations has direct effect on the possibility of chip crack.
The more the amount of solder and stress, the more the possibilities of chip crack.

## For Chip Type

(UNIT: mm)




• Reflow Soldering(RC, RCA, RCM, RUT)

| Type | A | B | 2A+B | C |
|---|---|---|---|---|
| 0402 | 0.17 | 0.20 | 0.54 | 0.18 |
| 0603 | 0.37 | 0.28 | 1.02 | 0.29 |
| 1005 | 0.6 | 0.5 | 1.7 | 0.5 |
| 1608 | 0.8 | 0.8 | 2.4 | 0.8 |
| 2012 | 0.9 | 1.4 | 3.2 | 1.2 |
| 3216 | 1.3 | 1.8 | 4.4 | 1.5 |
| 3225 | 1.3 | 1.8 | 4.4 | 2.4 |
| 5025 | 1.4 | 3.3 | 6.1 | 2.4 |
| 6432 | 1.4 | 4.6 | 7.4 | 3.0 |

• Reflow Soldering(RU, RUK)

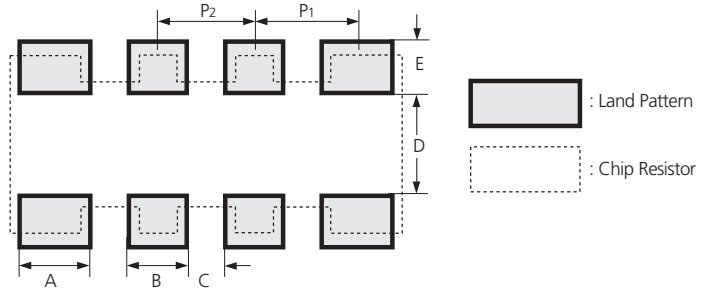
| Type | A | B | 2A+B | C |
|---|---|---|---|---|
| 1005 | 0.8 | 0.5 | 2.1 | 0.5 |
| 1608 | 0.8 | 0.5 | 2.1 | 0.8 |
| 2012 | 0.9 | 0.8 | 2.6 | 1.2 |
| 3216 | 1.7 | 1.2 | 4.6 | 1.4 |
| 3225 | 1.7 | 1.2 | 4.6 | 2.4 |
| 5025 | 2.15 | 1.8 | 6.1 | 2.6 |
| 6432 | 2.3 | 3.0 | 7.6 | 3.3 |

• Reflow Soldering(RJ, RW)

| Type | A | B | 2A+B | C |
|---|---|---|---|---|
| *0816 | 0.5 | 0.3 | 1.3 | 1.6 |
| 1220 | 0.7 | 0.4 | 1.8 | 2.0 |
| 1632 | 1.1 | 0.6 | 2.8 | 3.3 |
| 2037 | 1.4 | 1.2 | 4.0 | 3.8 |
| *3264 | 2.0 | 1.6 | 5.6 | 6.5 |

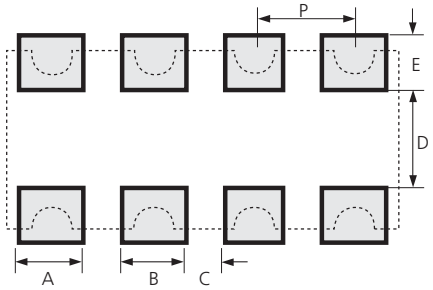
## For Array Type

• Convex type




• Concave type

(UNIT: mm)




| Type | A | B | C | D | E | P1 | P2 |
|---|---|---|---|---|---|---|---|
| 062P | 0.20 | 0.20 | 0.30 | 0.30 | 0.30 | 0.50 | - |
| 064P | 0.20 | 0.20 | 0.20 | 0.30 | 0.30 | 0.40 | 0.40 |
| 10AT | 0.4 | 0.4 | 0.25 | 0.5 | 0.5 | 0.65 | - |
| 102P | 0.4 | 0.4 | 0.25 | 0.5 | 0.5 | 0.65 | |
| 104P | 0.5 | 0.3 | 0.2 | 0.5 | 0.5 | 0.55 | 0.5 |
| 164P | 0.7 | 0.5 | 0.3 | 0.9 | 0.8 | 0.9 | 0.8 |

| Type | A | B | C | D | E | P |
|---|---|---|---|---|---|---|
| 102P | 0.3 | 0.3 | 0.2 | 0.5 | 0.4 | 0.5 |
| 104P | 0.3 | 0.3 | 0.2 | 0.5 | 0.4 | 0.5 |

• This is the recommended land pattern for designing PCB.
This pattern does not guarantee any characteristic of other product.

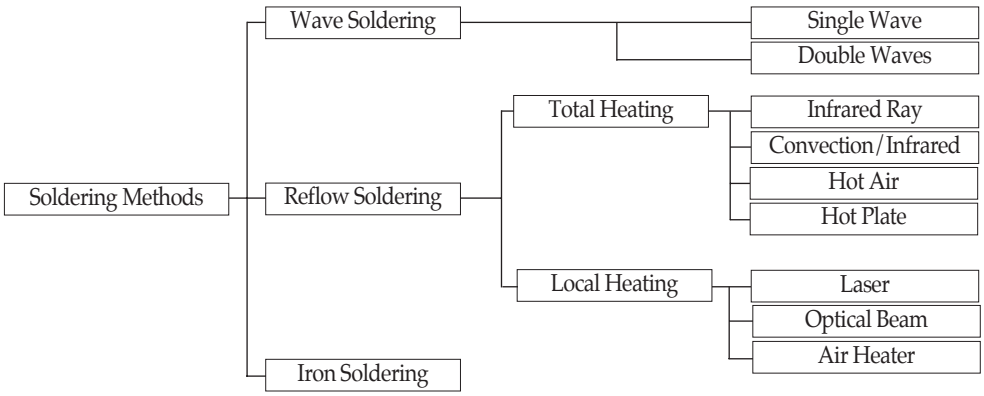
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Attenuator
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# Recommended Soldering Conditions

## Abstract

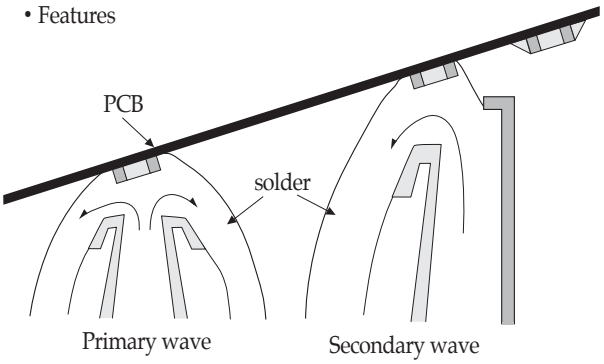

• There are 3 soldering methods.
- Flow(wave) soldering.
- Reflow soldering. (Reflow soldering is broadly divided into the total heating method and local heating method.)
- Iron soldering.


Since Chip resistors come into direct contact with melted solder during soldering, it is exposed to potential mechanical stress caused by the sudden temperature change. The chip resistors may also be subject to silver migration and flux contamination.

## Flow(wave) Soldering

• Features



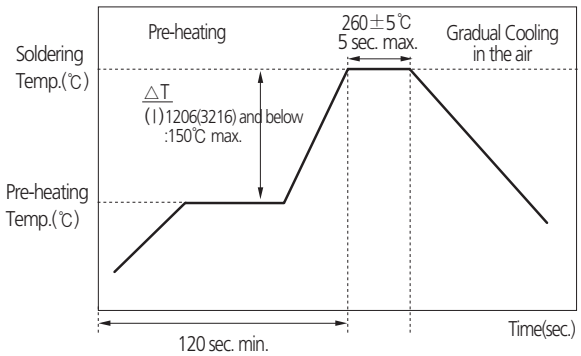

There are two types of soldering methods in flow(wave) soldering. One is single wave soldering, and the other is a double waves soldering. However, double waves soldering is mainly used. This method is designed for continuous and multiple dipping process by using primary and secondary wave, having completely different waveforms and characteristics.
With the primary wave, a comparatively strong jet flow is used to remove the flux gas and to solder.
With the secondary wave, it is used to remove excessive solder.
With the primary wave, the solder flows into a very small gap between components and air bubbles remaining on the soldered joint are removed.
With the secondary wave, the peel back is used to prevent bridging.

• Preheating

If a chip component is heated suddenly during soldering, it may crack by the thermal shock caused by the temperature difference between the surface and the inside of the chip. To prevent this, a full preheating is necessary. In case of wave soldering, the temperature difference between solder and surface of the component should be kept within 150℃ . Also when cooling is done by dipping into solvent, care should be taken to keep the temperature difference within 150℃ .

• Standard Soldering Condition

Soldering must be carried out without exceeding the approved soldering temperature and time shown within the shaded area of the graph at right. An excessively long soldering time or high soldering temperature results in leaching of outer terminations. When a PCB is warped, mechanical stress applied to the chip will be increased and might cause chip crack, especially if there is a big amount of solder on the chip. So, care should be taken not to use excessive amount of solder on the PCB.
For the flow(wave) soldering, the solder amount can be controlled by land size.

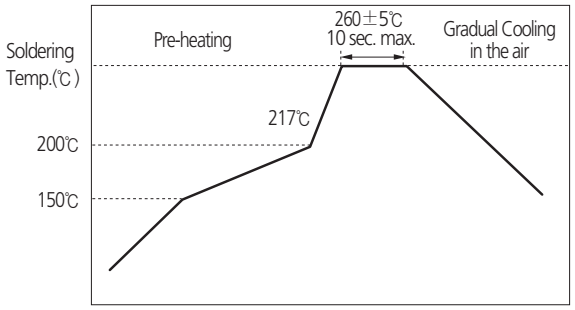



< Flow Soldering>

## Reflow Soldering

• Pre-heating and cooling
In the reflow soldering method, a full pre-heating at the proper temperature is necessary to dry and activate solder paste. Tomb-stoning can be reduced by preheating at 150~180℃ for more than 1 minute. Also when cooling is done by dipping into solvent, care should be taken to keep the temperature difference within 150℃ .

• Standard Reflow Soldering Condition
Soldering must be carried out without exceeding the approved soldering temperature and time shown within the shaded area of the right graph. This prevents the terminations from leaching and characteristics from deteriorating. When soldering is repeated, the allowed time is the accumulated time.



< Reflow Soldering>

• Standard solder amount
When a PCB is warped, mechanical stress applied to the chip should be reduced, and to do so, care should be taken not to use excessive amount of solder on the PCB. In the case of the reflow method, the thickness of the coated solder paste is controlled to prevent excessive solder. The thickness of solder paste should be 100~300㎛.

• Tombstoning and Prevention
When reflow soldering, or especially vapor phase soldering (VPS), small chip components of less than RC3216 type may break away from solder and stand on end. This is commonly known as tombstoning or the Manhattan phenomenon.

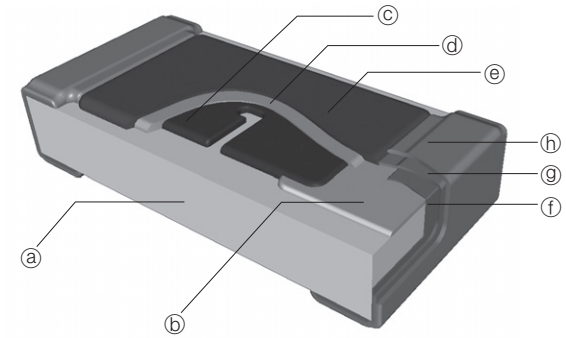
- Preventing tombstoning
Keep land size as small as possible.
Keep the pre-heating conditions properly
( Pre-heating temperature : 150 ~ 180°, Pre-heating time : more than 1 min.)
Keep the solder paste quantity not too much and uniform for every lands.
Keep the position of chips properly.
At around the soldering temperature, keep minimum difference of the temperature between the electrodes of a chip.

## Iron Soldering

When using a soldering iron or any other soldering operation, the permissible temperature and time should not exceed that of the reflow soldering. In order to prevent the external terminations from leaching and characteristics from deteriorating, the tip of the soldering iron should not touch the chip component (ceramic element, resin case, etc.). Soldering with a soldering iron and correcting with a soldering iron can be performed right under following conditions.

| Item | Condition |
|---|---|
| Temperature at tip | 350℃ Max. |
| Soldering iron output | 20-Watt Max. |
| End of soldering iron | Ø 3mm Max. |
| Note | Do not directly touch the chip by the tip of the iron. |

## General Structure of the Chip Resistor

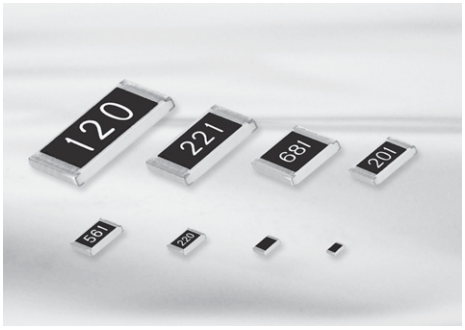



| No. | Name | Main Substance |
|---|---|---|
| ⓐ | Ceramic Substrate | $Al_2O_3$ |
| ⓑ | Inner Electrode | Ag |
| ⓒ | Resistor | $RuO_2$ |
| ⓓ | Glass Coat | $Bi_2O_3$, $SiO_2$ |
| ⓔ | Protective Coat | Polymer / Glass |
| ⓕ | Terminal Coat | Ni-Cr Alloy /Ag |
| ⓖ | Ni Plate | Ni |
| ⓗ | Sn Plate | Sn |

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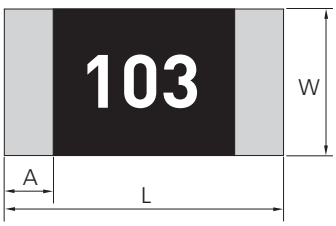

## Feature

- Very small, thin, and light weight.
- Both flow and reflow soldering are applicable.
- Very low inductance.
- Suitable size and packaging for surface mount assembly.
- Lead-free terminal.
- PbO(lead oxide) is included in the glass of our product which is prescribed on RoHS appendix as an exemption.

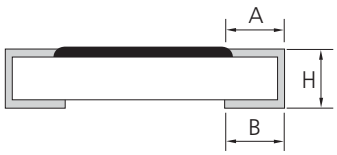
## Application

- General purpose.
- Home Appliances.
  (DVD, Digital TV, Digital Camera, Audio, Tunner).
- For Computers & Communications.
  (Notebook, Memory Module, Mobile, Network Equipment, etc).

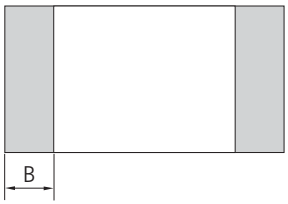
## Structure and Dimensions




〈 Top View 〉




〈 Side View 〉




〈 Bottom View 〉

(UNIT: mm)

| Type | SIZE(Inch) | L | W | H | A | B |
|---|---|---|---|---|---|---|
| RC0402 | 01005 | 0.40 ±0.02 | 0.20 ±0.02 | 0.13 ±0.02 | 0.10 ±0.03 | 0.10 ±0.03 |
| RC0603 | 0201 | 0.60 ±0.03 | 0.30 ±0.03 | 0.23 ±0.03 | 0.10 ±0.05 | 0.15 ±0.05 |
| RC1005 | 0402 | 1.00 ±0.05 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| RC1608 | 0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.30 ±0.20 | 0.30 ±0.10 |
| RC2012 | 0805 | 2.00 ±0.15 | 1.25 ±0.15 | 0.50 ±0.10 | 0.40 ±0.20 | 0.35 ±0.20 |
| RC3216 | 1206 | 3.20 ±0.15 | 1.60 ±0.15 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| RC3225 | 1210 | 3.20 ±0.20 | 2.55 ±0.20 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| RC5025 | 2010 | 5.00 ±0.20 | 2.50 ±0.20 | 0.55 ±0.10 | 0.60 ±0.20 | 0.60 ±0.20 |
| RC6432 | 2512 | 6.30 ±0.20 | 3.20 ±0.20 | 0.55 ±0.10 | 0.60 ±0.20 | 0.60 ±0.20 |

※ 0402 and smaller size don't have marking on top of the chips.
※ 0603 4-digit models(E-96 series) don't have making on top of the chips.

## Parts Numbering System

- The part number system shall be in the following format

| RC | 2012 | J | 100 | CS |
|---|---|---|---|---|
| | Dimension & Size Code | Tolerance | Resistance Value | Packaging Code |
| RC: Chip Resistor | 0402: 0.4×0.2(㎜) - 01005(inch)<br>0603: 0.6×0.3(㎜) - 0201(inch)<br>1005: 1.0×0.5(㎜) - 0402(inch)<br>1608: 1.6×0.8(㎜) - 0603(inch)<br>2012: 2.0×1.2(㎜) - 0805(inch)<br>3216: 3.2×1.6(㎜) - 1206(inch)<br>3225: 3.2×2.5(㎜) - 1210(inch)<br>5025: 5.0×2.5(㎜) - 2010(inch)<br>6432: 6.4×3.2(㎜) - 2512(inch) | D : ±0.5%<br>F : ±1%<br>G : ±2%<br>J : ±5%<br>※ Jumper : J | 3 or 4 digits coding system<br>(EIA coding system)<br>3digits (E-24 series)<br>4digits (E-96 series)<br>※ Jumper : '000' | CS: Tape Packaging 7"<br>ES: Tape Packaging 10"<br>AS: Tape Packaging 13" |

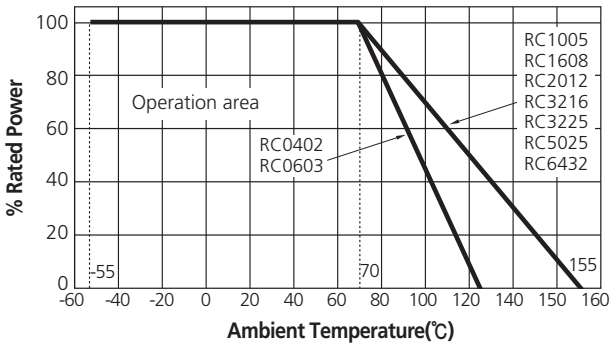
## Specification

| Type | Size (inch) | Rated Power (W) | Rated Voltage (V) | Max Working Voltage (V) | Tolerance (%) | Resistance Range (Ω) | T.C.R (ppm/℃) | Working Temp. (℃) | Rated Ambient Temp. (℃) | Moisture Level |
|---|---|---|---|---|---|---|---|---|---|---|
| RC 0402 | 01005 | 1/32 | $\sqrt{P \times R}$<br>P: Rated Power(W)<br>R: Resistance(Ω) | 15 | ±1(F)<br>±2(G)<br>±5(J) | 1 ~ 99<br>100 ~ 1M | ±300<br>±250 | -55~125 | 70 | Level 1 |
| RC 0603 | 0201 | 1/20 | | 25 | | 1 ~ 9.9<br>10 ~ 10M | ±300<br>±250 | | | |
| RC 1005 | 0402 | 1/16 | | 50 | ±0.5(D)<br>±1(F)<br>±2(G)<br>±5(J) | 1 ~ 9.9<br>10 ~ 10M | ±300<br>±100 | -55~155 | | |
| RC 1608 | 0603 | 1/10 | | 50 | | | | | | |
| RC 2012 | 0805 | 1/8 | | 150 | | | | | | |
| RC 3216 | 1206 | 1/4 | | 200 | | | | | | |
| RC 3225 | 1210 | 1/3 | | 200 | | | | | | |
| RC 5025 | 2010 | 2/3 | | 200 | | | | | | |
| RC 6432 | 2512 | 1 | | 200 | | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.




## Jumper Rating

| Type | Size (inch) | Rated Current (A) | Resistance (Ω) |
|---|---|---|---|
| RC0402 | 01005 | 0.5 | 0.05 Max |
| RC0603 | 0201 | | |
| RC1005 | 0402 | 1.0 | |
| RC1608 | 0603 | | |
| RC2012 | 0805 | 2.0 | |
| RC3216 | 1206 | | |
| RC3225 | 1210 | | |
| RC5025 | 2010 | | |
| RC6432 | 2512 | | |

## Marking

| • 3 digits indication (E-24 series) | • 4 digits indication (E-96 series) |
|---|---|
| - Left 2 digits represent significant figures.<br>- Last 1 digit represents exponential number of 10.<br>- Example: 103<br>Left 2 digits: 10<br>Last 1 digit: 3<br>$103 = 10 \times 10^3 \Omega$<br>$= 10000\Omega = 10k\Omega$ | - Left 3 digits represent significant figures.<br>- Last 1 digit represents exponential number of 10.<br>- Example: 1002<br>Left 3 digits: 100<br>Last 1 digit: 2<br>$1002 = 100 \times 10^2 \Omega$<br>$= 10000\Omega = 10k\Omega$ |
|  |  |
| No marking types :<br>RC0402, RC0603,<br>RC1005 | No marking types :<br>RC0402, RC0603,<br>RC1005, RC1608 |

## IEC Code System (E-96, E-24)

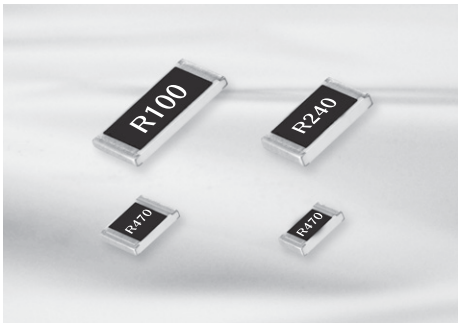
| E-96 | E-24 | E-96 | E-24 | E-96 | E-24 | E-96 | E-24 |
|---|---|---|---|---|---|---|---|
| 100 | 10 | 178 | | 316 | | 562 | 56 |
| 102 | | 182 | 18 | 324 | 33 | 576 | |
| 105 | | 187 | | 332 | | 590 | |
| 107 | | 191 | | 340 | | 604 | |
| 110 | 11 | 196 | | 348 | | 619 | |
| 113 | | 200 | 20 | 357 | 36 | 634 | 62 |
| 115 | | 205 | | 365 | | 649 | |
| 118 | | 210 | | 374 | | 665 | |
| 121 | 12 | 215 | | 383 | 39 | 681 | 68 |
| 124 | | 221 | 22 | 392 | | 698 | |
| 127 | | 226 | | 402 | | 715 | |
| 130 | 13 | 232 | | 412 | | 732 | |
| 133 | | 237 | | 422 | | 750 | 75 |
| 137 | | 243 | 24 | 432 | 43 | 768 | |
| 140 | | 249 | | 442 | | 787 | |
| 143 | | 255 | | 453 | | 806 | |
| 147 | | 261 | | 464 | | 825 | 82 |
| 150 | 15 | 267 | | 475 | 47 | 845 | |
| 154 | | 274 | 27 | 487 | | 866 | |
| 158 | | 280 | | 499 | | 887 | |
| 162 | 16 | 287 | | 511 | 51 | 909 | |
| 165 | | 294 | | 523 | | 931 | 91 |
| 169 | | 301 | 30 | 536 | | 953 | |
| 174 | | 309 | | 549 | | 976 | |

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Operation Notes
Example of land Pattern Design
Recommended Soldering Conditions
General Structure
General
Low ohms (RUT Series)
Ultra Low ohms (RU Series)
Ultra Low Ohms (RUK Series)
Ultra Low Ohms (RJ Series)
Arrays (CONVEX Type)
Arrays (CONCAVE Type)
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Anti-Sulfur Resistors
Anti-Sulfur Resistor Arrays(Convex Type)
Anti-Sulfur Resistor Arrays(Concave Type)
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Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Low Ohms(RUT Series)




## Feature

- Under 1 ohms, precision resistance.
- Both flow and reflow soldering are applicable.
- High Power with Low TCR.
- 100% Lead Free Products (PbO not used).
- RoHS Complaint.

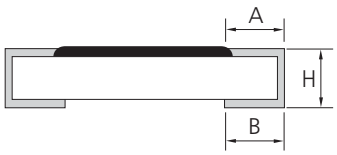
## Application

- Current Sensing.
- PCM of Battery Pack.
- Power supplying part, DC power charger, adapter.
- Mobile Phone, HDD, DSC, LCD.

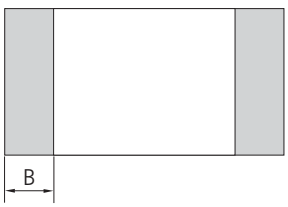
## Structure and Dimensions




〈 Top View 〉




〈 Side View 〉




〈 Bottom View 〉

(UNIT: mm)

| Type | SIZE(Inch) | L | W | H | A | B |
|---|---|---|---|---|---|---|
| RUT1005 | 0402 | 1.00±0.05 | 0.50±0.05 | 0.35±0.05 | 0.20±0.10 | 0.25±0.10 |
| RUT1608 | 0603 | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.30±0.20 | 0.30±0.10 |
| RUT2012 | 0805 | 2.00±0.15 | 1.25±0.15 | 0.50±0.10 | 0.40±0.20 | 0.35±0.20 |
| RUT3216 | 1206 | 3.20±0.15 | 1.60±0.15 | 0.55±0.10 | 0.45±0.20 | 0.40±0.20 |
| RUT3225 | 1210 | 3.20±0.20 | 2.55±0.20 | 0.55±0.10 | 0.45±0.20 | 0.40±0.20 |
| RUT5025 | 2010 | 5.00±0.20 | 2.50±0.20 | 0.55±0.10 | 0.60±0.20 | 0.60±0.20 |
| RUT6432 | 2512 | 6.30±0.20 | 3.20±0.20 | 0.55±0.10 | 0.60±0.20 | 0.60±0.20 |

## Parts Numbering System

- The part number system shall be in the following format

| RUT | 2012 | J | R100 | CS |
|---|---|---|---|---|
| Code Designation | Dimension & Size Code | Tolerance | Resistance Value | Packaging Code |
| RUT: Current Sensing Resistor Top Mounting (Face-up) | 1005: 1.0×0.5(㎜) - 0402(inch)<br>1608: 1.6×0.8(㎜) - 0603(inch)<br>2012: 2.0×1.2(㎜) - 0805(inch)<br>3216: 3.2×1.6(㎜) - 1206(inch)<br>3225: 3.2×2.5(㎜) - 1210(inch)<br>5025: 5.0×2.5(㎜) - 2010(inch)<br>6432: 6.4×3.2(㎜) - 2512(inch) | F: ±1%<br>G: ±2%<br>J: ±5% | 4-digit coding system | CS: Tape & Reel 7"<br>ES : Tape & Reel 10"<br>AS: Tape & Reel 13" |

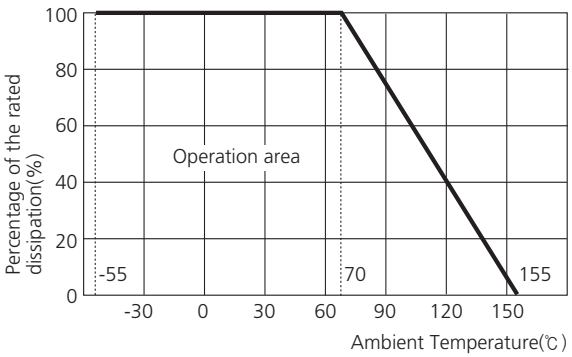
## Specification

| Type | Size (inch) | Rated Power (W) | Resistance (Ω) | T.C.R (ppm/℃) | Rated Current (A) | Rated Ambient Temperature (℃) | Working Temperature (℃) |
|---|---|---|---|---|---|---|---|
| RUT1005 | 0402 | 1/10 | 0.1~0.976 | ±150 | $\sqrt{P/R}$<br>P: Rated Power(W)<br>R: Resistance(Ω) | 70 | -55~+155 |
| RUT1608 | 0603 | 1/8 | | | | | |
| RUT2012 | 0805 | 1/4 | | | | | |
| RUT3216 | 1206 | 1/3 | | | | | |
| RUT3225 | 1210 | 1/2 | | | | | |
| RUT5025 | 2010 | 2/3 | | | | | |
| RUT6432 | 2512 | 1 | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.




## Marking

**4 digits indication**

- R means decimal point.
- Other digits represent the significant value.
- Example : R100
  R100 = .100 = 0.100Ω
  =0.1Ω or 100MΩ



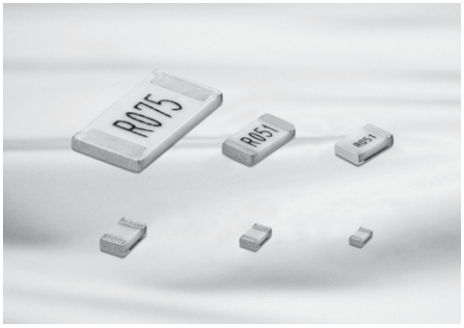

## Resistance Value Table

| Code | Value (Ω) | Tol (%) | Code | Value (Ω) | Tol (%) | Code | Value (Ω) | Tol (%) | Code | Value (Ω) | Tol (%) | Code | Value (Ω) | Tol (%) | Code | Value (Ω) | Tol (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R100 | 0.1 | ±1, ±5 | R154 | 0.154 | ±1 | R226 | 0.226 | ±1 | R330 | 0.33 | ±1, ±5 | R470 | 0.47 | ±1, ±5 | R680 | 0.68 | ±1, ±5 |
| R102 | 0.102 | ±1 | R158 | 0.158 | ±1 | R232 | 0.232 | ±1 | R332 | 0.332 | ±1 | R475 | 0.475 | ±1 | R681 | 0.681 | ±1 |
| R105 | 0.105 | ±1 | R160 | 0.16 | ±1, ±5 | R237 | 0.237 | ±1 | R340 | 0.34 | ±1 | R487 | 0.487 | ±1 | R698 | 0.698 | ±1 |
| R107 | 0.107 | ±1 | R162 | 0.162 | ±1 | R240 | 0.24 | ±1, ±5 | R348 | 0.348 | ±1 | R499 | 0.499 | ±1 | R715 | 0.715 | ±1 |
| R110 | 0.11 | ±1, ±5 | R165 | 0.165 | ±1 | R243 | 0.243 | ±1 | R357 | 0.357 | ±1 | R510 | 0.51 | ±1, ±5 | R732 | 0.732 | ±1 |
| R113 | 0.113 | ±1 | R169 | 0.169 | ±1 | R249 | 0.249 | ±1 | R360 | 0.36 | ±1, ±5 | R511 | 0.511 | ±1 | R750 | 0.75 | ±1, ±5 |
| R115 | 0.115 | ±1 | R174 | 0.174 | ±1 | R255 | 0.255 | ±1 | R365 | 0.365 | ±1 | R523 | 0.523 | ±1 | R768 | 0.768 | ±1 |
| R118 | 0.118 | ±1 | R178 | 0.178 | ±1 | R261 | 0.261 | ±1 | R374 | 0.374 | ±1 | R536 | 0.536 | ±1 | R787 | 0.787 | ±1 |
| R120 | 0.12 | ±1, ±5 | R180 | 0.180 | ±1, ±5 | R267 | 0.267 | ±1 | R383 | 0.383 | ±1 | R549 | 0.549 | ±1 | R806 | 0.806 | ±1 |
| R121 | 0.121 | ±1 | R182 | 0.182 | ±1 | R270 | 0.27 | ±1, ±5 | R390 | 0.39 | ±1, ±5 | R560 | 0.56 | ±1, ±5 | R820 | 0.82 | ±1, ±5 |
| R124 | 0.124 | ±1 | R187 | 0.187 | ±1 | R274 | 0.274 | ±1 | R392 | 0.392 | ±1 | R562 | 0.562 | ±1 | R825 | 0.825 | ±1 |
| R127 | 0.127 | ±1 | R191 | 0.191 | ±1 | R280 | 0.28 | ±1 | R402 | 0.402 | ±1 | R576 | 0.576 | ±1 | R845 | 0.845 | ±1 |
| R130 | 0.13 | ±1, ±5 | R196 | 0.196 | ±1 | R287 | 0.287 | ±1 | R412 | 0.412 | ±1 | R590 | 0.59 | ±1 | R866 | 0.866 | ±1 |
| R133 | 0.133 | ±1 | R200 | 0.200 | ±1, ±5 | R294 | 0.294 | ±1 | R422 | 0.422 | ±1 | R604 | 0.604 | ±1 | R887 | 0.887 | ±1 |
| R137 | 0.137 | ±1 | R205 | 0.205 | ±1 | R300 | 0.3 | ±1, ±5 | R430 | 0.43 | ±1, ±5 | R619 | 0.619 | ±1 | R909 | 0.909 | ±1 |
| R140 | 0.14 | ±1 | R210 | 0.21 | ±1 | R301 | 0.301 | ±1 | R432 | 0.432 | ±1 | R620 | 0.62 | ±1, ±5 | R910 | 0.91 | ±1, ±5 |
| R143 | 0.143 | ±1 | R215 | 0.215 | ±1 | R309 | 0.309 | ±1 | R442 | 0.442 | ±1 | R634 | 0.634 | ±1 | R931 | 0.931 | ±1 |
| R147 | 0.147 | ±1 | R220 | 0.22 | ±1, ±5 | R316 | 0.316 | ±1 | R453 | 0.453 | ±1 | R649 | 0.649 | ±1 | R953 | 0.953 | ±1 |
| R150 | 0.15 | ±1, ±5 | R221 | 0.221 | ±1 | R324 | 0.324 | ±1 | R464 | 0.464 | ±1 | R665 | 0.665 | ±1 | R976 | 0.976 | ±1 |

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Ultra Low ohms (RU Series)
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Ultra Low Ohms (RJ Series)
Arrays (CONVEX Type)
Arrays (CONCAVE Type)
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Anti-Sulfur Resistor Arrays (Flat Type)
Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

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# Ultra Low Ohms(RU Series)



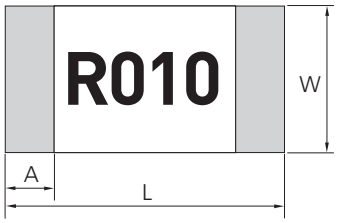

## Feature

- Thick Film Type Ultra Low Ohm Resistor.
- High Precision Reliability.
- High Power with Low TCR.
- 100% Lead Free Products (PbO not used).
- RoHS Compliant.

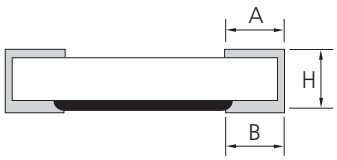
## Application

- Current Sensing.
- PCM of Battery Pack.
- Power supplying part, DC power charger, adapter.
- Mobile Phone, Mobile PC, Note PC, HDD, DSC, LCD.

## Structure and Dimensions




〈 Top View 〉




〈 Side View 〉




〈 Bottom View 〉

(UNIT: mm)

| Type | SIZE(Inch) | L | W | H | A | B |
|---|---|---|---|---|---|---|
| RU1005 | 0402 | 1.00±0.05 | 0.50±0.05 | 0.35±0.05 | 0.25±0.15 | 0.25±0.15 |
| RU1608 | 0603 | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.30±0.20 | R≤0.05 :0.50±0.20<br>R>0.05 :0.35±0.20 |
| RU2012 | 0805 | 2.00±0.15 | 1.25±0.15 | 0.55±0.10 | 0.40±0.20 | R≤0.05 :0.65±0.20<br>R>0.05 :0.40±0.20 |
| RU3216 | 1206 | 3.20±0.15 | 1.60±0.15 | 0.60±0.10 | 0.45±0.20 | R≤0.05 :0.90±0.20<br>R>0.05 :0.60±0.20 |
| RU3225 | 1210 | 3.20±0.20 | 2.55±0.20 | 0.55±0.10 | 0.45±0.20 | R≤0.05 :1.20±0.20<br>R>0.05 :0.75±0.20 |
| RU5025 | 2010 | 5.00±0.20 | 2.50±0.20 | 0.60±0.10 | 0.50±0.20 | R≤0.05 :1.50±0.20<br>R>0.05 :0.90±0.20 |
| RU6432 | 2512 | 6.30±0.20 | 3.20±0.20 | 0.60±0.10 | 0.50±0.20 | R≤0.05 :1.90±0.20<br>R>0.05 :1.10±0.25 |

## Parts Numbering System

- The part number system shall be in the following format

| R U | 2012 | F | R051 | CS |
|---|---|---|---|---|
| Code Designation | Dimension & Size Code | Tolerance | Resistance Value | Packaging Code |
| RU : Current sensing resistor | 1005: 1.0×0.5(㎜) - 0402(inch)<br>1608: 1.6×0.8(㎜) - 0603(inch)<br>2012: 2.0×1.2(㎜) - 0805(inch)<br>3216: 3.2×1.6(㎜) - 1206(inch)<br>3225: 3.2×2.5(㎜) - 1210(inch)<br>5025: 5.0×2.5(㎜) - 2010(inch)<br>6432: 6.4×3.2(㎜) - 2512(inch) | F: ±1%<br>G: ±2%<br>J: ±5% | 4-digit coding system | CS: Tape & Reel 7"<br>ES : Tape & Reel 10"<br>AS: Tape & Reel 13" |

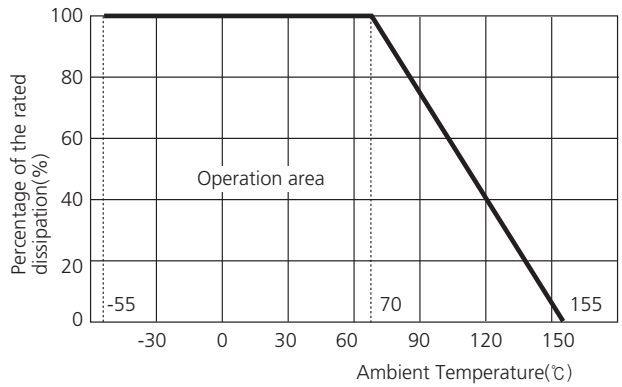
## Specification

| Type | Size (inch) | Rated Power (W) | Resistance (Ω) | T.C.R (ppm/℃) | Rated Current (A) | Rated Ambient Temperature (℃) | Working Temperature (℃) |
|---|---|---|---|---|---|---|---|
| RU1005 | 0402 | 1/8 | 0.02~0.1 | R<0.047: ±500<br>R≥0.047: ±150 | $\sqrt{P/R}$<br>P: Rated Power(W)<br>R: Resistance(Ω) | 70 | -55~+155 |
| RU1608 | 0603 | 1/4 | 0.01~0.1 | R≤0.025: ±600<br>R<0.033: ±400<br>R≥0.033: ±150 | | | |
| RU2012 | 0805 | 1/3 | | | | | |
| RU3216 | 1206 | 1/2 | | R≤0.025: ±500<br>R<0.033: ±350<br>R≥0.033: ±150 | | | |
| RU3225 | 1210 | 2/3 | | | | | |
| RU5025 | 2010 | 3/4 | | | | | |
| RU6432 | 2512 | 1 | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70 ℃, the loading power follows the below power derating curve.




## Marking

**4-digit Coding System**

- R means decimal point.
- Other digits represent the significant value.
- Example : R010
  R010 = .010 = 0.010Ω
  = 0.01Ω or 10㏁



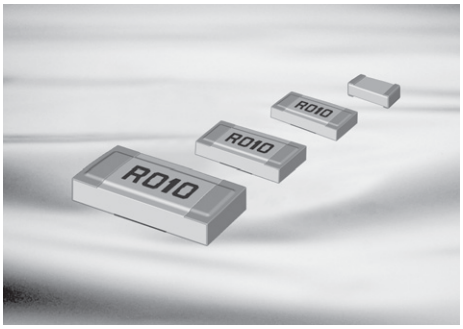

## Resistance Value Table

| Code | Value (Ω) | Tol (%) | Code | Value (Ω) | Tol (%) | Code | Value (Ω) | Tol (%) | Code | Value (Ω) | Tol (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R010 | 0.010 | ±1, ±5 | R020 | 0.020 | ±1, ±5 | R039 | 0.039 | ±1, ±5 | R062 | 0.062 | ±1, ±5 |
| R011 | 0.011 | ±1, ±5 | R022 | 0.022 | ±1, ±5 | R040 | 0.040 | ±1, ±5 | R068 | 0.068 | ±1, ±5 |
| R012 | 0.012 | ±1, ±5 | R024 | 0.024 | ±1, ±5 | R043 | 0.043 | ±1, ±5 | R075 | 0.075 | ±1, ±5 |
| R013 | 0.013 | ±1, ±5 | R027 | 0.027 | ±1, ±5 | R047 | 0.047 | ±1, ±5 | R082 | 0.082 | ±1, ±5 |
| R015 | 0.015 | ±1, ±5 | R030 | 0.030 | ±1, ±5 | R050 | 0.050 | ±1, ±5 | R091 | 0.091 | ±1, ±5 |
| R016 | 0.016 | ±1, ±5 | R033 | 0.033 | ±1, ±5 | R051 | 0.051 | ±1, ±5 | R100 | 0.100 | ±1, ±5 |
| R018 | 0.018 | ±1, ±5 | R036 | 0.036 | ±1, ±5 | R056 | 0.056 | ±1, ±5 | | | |

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Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Ultra Low Ohms(RUK Series)



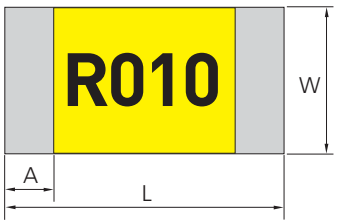

## Feature

- Thick Film Type Ultra Low Ohm Resistor.
- High Precision Reliability.
- High Power with Very Low TCR.
- 100% Lead Free Products (PbO not used).
- RoHS Compliant.

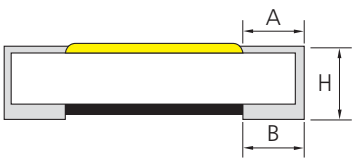
## Application

- Current Sensing.
- PCM of Battery Pack.
- Power supplying part, DC power charger, adapter.
- Mobile Phone, Mobile PC, Note PC, HDD, DSC, LCD.

## Structure and Dimensions




〈 Top View 〉




〈 Side View 〉




〈 Bottom View 〉

(UNIT: mm)

| Type | SIZE(Inch) | L | W | H | A | B |
|---|---|---|---|---|---|---|
| RUK1608 | 0603 | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.35±0.20 | 0.50±0.20 |
| RUK2012 | 0805 | 2.00±0.15 | 1.25±0.15 | 0.55±0.10 | 0.40±0.20 | 0.55±0.20 |
| RUK3216 | 1206 | 3.20±0.15 | 1.60±0.15 | 0.65±0.10 | 0.45±0.20 | 0.90±0.20 |
| RUK6432 | 2512 | 6.30±0.20 | 3.20±0.20 | 0.65±0.10 | 1.15±0.20 | 0.90±0.20 |

## Parts Numbering System

- The part number system shall be in the following format

| R U K | 1608 | F | R010 | CS |
|---|---|---|---|---|
| Code Designation | Dimension & Size Code | Tolerance | Resistance Value | Packaging Code |
| RUK : Current Sensing Resistor Low TCR | 1608: 1.6×0.8(㎜) - 0603(inch)<br>2012: 2.0×1.2(㎜) - 0805(inch)<br>3216: 3.2×1.6(㎜) - 1206(inch)<br>3225: 3.2×2.5(㎜) - 1210(inch)<br>5025: 5.0×2.5(㎜) - 2010(inch)<br>6432: 6.4×3.2(㎜) - 2512(inch) | F: ±1%<br>G: ±2%<br>J: ±5% | 4-digits coding system | CS: Tape & Reel 7"<br>ES : Tape & Reel 10"<br>AS: Tape & Reel 13" |

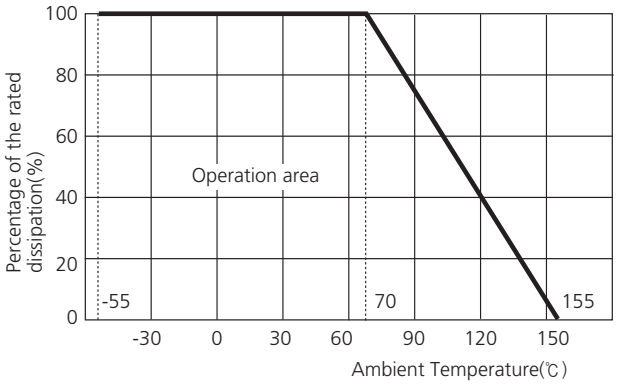
## Specification

| Type | Size (inch) | Rated Power (W) | Resistance (Ω) | T.C.R (ppm/℃) | Rated Current (A) | Rated Ambient Temperature (℃) | Working Temperature (℃) |
|---|---|---|---|---|---|---|---|
| RUK1608 | 0603 | 1/2 | 0.01 ~ 0.03 | ±100 | $\sqrt{P/R}$<br>P : Rated Power(W)<br>R : Resistance (Ω) | 70 | -55 ~ +155 |
| RUK2012 | 0805 | 1/2 | | | | | |
| RUK3216 | 1206 | 1 | | | | | |
| RUK6432 | 2512 | 1 | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃ , the loading power follows the below power derating curve.




## Marking

4-digits coding system

- R means decimal point.
- Other digits represent significant value.
- Example : R010
  R010 = .010 = 0.010Ω
  = 0.01Ω or 10mΩ



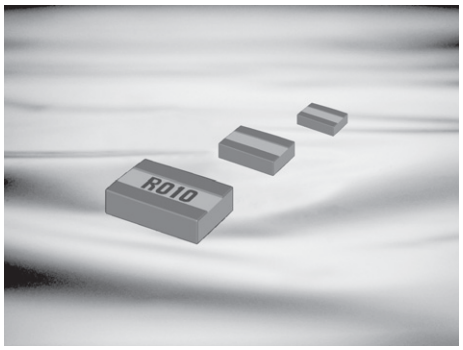

## Resistance Value Table

| Code | Value(Ω) | Tol(%) | Code | Value(Ω) | Tol(%) |
|---|---|---|---|---|---|
| R010 | 0.010 | ±1, ±5 | R018 | 0.018 | ±1, ±5 |
| R011 | 0.011 | ±1, ±5 | R020 | 0.020 | ±1, ±5 |
| R012 | 0.012 | ±1, ±5 | R022 | 0.022 | ±1, ±5 |
| R013 | 0.013 | ±1, ±5 | R024 | 0.024 | ±1, ±5 |
| R015 | 0.015 | ±1, ±5 | R027 | 0.027 | ±1, ±5 |
| R016 | 0.016 | ±1, ±5 | R030 | 0.030 | ±1, ±5 |

The specifications and designs contained herein may be subject to change without notice.
Please contact our sales representatives or product engineers before order.

Operation Notes
Example of land Pattern Design
Recommended Soldering Conditions
General Structure
General
Low ohms (RUT Series)
Ultra Low ohms (RU Series)
Ultra Low Ohms (RUK Series)
Ultra Low Ohms (RJ Series)
Arrays (CONVEX Type)
Arrays (CONCAVE Type)
Arrays (FLAT Type)
Anti-Sulfur Resistors
Anti-Sulfur Resistor Arrays(Convex Type)
Anti-Sulfur Resistor Arrays(Concave Type)
Anti-Sulfur Resistor Arrays (Flat Type)
Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Ultra Low Ohms(RJ Series)




## Feature

- Thick Film Wide Terminal Type.
- High Precision Reliability.
- High Power with Low TCR.
- 100% Lead Free Products (PbO not used).
- RoHS Compliant.

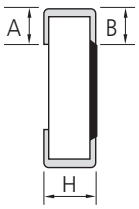
## Application

- Current Sensing.
- PCM of Battery Pack.
- DC Power Charger, Adapter.
- Mobile Phone, Mobile PC, HDD, DSC, LCD.

## Structure and Dimensions




〈Top View〉




〈Side View〉




〈Bottom View〉

(UNIT: mm)

| Type | SIZE(Inch) | L | W | H | A | B |
|---|---|---|---|---|---|---|
| RJ0816 | 0306 | 0.80±0.10 | 1.60±0.10 | 0.45±0.15 | 0.25±0.15 | 0.30±0.15 |
| RJ1220 | 0508 | 1.25±0.10 | 2.00±0.10 | 0.55±0.15 | 0.30±0.15 | 0.35±0.15 |
| RJ1632 | 0612 | 1.60±0.15 | 3.20±0.15 | 0.55±0.15 | 0.35±0.20 | 0.40±0.20 |
| RJ2037 | 0815 | 2.00±0.15 | 3.75±0.15 | 0.55±0.15 | 0.45±0.20 | 0.55±0.20 |
| RJ3264 | 1225 | 3.20±0.20 | 6.40±0.20 | 0.55±0.15 | 0.60±0.20 | 0.60±0.20 |

## Parts Numbering System

- The part number system shall be in the following format

| RJ | 0816 | F | R010 | CS |
|---|---|---|---|---|
| Code Designation | Dimension & Size Code | Tolerance | Resistance Value | Packaging Code |
| RJ : Thick Film Wide Terminal CSR | 0816 : 0.8×1.6(㎜) - 0306(inch)<br>1220 : 1.2×2.0(㎜) - 0508(inch)<br>1632 : 1.6×3.2(㎜) - 0612(inch)<br>2037 : 2.0×3.7(㎜) - 0815(inch)<br>3264 : 3.2×6.4(㎜) - 1225(inch) | F: ±1%<br>G: ±2%<br>J: ±5% | 4-digits coding system | CS: Tape & Reel 7"<br>ES : Tape & Reel 10"<br>AS: Tape & Reel 13" |

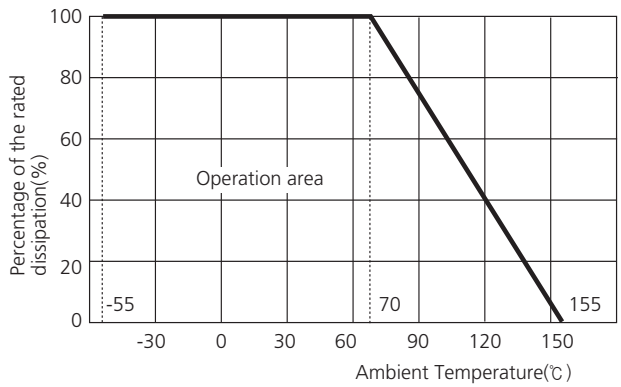
## Specification

| Type | Size (inch) | Rated Power (W) | Resistance (Ω) | T.C.R (ppm/℃) | Rated Current (A) | Rated Ambient Temperature (℃) | Working Temperature (℃) |
|---|---|---|---|---|---|---|---|
| RJ0816 (1) | 0306 | 1/2 | 0.005 ~ 0.02 | ±100 | $\sqrt{P/R}$ P: Rated Power(W) R: Resistance(Ω) | 70 | -55 ~ +155 |
| RJ1220 | 0508 | 1 | 0.005 ~ 0.02 | | | | |
| | | 1/2 | 0.021 ~ 0.05 | -200 ~ 0 | | | |
| RJ1632 | 0612 | 1 | 0.005 ~ 0.02 | ±100 | | | |
| | | 3/4 | 0.021 ~ 0.05 | -200 ~ 0 | | | |
| RJ2037 | 0815 | 1 | 0.005 ~ 0.02 | ±100 | | | |
| RJ3264 (1) | 1225 | 2 | 0.005 ~ 0.02 | | | | |

(1) RJ0816, RJ3264 are under development (sample available)
• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.




## Marking

4-digits coding system

- R means decimal point.
- Other digits represent significant value.
- Example : R010
  R010 = .010 = 0.010Ω
  = 0.01Ω or 10MΩ

R010

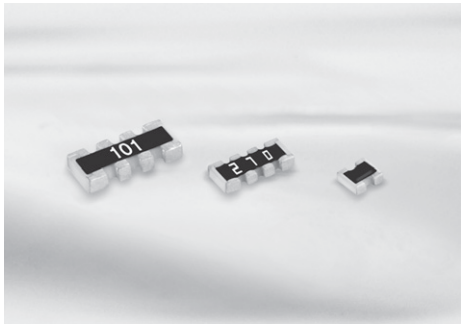
## Resistance Value Table

| Code | Value (Ω) | Tol (%) | Code | Value (Ω) | Tol (%) | Code | Value (Ω) | Tol (%) |
|---|---|---|---|---|---|---|---|---|
| R005 | 0.005 | ±1, ±5 | R013 | 0.013 | ±1, ±5 | R030 | 0.030 | ±1, ±5 |
| R006 | 0.006 | ±1, ±5 | R015 | 0.015 | ±1, ±5 | R033 | 0.033 | ±1, ±5 |
| R007 | 0.007 | ±1, ±5 | R016 | 0.016 | ±1, ±5 | R036 | 0.036 | ±1, ±5 |
| R008 | 0.008 | ±1, ±5 | R018 | 0.018 | ±1, ±5 | R039 | 0.039 | ±1, ±5 |
| R009 | 0.009 | ±1, ±5 | R020 | 0.020 | ±1, ±5 | R040 | 0.040 | ±1, ±5 |
| R010 | 0.010 | ±1, ±5 | R022 | 0.022 | ±1, ±5 | R043 | 0.043 | ±1, ±5 |
| R011 | 0.011 | ±1, ±5 | R024 | 0.024 | ±1, ±5 | R047 | 0.047 | ±1, ±5 |
| R012 | 0.012 | ±1, ±5 | R027 | 0.027 | ±1, ±5 | R050 | 0.050 | ±1, ±5 |

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Operation Notes
Example of land Pattern Design
Recommended Soldering Conditions
General Structure
General
Low ohms (RUT Series)
Ultra Low ohms (RU Series)
Ultra Low Ohms (RUK Series)
Ultra Low Ohms (RJ Series)
Arrays (CONVEX Type)
Arrays (CONCAVE Type)
Arrays (FLAT Type)
Anti-Sulfur Resistors
Anti-Sulfur Resistor Arrays(Convex Type)
Anti-Sulfur Resistor Arrays(Concave Type)
Anti-Sulfur Resistor Arrays (Flat Type)
Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Arrays(Convex Type)



## Feature

- Reducing SMD surface area (40% reduced).
- Reducing SMD costs (75% reduced).
- Both flow and reflow soldering are applicable.

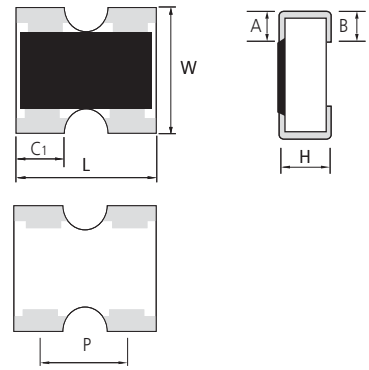
The product of lead-free terminal is RoHS compliant.
PhO(lead oxide) is included in the glass of our product which is prescribed on RoHS appendix as an exception.

## Application

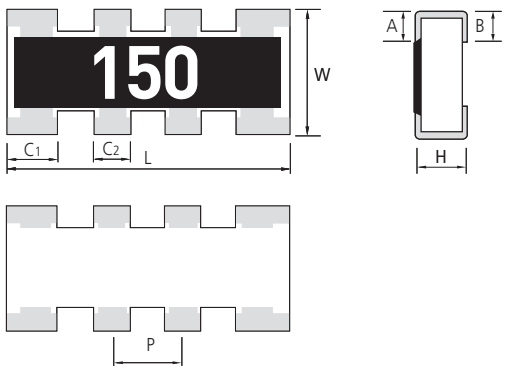
- For semiconductor devices.
- For computers, digital circuits.

## Structure and Dimensions

• 2 Array




• 4 Array




(UNIT: mm)

| Type | L | W | H | A | B | C1 | C2 | P |
|---|---|---|---|---|---|---|---|---|
| RP102P | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.20±0.10 | 0.25±0.10 | 0.33±0.10 | - | 0.65±0.10 |
| RP104P | 2.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.20±0.10 | 0.25±0.10 | 0.40±0.10 | 0.30±0.10 | 0.50±0.10 |
| RP164P | 3.20±0.10 | 1.60±0.10 | 0.50±0.10 | 0.30±0.15 | 0.30±0.15 | 0.60±0.15 | 0.40±0.15 | 0.80±0.15 |

## Parts Numbering System

• The part number system shall be in the following format

| RP | 10 | 4P | J | 1 0 0 | CS |
|---|---|---|---|---|---|
| Code Designation | Dimension | Resistors | Tolerance | Resistance Value | Packaging Code |
| RP: Convex type array | 10 : 0402 Array<br>16 : 0603 Array | 2P: 2 Pieces<br>4P: 4 Pieces | F:±1%<br>G:±2%<br>J:±5%<br>※ Jumper : J | 3 digits coding system<br>(E-24 series)<br>※ Jumper : '000' | CS : Tape Packaging 7"<br>ES : Tape Packaging 10"<br>AS : Tape Packaging 13" |

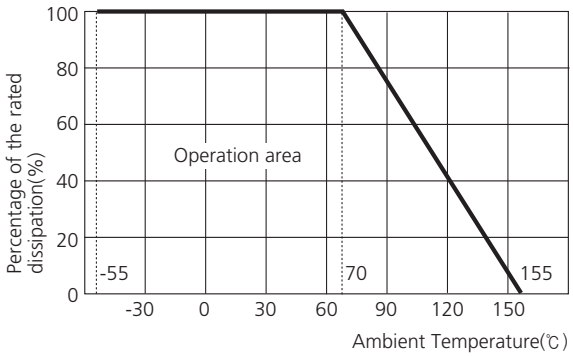
## Specification

| Type | Size (inch) | Rated Power (W) | Rated Voltage (V) | Max Working Voltage (V) | Tolerance (%) | Resistance Range (Ω) | T.C.R (ppm/℃) | Working Temp. (℃) | Rated Ambient Temp. (℃) | Moisture Level |
|---|---|---|---|---|---|---|---|---|---|---|
| RP102P | 0404 | 1/16 | $\sqrt{P \times R}$<br>P: Rated Power(W)<br>R: Resistance(Ω) | 50 | ±1(F)<br>±2(G)<br>±5(J) | 1 ~ 9.9<br>10 ~ 1M | ±300<br>±200 | -55~155 | 70 | Level 1 |
| RP104P | 0804 | 1/16 | | 50 | | | | | | |
| RP164P | 1206 | 1/16 | | 100 | | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

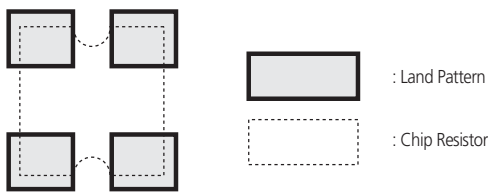
The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.

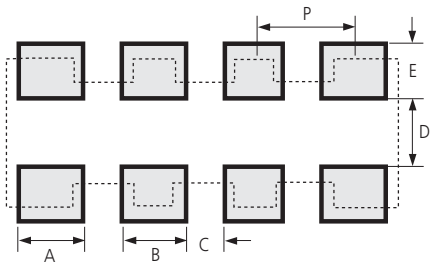



## Jumper Rating

| Type | Size (inch) | Rated Current (A) | Resistance (Ω) |
|---|---|---|---|
| RP102P | 0404 | 1.0 | 0.05 Max |
| RP104P | 0804 | | |
| RP164P | 1206 | | |

## Land Pattern



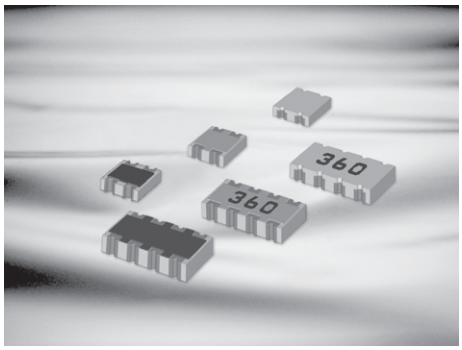




| Type | A | B | C | D | E | $P_1$ | $P_2$ |
|---|---|---|---|---|---|---|---|
| 10AT | 0.4 | 0.4 | 0.25 | 0.5 | 0.5 | 0.65 | - |
| 102P | 0.4 | 0.4 | 0.25 | 0.5 | 0.5 | 0.65 | |
| 104P | 0.7 | 0.3 | 0.2 | 0.5 | 0.5 | 0.55 | 0.5 |
| 164P | 0.7 | 0.5 | 0.3 | 0.9 | 0.8 | 0.9 | 0.8 |

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Operation Notes
Example of land Pattern Design
Recommended Soldering Conditions
General Structure
General
Low ohms (RUT Series)
Ultra Low ohms (RU Series)
Ultra Low Ohms (RUK Series)
Ultra Low Ohms (RJ Series)
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Arrays (CONCAVE Type)
Arrays (FLAT Type)
Anti-Sulfur Resistors
Anti-Sulfur Resistor Arrays(Convex Type)
Anti-Sulfur Resistor Arrays(Concave Type)
Anti-Sulfur Resistor Arrays (Flat Type)
Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Arrays(Concave Type)




## Feature

- Strong Body.
- Both flow and reflow soldering are applicable.
- Concave Type Terminal.

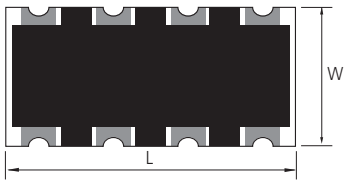
The product of lead-free terminal is RoHS compliant.
PhO(lead oxide) is included in the glass of our product which is prescribed on RoHS appendix as an exception.

## Application

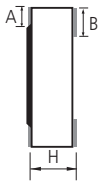
- For semiconductor devices.
- For computers, digital circuits.

## Structure and Dimensions

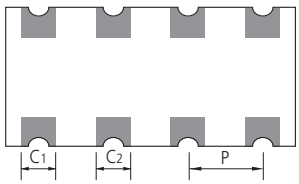
(1) Concave Type




〈 Top View 〉




〈 Side View 〉

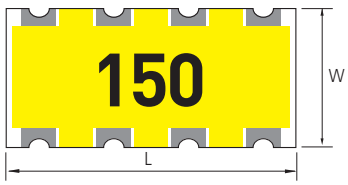



〈 Bottom View 〉

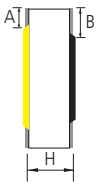
(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RN102P | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.15±0.10 | 0.25±0.10 | 0.33±0.10 | - | 0.50±0.10 |
| RN104P | 2.00±0.10 | 1.00±0.10 | 0.40±0.10 | 0.15±0.10 | 0.25±0.10 | 0.30±0.10 | 0.30±0.10 | 0.50±0.10 |

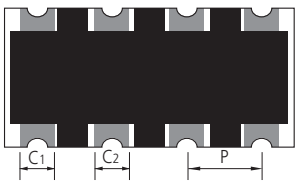
(2) Inverted Concave Type




〈 Top View 〉




〈 Side View 〉

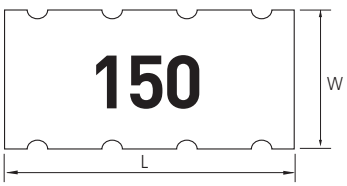



〈 Bottom View 〉

(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RM102P | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.15±0.10 | 0.25±0.10 | 0.33±0.10 | - | 0.50±0.10 |
| RM104P | 2.00±0.10 | 1.00±0.10 | 0.40±0.10 | 0.15±0.10 | 0.25±0.10 | 0.30±0.10 | 0.30±0.10 | 0.50±0.10 |

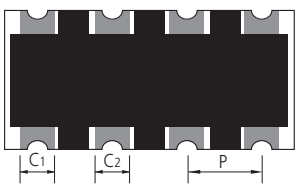
(3) Short-free & Inverted Concave Type




〈 Top View 〉




〈 Side View 〉




〈 Bottom View 〉

(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RK102P | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | - | 0.25±0.10 | 0.33±0.10 | - | 0.50±0.10 |
| RK104P | 2.00±0.10 | 1.00±0.10 | 0.40±0.10 | - | 0.25±0.10 | 0.30±0.10 | 0.30±0.10 | 0.50±0.10 |

## Parts Numbering System

• The part number system shall be in the following format

| RN | 10 | 4P | J | 1 0 0 | CS |
|---|---|---|---|---|---|
| Code Designation | Dimension | Resistors | Tolerance | Resistance Value | Packaging Code |
| RN : Concave Type Array<br>RM : Inverted Type Array<br>RK : Short Free & Inverted Type | 10: 0402 Array | 2P: 2 Pieces<br>4P: 4 Pieces | F: ±1%<br>J: ±5%<br>※ Jumper : J | 3 digit coding system<br>(EIA coding system)<br>E-24 series<br>※ Jumper : '000' | CS : Tape & Reel 7"<br>ES : Tape & Reel 10"<br>AS : Tape & Reel 13" |

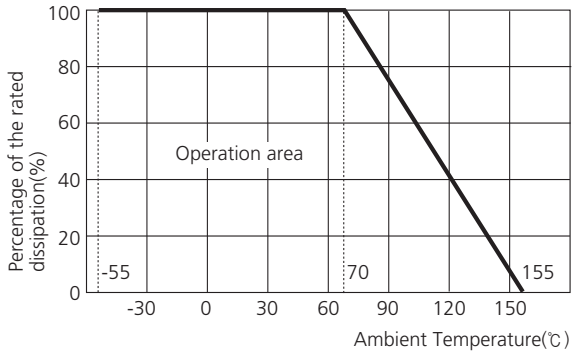
## Specification

| Type | Size (inch) | Rated Power (W) | Rated Voltage (V) | Max Working Voltage (V) | Tolerance (%) | Resistance Range (Ω) | T.C.R (ppm/℃) | Working Temp. (℃) | Rated Ambient Temp. (℃) | Moisture Level |
|---|---|---|---|---|---|---|---|---|---|---|
| 102P | 0404 | 1/16 | $\sqrt{P \times R}$<br>P: Rated Power(W)<br>R: Resistance(Ω) | 25 | ±1(F)<br>±2(G)<br>±5(J) | 1 ~ 1M | ±200 | -55~155 | 70 | Level 1 |
| 104P | 0804 | 1/16 | | 25 | | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

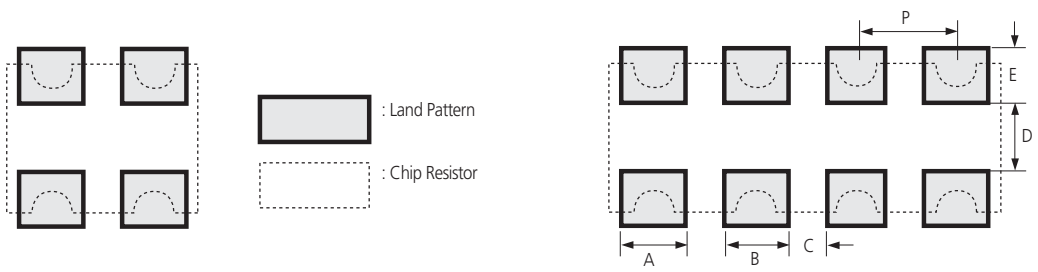
The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.




## Jumper Rating

| Type | Size (inch) | Rated Current (A) | Resistance (Ω) |
|---|---|---|---|
| 102P | 0404 | 1.0 | 0.05 Max |
| 104P | 0804 | | |

## Land Pattern

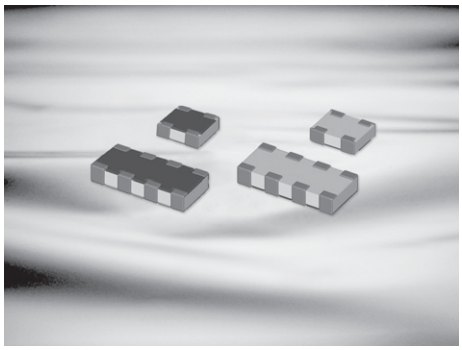



| Type | A | B | C | D | E | P |
|---|---|---|---|---|---|---|
| 102P | 0.3 | 0.3 | 0.2 | 0.5 | 0.4 | 0.5 |
| 104P | 0.3 | 0.3 | 0.2 | 0.5 | 0.4 | 0.5 |

The specifications and designs contained herein may be subject to change without notice.
Please contact our sales representatives or product engineers before order.

Operation Notes
Example of land Pattern Design
Recommended Soldering Conditions
General Structure
General
Low ohms (RUT Series)
Ultra Low ohms (RU Series)
Ultra Low Ohms (RUK Series)
Ultra Low Ohms (RJ Series)
Arrays (CONVEX Type)
Arrays (CONCAVE Type)
Arrays (FLAT Type)
Anti-Sulfur Resistors
Anti-Sulfur Resistor Arrays(Convex Type)
Anti-Sulfur Resistor Arrays(Concave Type)
Anti-Sulfur Resistor Arrays (Flat Type)
Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Arrays(Flat Type)



## Feature

- Very Small Array.
- Stable and Accurate Resistance.
- Flat Type Terminal.

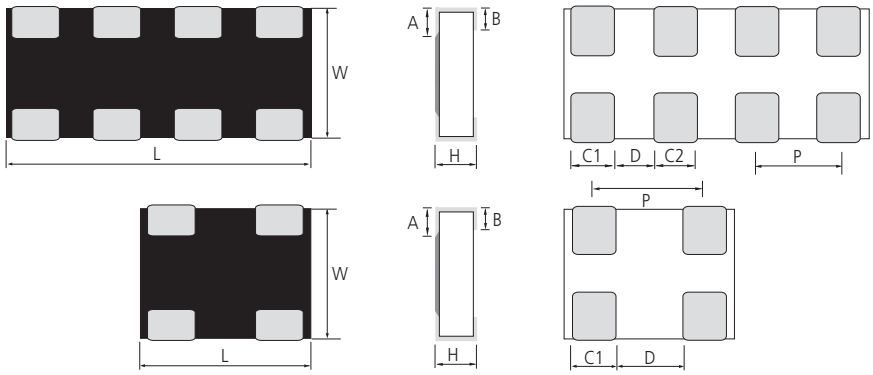
The product of lead-free terminal is RoHS compliant.
PhO(lead oxide) is included in the glass of our product which is prescribed on RoHS appendix as an exception.

## Application

- For semiconductor devices.
- For computers, digital circuits.

## Structure and Dimensions

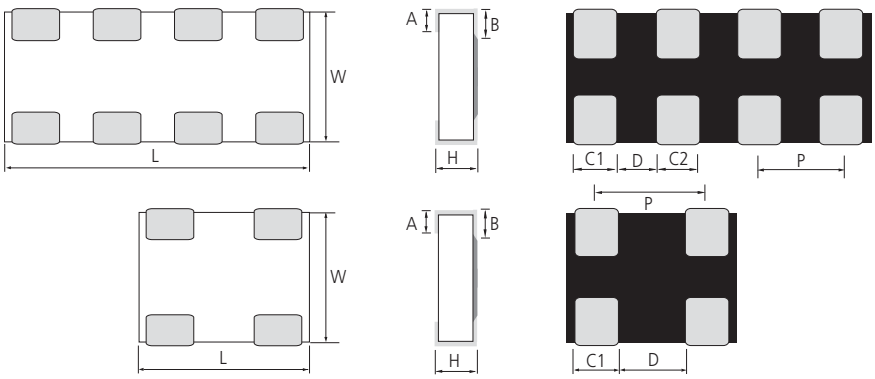
(1) Flat Type Array




(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RF062P | 0.80±0.05 | 0.60±0.05 | 0.23±0.10 | 0.15±0.10 | 0.20±0.10 | 0.25±0.10 | - | 0.50±0.10 |
| RF064P | 1.40±0.05 | 0.60±0.05 | 0.23±0.10 | 0.15±0.10 | 0.20±0.10 | 0.25±0.10 | 0.25±0.10 | 0.40±0.10 |

(2) Inverted Type Array




(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RM062P | 0.80±0.05 | 0.60±0.05 | 0.23±0.10 | 0.15±0.10 | 0.20±0.10 | 0.25±0.10 | - | 0.50±0.10 |
| RM064P | 1.40±0.05 | 0.60±0.05 | 0.23±0.10 | 0.15±0.10 | 0.20±0.10 | 0.25±0.10 | 0.25±0.10 | 0.40±0.10 |

## Parts Numbering System

• The part number system shall be in the following format

| RF | 06 | 4P | J | 150 | CS |
|---|---|---|---|---|---|
| Code Designation | Dimension | Resistors | Tolerance | Resistance Value | Packaging Code |
| RF : Flat Type Array<br>RM : Inverted Type Array | 06: 0201 Array | 2P: 2 Pieces<br>4P: 4 Pieces | J: ±5%<br>※ Jumper : J | 3 digit coding system<br>(EIA coding system)<br>E-24 series<br>※ Jumper : '000' | CS : Tape & Reel 7"<br>ES : Tape & Reel 10"<br>AS : Tape & Reel 13" |

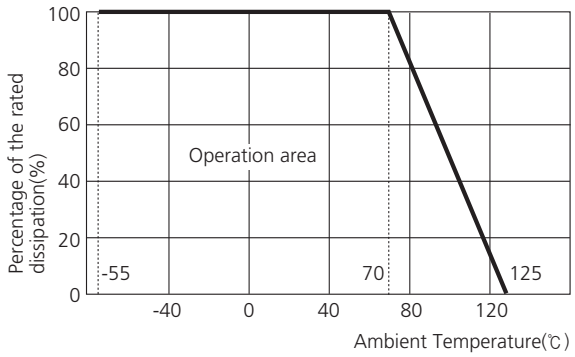
## Specification

| Type | Size (inch) | Rated Power (W) | Rated Voltage (V) | Max Working Voltage (V) | Tolerance (%) | Resistance Range (Ω) | T.C.R (ppm/℃) | Working Temp. (℃) | Rated Ambient Temp. (℃) | Moisture Level |
|---|---|---|---|---|---|---|---|---|---|---|
| 062P | 0302 | 1/32 | $\sqrt{P \times R}$<br>P: Rated Power(W)<br>R: Resistance(Ω) | 12.5 | ±5(J) | 1 ~ 1M | ±200 | -55~125 | 70 | Level 1 |
| 064P | 0502 | 1/32 | | 12.5 | | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

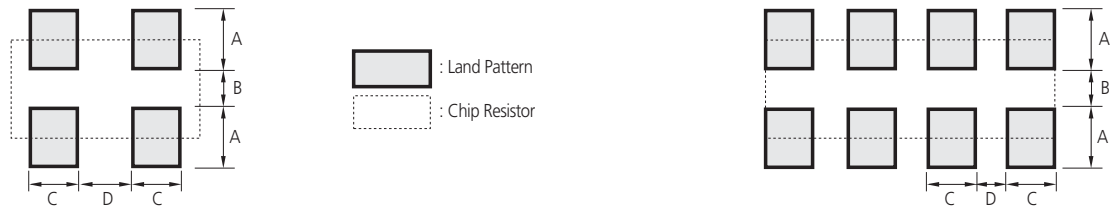
The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.




## Jumper Rating

| Type | Size (inch) | Rated Current (A) | Resistance (Ω) |
|---|---|---|---|
| 062P | 0302 | 0.5 | 0.05 Max |
| 064P | 0502 | | |

## Land Pattern

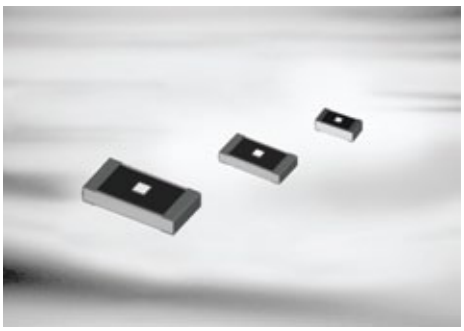



| TYPE (Inch) | Reflow Soldering | | | | |
|---|---|---|---|---|---|
| Dimension | A | B | 2A + B | C | D |
| 062P | 0.3 | 0.3 | 0.9 | 0.2 | 0.3 |
| 064P | 0.3 | 0.3 | 0.9 | 0.2 | 0.2 |

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Operation Notes
Example of land Pattern Design
Recommended Soldering Conditions
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Ultra Low ohms (RU Series)
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Ultra Low Ohms (RJ Series)
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Arrays (FLAT Type)
Anti-Sulfur Resistors
Anti-Sulfur Resistor Arrays(Convex Type)
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Anti-Sulfur Resistor Arrays (Flat Type)
Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Anti-Sulfur Resistors



## Feature

- Stable in the Sulfur Atmosphere.
- ASTM B809-95 Satisfied
- Passed 720hrs with the dried Sulfur at 105℃ .
- High Precision Reliability.
- RoHS Compliant.

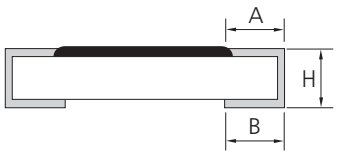
## Application

- Electronic Devices with long-term reliability.
- Server System (Memory Module / HDD).
- Network Equipment.

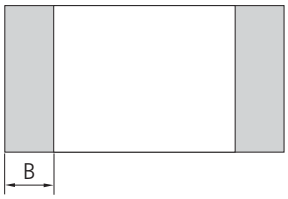
## Structure and Dimensions




〈 Top View 〉




〈 Side View 〉




〈 Bottom View 〉

(UNIT: mm)

| Type | SIZE(Inch) | L | W | H | A | B |
|---|---|---|---|---|---|---|
| RCS0603 | 0201 | 0.60±0.03 | 0.30±0.03 | 0.23±0.03 | 0.15±0.05 | 0.15±0.05 |
| RCS1005 | 0402 | 1.00±0.05 | 0.50±0.05 | 0.35±0.05 | 0.22±0.10 | 0.25±0.10 |
| RCS1608 | 0603 | 1.60±0.10 | 0.80±0.15 | 0.45±0.10 | 0.30±0.20 | 0.30±0.10 |
| RCS2012 | 0805 | 2.00±0.20 | 1.25±0.15 | 0.55±0.10 | 0.40±0.20 | 0.35±0.20 |
| RCS3216 | 1206 | 3.20±0.20 | 1.60±0.15 | 0.55±0.10 | 0.45±0.20 | 0.40±0.20 |
| RCS3225 | 1210 | 3.20±0.20 | 2.55±0.20 | 0.55±0.10 | 0.45±0.20 | 0.40±0.20 |
| RCS5025 | 2010 | 5.00±0.20 | 2.50±0.20 | 0.55±0.10 | 0.60±0.20 | 0.60±0.20 |
| RCS6432 | 2512 | 6.30±0.20 | 3.20±0.20 | 0.55±0.10 | 0.60±0.20 | 0.60±0.20 |

## Parts Numbering System

- The part number system shall be in the following format

| RCS | 2012 | J | 100 | CS |
|---|---|---|---|---|
| Code Designation | Dimension & Size Code | Tolerance | Resistance Value | Packaging Code |
| RCS: Anti-sulfur General Type | 0603: 0.6×0.3(㎜) - 0201(inch)<br>1005: 1.0×0.5(㎜) - 0402(inch)<br>1608: 1.6×0.8(㎜) - 0603(inch)<br>2012: 2.0×1.2(㎜) - 0805(inch)<br>3216: 3.2×1.6(㎜) - 1206(inch)<br>3225: 3.2×2.5(㎜) - 1210(inch)<br>5025: 5.0×2.5(㎜) - 2010(inch)<br>6432: 6.4×3.2(㎜) - 2512(inch) | D: ±0.5%<br>F: ±1%<br>G: ±2%<br>J: ±5%<br>※ Jumper : J | 3 or 4 digits coding system<br>(EIA coding system)<br>3digits (E-24 series)<br>4digits (E-96 series)<br>※ Jumper : '000' | CS: Tape & Reel 7"<br>ES: Tape & Reel 10"<br>AS: Tape & Reel 13" |

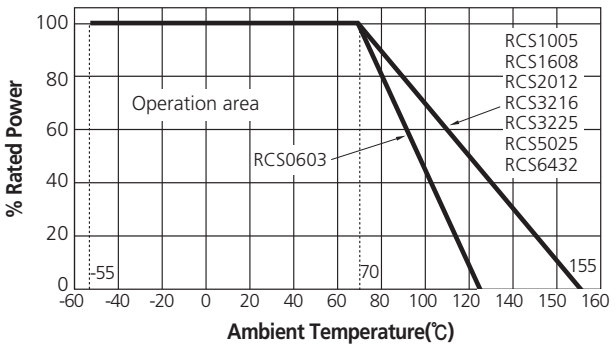
## Specification

| Type | Size (inch) | Rated Power (W) | Rated Voltage (V) | Max Working Voltage (V) | Tolerance (%) | Resistance Range (Ω) | T.C.R (ppm/℃) | Working Temp. (℃) | Rated Ambient Temp. (℃) | Moisture Level |
|---|---|---|---|---|---|---|---|---|---|---|
| RCS0603 | 0201 | 1/20 | $\sqrt{P \times R}$<br>P: Rated Power(W)<br>R: Resistance( Ω ) | 25 | ±1(F)<br>±2(G)<br>±5(J) | 1 ~ 9.9<br>10 ~ 10M | ±300<br>±250 | -55~125 | 70 | Level 1 |
| RCS1005 | 0402 | 1/16 | | 50 | ±0.5(D)<br>±1(F)<br>±2(G)<br>±5(J) | 1 ~ 9.9<br>10 ~ 10M | ±300<br>±100 | -55~155 | | |
| RCS1608 | 0603 | 1/10 | | 50 | | | | | | |
| RCS2012 | 0805 | 1/8 | | 150 | | | | | | |
| RCS3216 | 1206 | 1/4 | | 200 | | | | | | |
| RCS3225 | 1210 | 1/3 | | 200 | | | | | | |
| RCS5025 | 2010 | 2/3 | | 200 | | | | | | |
| RCS6432 | 2516 | 1 | | 200 | | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.

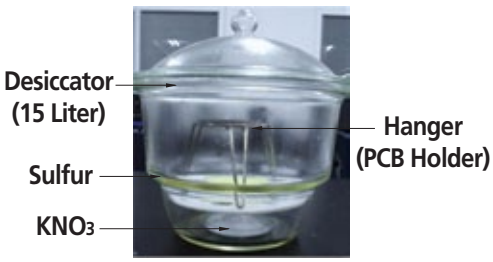



## Jumper Rating

| Type | Size (inch) | Rated Current (A) | Resistance (Ω) |
|---|---|---|---|
| RCS0603 | 0201 | 0.5 | 0.05 Max |
| RCS1005 | 0402 | 1.0 | |
| RCS1608 | 0603 | | |
| RCS2012 | 0805 | 2.0 | |
| RCS3216 | 1206 | | |
| RCS3225 | 1210 | | |
| RCS5025 | 2010 | | |
| RCS6432 | 2512 | | |

## Sulfur Corrosion Test

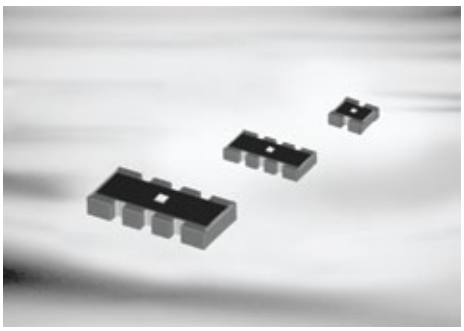
| Test name | Adding Material | Temp. | Duration Time | Decision Criteria |
|---|---|---|---|---|
| ASTM B 809-95 | Sulfur 50 g<br>$KNO_3$ 200 g<br>DI water 200ml | 50℃ | 720hrs | △R< ±1% |
| Dry Sulfur (IBM recommended) | Sulfur 50 g | 105℃ | 720hrs | △R< ±1% |




[ Test Equipment ]

Operation Notes
Example of land Pattern Design
Recommended Soldering Conditions
General Structure
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Low ohms (RUT Series)
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Ultra Low Ohms (RUK Series)
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Anti-Sulfur Resistor Arrays (Flat Type)
Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Anti-Sulfur Resistor Arrays (Convex Type)



## Feature

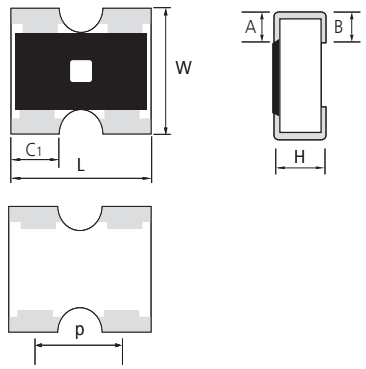
- Stable in the Sulfur Atmosphere.
- ASTM Satisfied
- Passed 720hrs with the dried Sulfur at 105℃ .
- High Precision Reliability.
- RoHS Compliant.

## Application

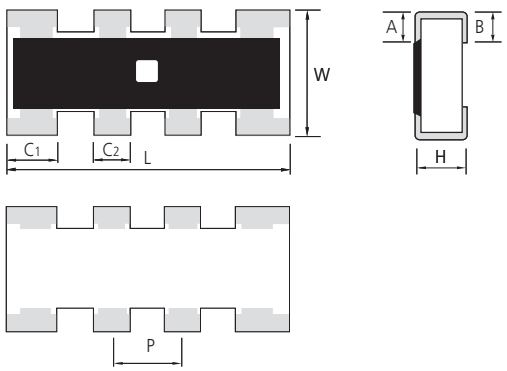
- Electronic Devices with long-term reliability.
- Server System (Memory Module / HDD).
- Network Equipment.
- Automotive ECU parts

## Structure and Dimensions

• 2 Array




• 4 Array




(UNIT: mm)

| Type | L | W | H | A | B | C1 | C2 | P |
|---|---|---|---|---|---|---|---|---|
| RPS102P | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.20±0.10 | 0.25±0.10 | 0.33±0.10 | - | 0.65±0.10 |
| RPS104P | 2.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.20±0.10 | 0.25±0.10 | 0.40±0.10 | 0.30±0.10 | 0.50±0.10 |
| RPS164P | 3.20±0.10 | 1.60±0.10 | 0.50±0.10 | 0.30±0.15 | 0.30±0.15 | 0.60±0.15 | 0.40±0.15 | 0.80±0.15 |

## Parts Numbering System

• The part number system shall be in the following format

| RPS | 10 | 4P | J | 1 0 0 | CS |
|---|---|---|---|---|---|
| Code Designation | Dimension | Resistors | Tolerance | Resistance Value | Packaging Code |
| RPS : Anti-Sulfur Array (Convex Type) | 10 : 0402 Array<br>16 : 0603 Array | 2P: 2 Pieces<br>4P: 4 Pieces | F:±1%<br>G:±2%<br>J:±5%<br>※ Jumper : J | 3 or 4 digits coding system<br>(EIA coding system)<br>3digits (E-24 series)<br>4digits (E-96 series)<br>※ Jumper : '000' | CS : Tape Packaging 7"<br>ES : Tape Packaging 10"<br>AS : Tape Packaging 13" |

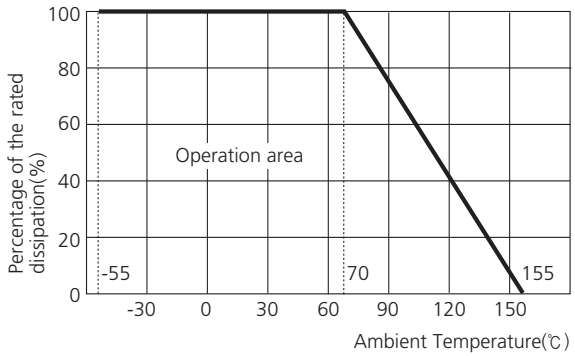
## Specification

| Type | Size (inch) | Rated Power (W) | Rated Voltage (V) | Max Working Voltage (V) | Tolerance (%) | Resistance Range (Ω) | T.C.R (ppm/℃) | Working Temp. (℃) | Rated Ambient Temp. (℃) | Moisture Level |
|---|---|---|---|---|---|---|---|---|---|---|
| RPS102P | 0404 | 1/16 | $\sqrt{P \times R}$<br>P: Rated Power(W)<br>R: Resistance(Ω) | 50 | ±1(F)<br>±2(G)<br>±5(J) | 1 ~ 9.9<br>10 ~ 1M | ±300<br>±200 | -55~155 | 70 | Level 1 |
| RPS104P | 0804 | 1/16 | | 50 | | | | | | |
| RPS164P | 1206 | 1/16 | | 100 | | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

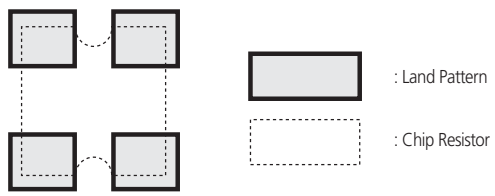
The rated power is the maximum continuous loading power at 70℃ ambient temperature.
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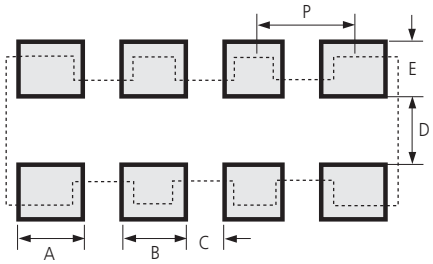



## Jumper Rating

| Type | Size (inch) | Rated Current (A) | Resistance (Ω) |
|---|---|---|---|
| RPS102P | 0404 | 1.0 | 0.05 Max |
| RPS104P | 0804 | | |
| RPS164P | 1206 | | |

## Land Pattern



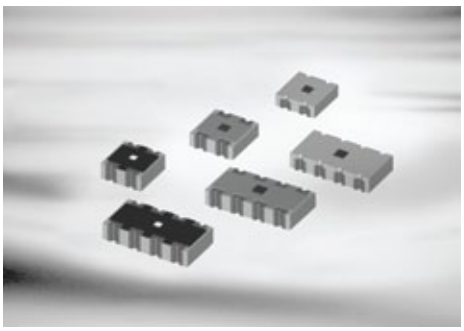




| Type | A | B | C | D | E | $P_1$ | $P_2$ |
|---|---|---|---|---|---|---|---|
| 102P | 0.4 | 0.4 | 0.25 | 0.5 | 0.5 | 0.65 | - |
| 104P | 0.7 | 0.3 | 0.2 | 0.5 | 0.5 | 0.55 | 0.5 |
| 164P | 0.7 | 0.5 | 0.3 | 0.9 | 0.8 | 0.9 | 0.8 |

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Anti-Sulfur Resistor Arrays (Flat Type)
Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Anti-Sulfur Resistor Arrays (Concave Type)



## Feature

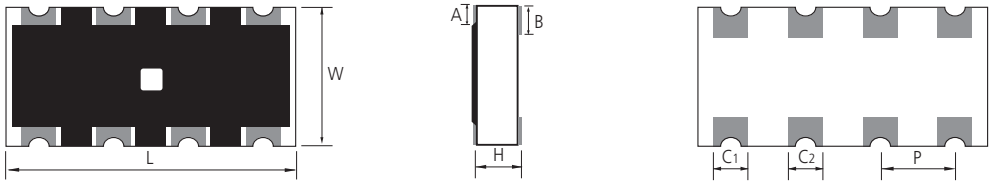
- Stable in the Sulfur Atmosphere.
- ASTM Satisfied
- Passed 720hrs with the dried Sulfur at 105℃ .
- High Precision Reliability.
- RoHS Compliant.

## Application

- Electronic Devices with long-term reliability.
- Server System (Memory Module / HDD).
- Network Equipment.
- Automotive ECU parts

## Structure and Dimensions

(1) Concave Type

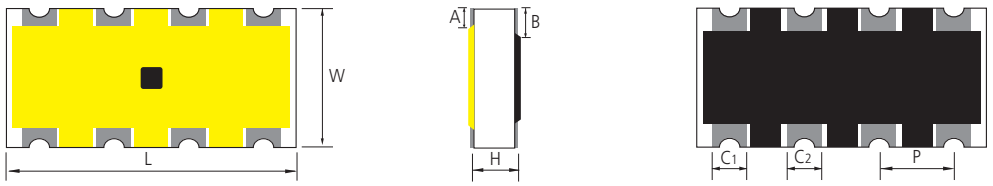



〈 Top View 〉 〈 Side View 〉 〈 Bottom View 〉

(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RNS102P | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.15±0.10 | 0.25±0.10 | 0.33±0.10 | - | 0.50±0.10 |
| RNS104P | 2.00±0.10 | 1.00±0.10 | 0.40±0.10 | 0.15±0.10 | 0.25±0.10 | 0.30±0.10 | 0.30±0.10 | 0.50±0.10 |

(2) Inverted Concave Type

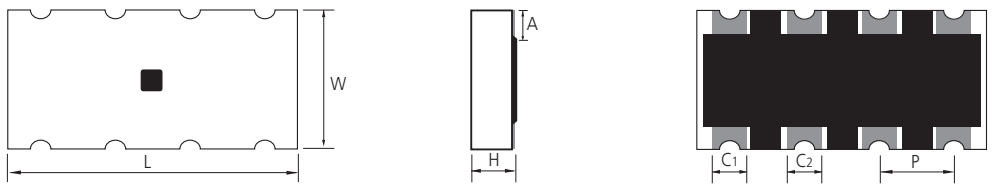



〈 Top View 〉 〈 Side View 〉 〈 Bottom View 〉

(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RMS102P | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.15±0.10 | 0.25±0.10 | 0.33±0.10 | - | 0.50±0.10 |
| RMS104P | 2.00±0.10 | 1.00±0.10 | 0.40±0.10 | 0.15±0.10 | 0.25±0.10 | 0.30±0.10 | 0.30±0.10 | 0.50±0.10 |

(3) Short-free & Inverted Concave Type




〈 Top View 〉 〈 Side View 〉 〈 Bottom View 〉

(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RKS102P | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | - | 0.25±0.10 | 0.33±0.10 | - | 0.50±0.10 |
| RKS104P | 2.00±0.10 | 1.00±0.10 | 0.40±0.10 | - | 0.25±0.10 | 0.30±0.10 | 0.30±0.10 | 0.50±0.10 |

## Parts Numbering System

• The part number system shall be in the following format

| RMS | 10 | 4P | J | 1 0 0 | CS |
|---|---|---|---|---|---|
| Code Designation | Dimension | Resistors | Tolerance | Resistance Value | Packaging Code |
| RNS : Anti-sulfur Array (Concave Type)<br>RMS : Anti-sulfur Array (Inverted Concave)<br>RKS : Anti-sulfur Array (Short-free & Inverted) | 10: 0402 Array | 2P: 2 Pieces<br>4P: 4 Pieces | F: ±1%<br>J: ±5%<br>※ Jumper : J | 3 digit coding system (EIA coding system)<br>E-24 series<br>※ Jumper : '000' | CS : Tape & Reel 7"<br>ES : Tape & Reel 10"<br>AS : Tape & Reel 13" |

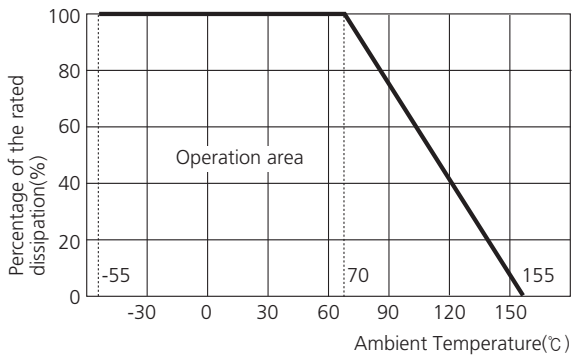
## Specification

| Type | Size (inch) | Rated Power (W) | Rated Voltage (V) | Max Working Voltage (V) | Tolerance (%) | Resistance Range (Ω) | T.C.R (ppm/℃) | Working Temp. (℃) | Rated Ambient Temp. (℃) | Moisture Level |
|---|---|---|---|---|---|---|---|---|---|---|
| 102P | 0404 | 1/16 | $\sqrt{P \times R}$<br>P: Rated Power(W)<br>R: Resistance(Ω) | 25 | ±1(F)<br>±2(G)<br>±5(J) | 1 ~ 1M | ±200 | -55~155 | 70 | Level 1 |
| 104P | 0804 | 1/16 | | 25 | | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

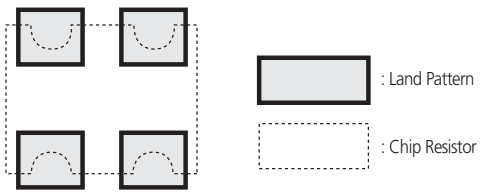
The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.

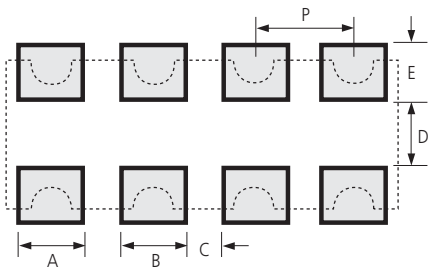



## Jumper Rating

| Type | Size (inch) | Rated Current (A) | Resistance (Ω) |
|---|---|---|---|
| 102P | 0404 | 1.0 | 0.05 Max |
| 104P | 0804 | | |

## Land Pattern



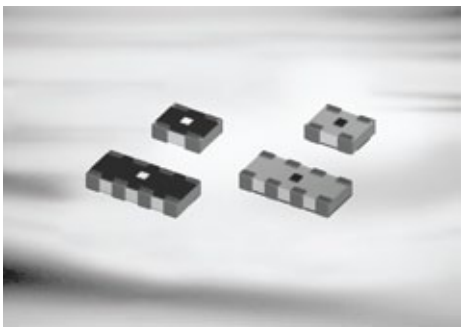




| Type | A | B | C | D | E | P |
|---|---|---|---|---|---|---|
| 102P | 0.3 | 0.3 | 0.2 | 0.5 | 0.4 | 0.5 |
| 104P | 0.3 | 0.3 | 0.2 | 0.5 | 0.4 | 0.5 |

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Operation Notes
Example of land Pattern Design
Recommended Soldering Conditions
General Structure
General
Low ohms (RUT Series)
Ultra Low ohms (RU Series)
Ultra Low Ohms (RUK Series)
Ultra Low Ohms (RJ Series)
Arrays (CONVEX Type)
Arrays (CONCAVE Type)
Arrays (FLAT Type)
Anti-Sulfur Resistors
Anti-Sulfur Resistor Arrays(Convex Type)
Anti-Sulfur Resistor Arrays(Concave Type)
Anti-Sulfur Resistor Arrays (Flat Type)
Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Anti-Sulfur Resistor Arrays (Flat Type)



## Feature

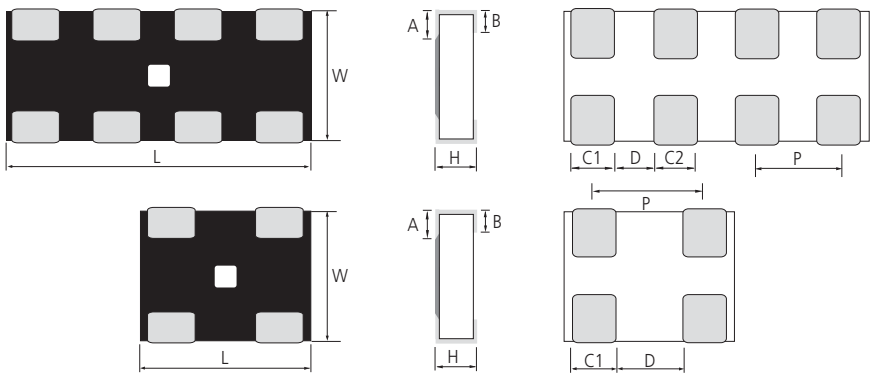
- Stable in the Sulfur Atmosphere.
- ASTM Satisfied
- Passed 720hrs with the dried Sulfur at 105℃ .
- High Precision Reliability.
- RoHS Compliant.

## Application

- Electronic Devices with long-term reliability.
- Server System (Memory Module / HDD).
- Network Equipment.
- Automotive ECU parts

## Structure and Dimensions

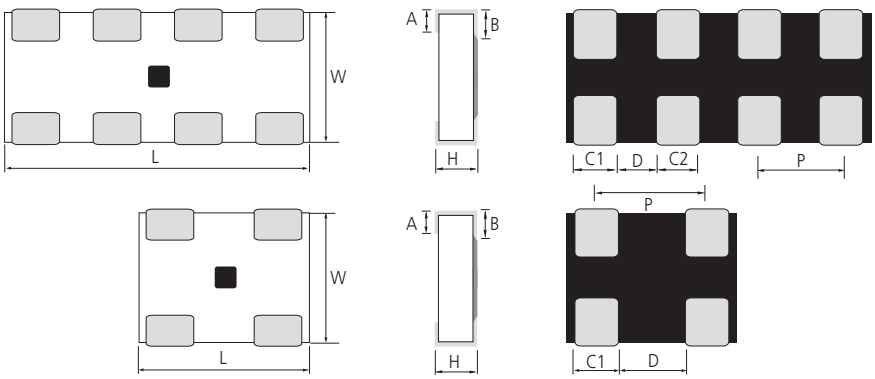
(1) Flat Type Array




(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RFS062P | 0.80±0.05 | 0.60±0.05 | 0.23±0.10 | 0.15±0.10 | 0.20±0.10 | 0.25±0.10 | - | 0.50±0.10 |
| RFS064P | 1.40±0.05 | 0.60±0.05 | 0.23±0.10 | 0.15±0.10 | 0.20±0.10 | 0.25±0.10 | 0.25±0.10 | 0.40±0.10 |

(2) Inverted Type Array




(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RFS062P | 0.80±0.05 | 0.60±0.05 | 0.23±0.10 | 0.15±0.10 | 0.20±0.10 | 0.25±0.10 | - | 0.50±0.10 |
| RFS064P | 1.40±0.05 | 0.60±0.05 | 0.23±0.10 | 0.15±0.10 | 0.20±0.10 | 0.25±0.10 | 0.25±0.10 | 0.40±0.10 |

## Parts Numbering System

• The part number system shall be in the following format

| RFS | 06 | 4P | J | 150 | CS |
|---|---|---|---|---|---|
| Code Designation | Dimension | Resistors | Tolerance | Resistance Value | Packaging Code |
| RFS : Anti-sulfur Array (Flat Type)<br>RMS : Anti-sulfur Array (Inverted & Flat Type) | 06: 0201 Array | 2P: 2 Pieces<br>4P: 4 Pieces | J: ±5%<br>※ Jumper : J | 3 digit coding system (EIA coding system)<br>E-24 series<br>※ Jumper : '000' | CS : Tape & Reel 7"<br>ES : Tape & Reel 10"<br>AS : Tape & Reel 13" |

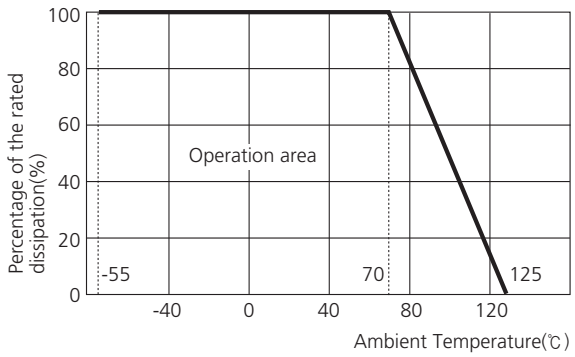
## Specification

| Type | Size (inch) | Rated Power (W) | Rated Voltage (V) | Max Working Voltage (V) | Tolerance (%) | Resistance Range (Ω) | T.C.R (ppm/℃) | Working Temp. (℃) | Rated Ambient Temp. (℃) | Moisture Level |
|---|---|---|---|---|---|---|---|---|---|---|
| 062P | 0302 | 1/32 | $\sqrt{P \times R}$<br>P: Rated Power(W)<br>R: Resistance(Ω) | 12.5 | ±5(J) | 1 ~ 1M | ±200 | -55~125 | 70 | Level 1 |
| 064P | 0502 | 1/32 | | 12.5 | | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.




## Jumper Rating

| Type | Size (inch) | Rated Current (A) | Resistance (Ω) |
|---|---|---|---|
| 062P | 0302 | 0.5 | 0.05 Max |
| 064P | 0502 | | |

## Land Pattern

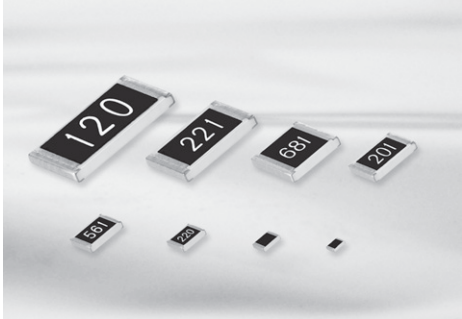



| TYPE (Inch) | Reflow Soldering | | | | |
|---|---|---|---|---|---|
| Dimension | A | B | 2A + B | C | D |
| 062P | 0.3 | 0.3 | 0.9 | 0.2 | 0.3 |
| 064P | 0.3 | 0.3 | 0.9 | 0.2 | 0.2 |

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Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Automotive Anti-sulfur



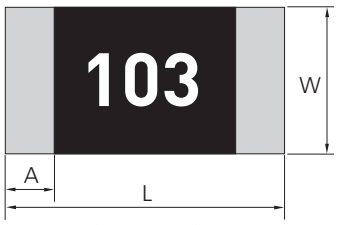

## Feature

- AEC-Q200 Qualified.
- ASTM B809-95 satisfied.
- Excellent anti-sulfur performance.
- Lead-free terminal (matt tin)
- RoHS complaint with exemption.

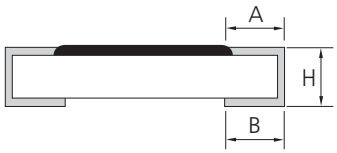
## Application

- Electronic Control Units of Automotive Parts
- Automotive grade applications
- Infotainment applications for car.

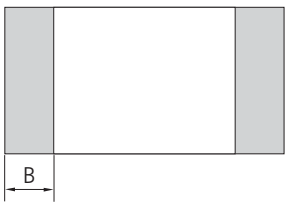
## Structure and Dimensions




〈 Top View 〉




〈 Side View 〉




〈 Bottom View 〉

(UNIT: mm)

| Type | SIZE(Inch) | L | W | H | A | B |
|---|---|---|---|---|---|---|
| RCM0603 | 0201 | 0.60 ±0.03 | 0.30 ±0.03 | 0.23 ±0.03 | 0.10 ±0.05 | 0.15 ±0.05 |
| RCM1005 | 0402 | 1.00 ±0.05 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| RCM1608 | 0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.30 ±0.20 | 0.30 ±0.10 |
| RCM2012 | 0805 | 2.00 ±0.15 | 1.25 ±0.15 | 0.50 ±0.10 | 0.40 ±0.20 | 0.35 ±0.20 |
| RCM3216 | 1206 | 3.20 ±0.15 | 1.60 ±0.15 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| RCM3225 | 1210 | 3.20 ±0.20 | 2.55 ±0.20 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| RCM5025 | 2010 | 5.00 ±0.20 | 2.50 ±0.20 | 0.55 ±0.10 | 0.60 ±0.20 | 0.60 ±0.20 |
| RCM6432 | 2512 | 6.30 ±0.20 | 3.20 ±0.20 | 0.55 ±0.10 | 0.60 ±0.20 | 0.60 ±0.20 |

※ 0402 and smaller size don't have marking on top of the chips.
※ 0603 4-digit models(E-96 series) don't have making on top of the chips.

## Parts Numbering System

- The part number system shall be in the following format

| RCM | 2012<br>Dimension & Size Code | J<br>Tolerance | 100<br>Resistance Value | CS<br>Packaging Code |
|---|---|---|---|---|
| RCM : Automotive Chip Resistor | 0603: 0.6×0.3(㎜) - 0201(inch)<br>1005: 1.0×0.5(㎜) - 0402(inch)<br>1608: 1.6×0.8(㎜) - 0603(inch)<br>2012: 2.0×1.2(㎜) - 0805(inch)<br>3216: 3.2×1.6(㎜) - 1206(inch)<br>3225: 3.2×2.5(㎜) - 1210(inch)<br>5025: 5.0×2.5(㎜) - 2010(inch)<br>6432: 6.4×3.2(㎜) - 2512(inch) | F : ±1%<br>G : ±2%<br>J : ±5%<br>※ Jumper : J | 3 or 4 digits coding system<br>(EIA coding system)<br>3digits (E-24 series)<br>4digits (E-96 series)<br>※ Jumper : '000' | CS: Tape Packaging 7"<br>ES: Tape Packaging 10"<br>AS: Tape Packaging 13" |

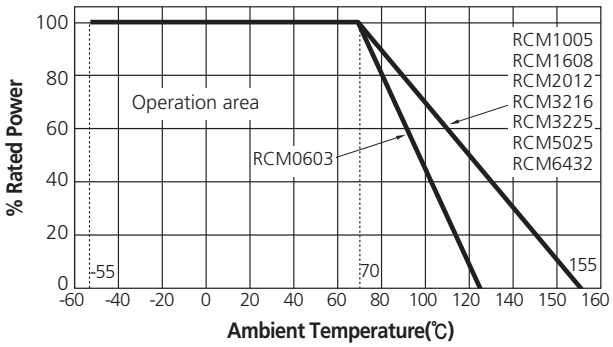
## Specification

| Type | Size (inch) | Rated Power (W) | Rated Voltage (V) | Max Working Voltage (V) | Tolerance (%) | Resistance Range (Ω) | T.C.R (ppm/℃) | Working Temp. (℃) | Rated Ambient Temp. (℃) | Moisture Level |
|---|---|---|---|---|---|---|---|---|---|---|
| RCM0603 | 0201 | 1/20 | $\sqrt{P \times R}$<br>P: Rated Power(W)<br>R: Resistance(Ω) | 25 | ±1(F)<br>±2(G)<br>±5(J) | 1 ~ 9.9<br>10 ~ 10M | ±300<br>±250 | -55~125 | 70 | Level 1 |
| RCM1005 | 0402 | 1/16 | | 50 | ±0.5(D)<br>±1(F)<br>±2(G)<br>±5(J) | 1 ~ 9.9<br>10 ~ 10M | ±300<br>±100 | -55~155 | | |
| RCM1608 | 0603 | 1/10 | | 50 | | | | | | |
| RCM2012 | 0805 | 1/8 | | 150 | | | | | | |
| RCM3216 | 1206 | 1/4 | | 200 | | | | | | |
| RCM3225 | 1210 | 1/3 | | 200 | | | | | | |
| RCM5025 | 2010 | 2/3 | | 200 | | | | | | |
| RCM6432 | 2512 | 1 | | 200 | | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.




## Jumper Rating

| Type | Size (inch) | Rated Current (A) | Resistance (A) |
|---|---|---|---|
| RCM0603 | 0201 | 0.5 | 0.05 Max |
| RCM1005 | 0402 | 1.0 | |
| RCM1608 | 0603 | | |
| RCM2012 | 0805 | 2.0 | |
| RCM3216 | 1206 | | |
| RCM3225 | 1210 | | |
| RCM5025 | 2010 | | |
| RCM6432 | 2512 | | |

## Marking

| • 3 digits indication (E-24 series) | • 4 digits indication (E-96 series) |
|---|---|
| - Left 2 digits represent significant figures.<br>- Last 1 digit represents exponential number of 10.<br>- Example: 103<br>Left 2 digits: 10<br>Last 1 digit: 3<br>$103 = 10 \times 10^3 \Omega$<br>$= 10000\Omega = 10k\Omega$ | - Left 3 digits represent significant figures.<br>- Last 1 digit represents exponential number of 10.<br>- Example: 1002<br>Left 3 digits: 100<br>Last 1 digit: 2<br>$1002 = 100 \times 10^2 \Omega$<br>$= 10000\Omega = 10k\Omega$ |
| No marking types for 3-digit models : RC0402, RC0603, RC1005 | No marking types for 4-digit models : RC0402, RC0603, RC1005, RC1608 |

## IEC Code System (E-96, E-24)

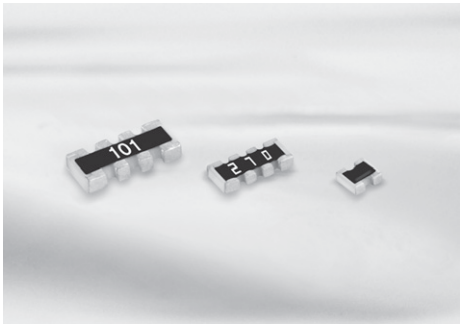
| E-96 | E-24 | E-96 | E-24 | E-96 | E-24 | E-96 | E-24 |
|---|---|---|---|---|---|---|---|
| 100 | 10 | 178 | | 316 | | 562 | 56 |
| 102 | | 182 | 18 | 324 | 33 | 576 | |
| 105 | | 187 | | 332 | | 590 | |
| 107 | | 191 | | 340 | | 604 | |
| 110 | 11 | 196 | | 348 | | 619 | |
| 113 | | 200 | 20 | 357 | 36 | 634 | 62 |
| 115 | | 205 | | 365 | | 649 | |
| 118 | | 210 | | 374 | | 665 | |
| 121 | 12 | 215 | | 383 | 39 | 681 | 68 |
| 124 | | 221 | 22 | 392 | | 698 | |
| 127 | | 226 | | 402 | | 715 | |
| 130 | 13 | 232 | | 412 | | 732 | |
| 133 | | 237 | | 422 | | 750 | 75 |
| 137 | | 243 | 24 | 432 | 43 | 768 | |
| 140 | | 249 | | 442 | | 787 | |
| 143 | | 255 | | 453 | | 806 | |
| 147 | | 261 | | 464 | | 825 | 82 |
| 150 | 15 | 267 | | 475 | 47 | 845 | |
| 154 | | 274 | 27 | 487 | | 866 | |
| 158 | | 280 | | 499 | | 887 | |
| 162 | 16 | 287 | | 511 | 51 | 909 | |
| 165 | | 294 | | 523 | | 931 | 91 |
| 169 | | 301 | 30 | 536 | | 953 | |
| 174 | | 309 | | 549 | | 976 | |

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Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
Packaging
Standard Resistance Value

# Automotive Anti-sulfur Arrays (Convex Type)



## Feature

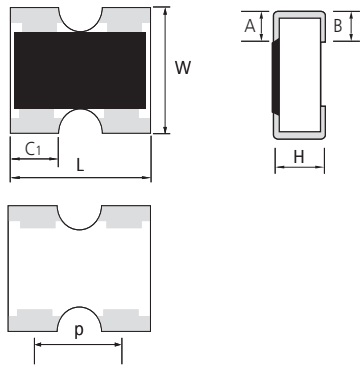
- AEC-Q200 Qualified.
- ASTM B809-95 satisfied.
- Excellent anti-sulfur performance.
- Lead-free terminal (matt tin)
- RoHS complaint with exemption.

## Application

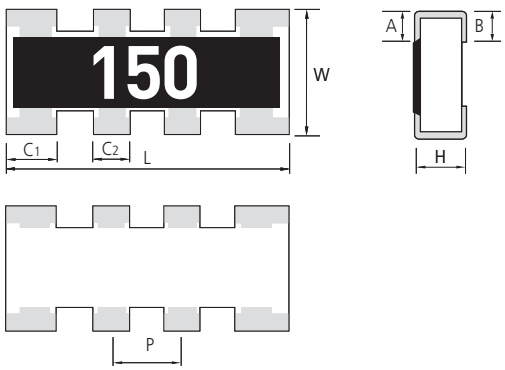
- Electronic Control Units of Automotive Parts
- Automotive grade applications
- Infotainment applications for car.

## Structure and Dimensions

• 2 Array




• 4 Array




(UNIT: mm)

| Type | L | W | H | A | B | $C_1$ | $C_2$ | P |
|---|---|---|---|---|---|---|---|---|
| RPM102P | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.25±0.10 | 0.25±0.10 | 0.33±0.10 | - | 0.65±0.10 |
| RPM104P | 2.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.25±0.10 | 0.25±0.10 | 0.40±0.10 | 0.30±0.10 | 0.50±0.10 |
| RPM164P | 3.20±0.10 | 1.60±0.10 | 0.50±0.10 | 0.30±0.15 | 0.30±0.15 | 0.60±0.15 | 0.40±0.15 | 0.80±0.15 |

## Parts Numbering System

• The part number system shall be in the following format

| RPM | 10 | 4P | J | 1 0 0 | CS |
|---|---|---|---|---|---|
| Code Designation | Dimension | Resistors | Tolerance | Resistance Value | Packaging Code |
| RPM : Automotive Anti-sulfur Array (Convex Type) | 10 : 0402 Array<br>16 : 0603 Array | 2P: 2 Pieces<br>4P: 4 Pieces | F:±1%<br>G:±2%<br>J:±5%<br>※ Jumper : J | 3 or 4 digits coding system<br>(EIA coding system)<br>3digits (E-24 series)<br>4digits (E-96 series)<br>※ Jumper : '000' | CS : Tape Packaging 7"<br>ES : Tape Packaging 10"<br>AS : Tape Packaging 13" |

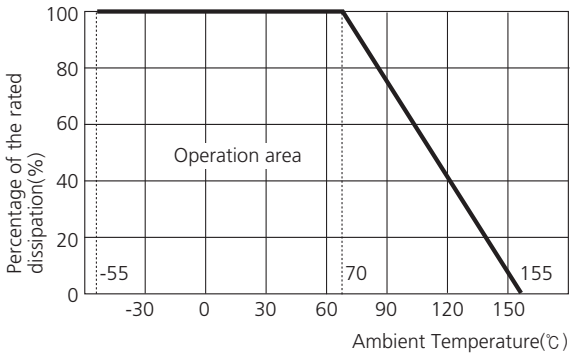
## Specification

| Type | Size (inch) | Rated Power (W) | Rated Voltage (V) | Max Working Voltage (V) | Tolerance (%) | Resistance Range (Ω) | T.C.R (ppm/℃) | Working Temp. (℃) | Rated Ambient Temp. (℃) | Moisture Level |
|---|---|---|---|---|---|---|---|---|---|---|
| RPM102P | 0404 | 1/16 | $\sqrt{P \times R}$ P: Rated Power(W) R: Resistance(Ω) | 50 | ±1(F) ±2(G) ±5(J) | 1 ~ 9.9 10 ~ 1M | ±300 ±200 | -55~155 | 70 | Level 1 |
| RPM104P | 0804 | 1/16 | | 50 | | | | | | |
| RPM164P | 1206 | 1/16 | | 100 | | | | | | |

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

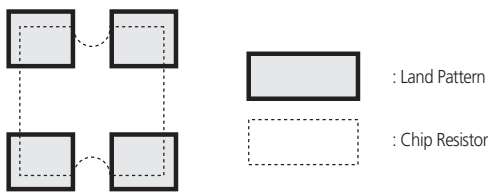
The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.

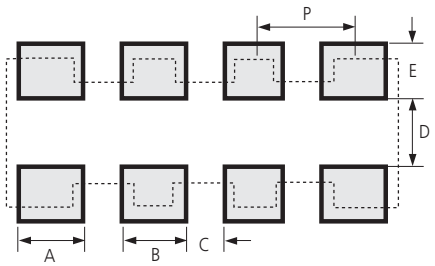



## Jumper Rating

| Type | Size (inch) | Rated Current (A) | Resistance (Ω) |
|---|---|---|---|
| RPM102P | 0404 | 1.0 | 0.05 Max |
| RPM104P | 0804 | | |
| RPM164P | 1206 | | |

## Land Pattern



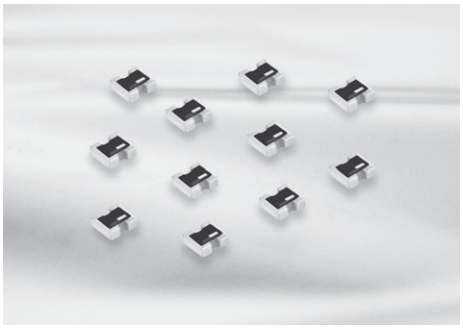




| Type | A | B | C | D | E | $P_1$ | $P_2$ |
|---|---|---|---|---|---|---|---|
| 102P | 0.4 | 0.4 | 0.25 | 0.5 | 0.5 | 0.65 | - |
| 104P | 0.7 | 0.3 | 0.2 | 0.5 | 0.5 | 0.55 | 0.5 |
| 164P | 0.7 | 0.5 | 0.3 | 0.9 | 0.8 | 0.9 | 0.8 |

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# Attenuator



## Feature

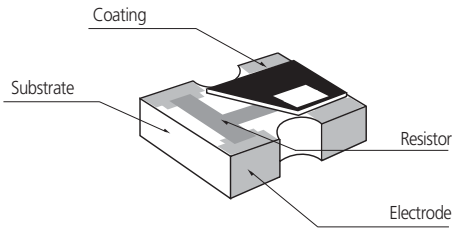
- The RP10AT is small-size chip Attenuator, suitable for high density surface mounting.
- Unbalanced π type attenuator circuit in one chip(1.0 mm x 1.0 mm).
- Mounting occupation area reduction : about 50 % reduction.
- Mounting cost reduction : Mounting times 3 times →1 time.
- Attenuation : 0 dB to 10 dB.

## Application

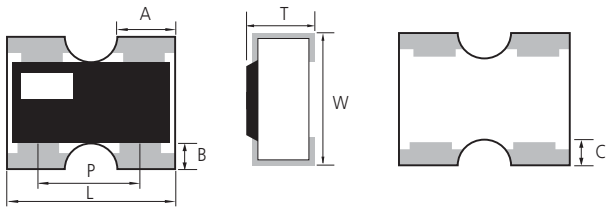
- Attenuation / level control / impedance matching of high frequency signals of communication equipment; cellular phones(GSM, CDMA, etc.), PHS, PDA, for example.

## Structure and Dimensions

- Structure




- Dimensions




(UNIT: mm)

| Type | Power(W) | L | W | T | A | B | C | P | Average Weight |
|---|---|---|---|---|---|---|---|---|---|
| RP10AT | 0.04W / package | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.33±0.05 | 0.20±0.10 | 0.25±0.10 | 0.65±0.10 | 1.1㎎ |

## Parts Numbering System

- The part number system shall be in the following format

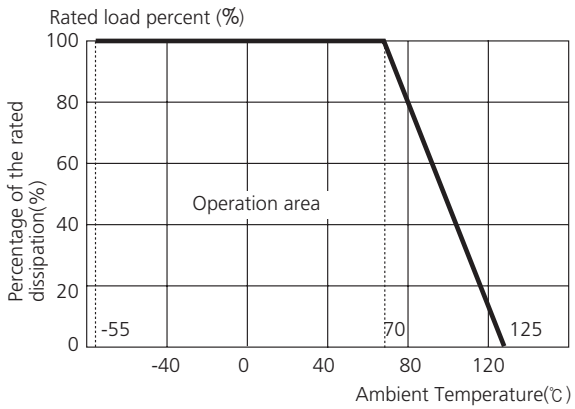
| RP | 10AT | L | A | 03 | CS |
|---|---|---|---|---|---|
| Code Designation | Dimensions & Circuit Configuration | Attenuation Value Tolerance | Characteristic Impedance | Attenuation Value | Packing Type |
| RP:Convex type | 10:1.0×1.0(mm)-0404(inch)<br>AT:Unbalanced π-type Attenuator | L : ± 0.3 dB<br>H : ± 0.5 dB | A : 50 ohm | 3 dB<br>EX) 0 → 0dB | CS:Tape Packaging 7" |

## Specification

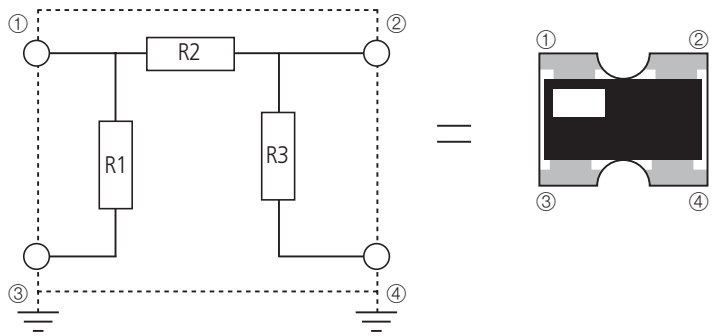
| Item | Specifications |
|---|---|
| Attenuation Value | 0 dB~15dB |
| Attenuation Value Tolerance | 0 dB~5 dB : ± 0.3 dB<br>6 dB~15dB : ± 0.5 dB |
| Characteristic Impendance | 50Ω |
| Power Rating | 0.04W / package |
| Frequency Range | DC to 3 GHz |
| VSWR (Voltage Standing Wave Ratio) | 1.3 max |
| Number of terminals | 4 terminals |
| Category Temperature Range<br>(Operating Temperature Range) | -55 ℃ to +125 ℃ |

## Power Derating Curve

The rated power is the maximum continuous loading power at 70℃ ambient temperature.
For ambient temperature above 70℃, the loading power follows the below power derating curve.




## Equivalent Circuit Configuration



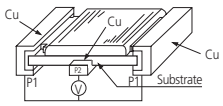

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# Characteristics
# Performance

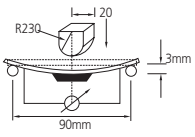
## Electrical Characteristic

| Item | | Requirements Specification | | Test Methods | |
|---|---|---|---|---|---|
| | | Resistor | Jumper | Resistor | Jumper |
| Direct Current Resistance | | Within the regulated resistance tolerance. | 50mΩ Max. | JIS C 5201-1 4.5<br>Voltage apply Within 5 sec.<br>Test temp: 20℃, 65RH<br>Test board: <FIG. 1> | |
| Temperature Characteristic | | 1Ω≤R＜10Ω : ±300ppm/℃<br>10Ω≤R≤10MΩ : ±100ppm/℃<br>(0201 size : ±250ppm/℃) | | JIS C 5201-1 4.8<br>Test Temperature(℃)<br>20℃ → -55℃ / 20℃ → 125℃<br>T.C.R(ppm/℃)=(R-$R_{20}$)/ $R_{20}$ × 1/(T-$T_{20}$) × $10^6$<br>※T=test Temperature, $T_{20}$ =20℃<br>R=Resistance at T, $R_{20}$ =Resistane at $T_{20}$<br>Test board: <FIG. 1> | |
| Short-time Overload | △R | Less than ±(1%±0.1Ω) of the initial value. | 50mΩ Max. | JIS C 5201-1 4.13<br>Apply 2.5 times rated voltage for 5 sec.<br>Wait 60 minutes at room temperature.<br>Measure the resistance value.<br>Test board: <FIG. 1> | Max Surge Current |
| | Visual | No evidence of mechanical damage. | | | |
| Intermittent Overload | △R | Less than ±(3%±0.1Ω) of the initial value. | 50mΩ Max. | JIS C 5201-1 4.13<br>2.5 times of rated voltage .<br>1 second ON, 25 second OFF.<br>10,000 cycles.<br>Test board: <FIG. 1> | Max Surge Current |
| | Visual | No evidence of mechanical damage. | | | |
| Dielectric Withstanding Voltage | | No evidence of mechanical damage. | | JIS C 5201-1 4.7<br>Apply Voltage for 1 minute<br>0402.0603:50V<br>1005, 1608: 100V<br>Other: 500V | |
| Insulation Resistance | | Over 1,000MΩ | | | |




## Mechanical Characteristic

| Item | | Requirements Specification | | Test Methods | |
|---|---|---|---|---|---|
| | | Resistor | Jumper | Resistor | Jumper |
| Solderability | | Coverage: ≥95% each termination.<br>No crack of termination parts and ceramic exposure of surface by melting. | | IEC60068-2-58<br>Rosin Flux: Rosin 25%, Methanol 75%<br>Solder Temp.: 245+5/-0℃<br>Dipping time: 2±0.5 sec.(Both side dipping) | |
| Bending Test | △R | Less than±(1.0%±0.05Ω)of the initial value. | 50mΩ Max. | JIS C 5201-1 4.33<br>After soldering resistor on the PCB, 3mm of bending shall be applied for 10 sec.<br>Test board: <FIG. 2> | |
| | Visual | No evidence of mechanical damage. | | | |
| Adhesive strength of termination | | ·No mechanical damage or sign of disconnection | | JIS C 5201-1(4.16)<br>- Test strengh : 5N (500g · f), 0603 : 2N<br>- Test time : Applying pressure for 10 seconds | |
| Resistance to Soldering Heat | △R | Less than±(1%±0.05Ω)of the initial value. | 50mΩ Max. | JIS C 5201-1 4.18<br>- Flow soldering :260±5℃,10 sec .max.(both side dipping)<br>- Reflow soldering :260±5℃, 10 sec. max.<br>over 230℃, 30~40 sec. | |
| | Visual | No evidence of mechanical damage. | | | |
| Anti-Vibration Test | △R | Less than±(1%±0.05Ω)of the initial value. | 50mΩ Max. | JIS C 5201-1 4.22<br>2 hours each in X, Y and Z axis(total 6 hours)<br>10 to 55Hz sweep in 1 minute at 1.5mm amplitude. | |
| | Visual | No evidence of mechanical damage. | | | |






## Environmental Characteristic

| Item | | Requirements Specification | | Test Methods | |
|---|---|---|---|---|---|
| | | Resistor | Jumper | Resistor | Jumper |
| Temperature Cycle | △R | Less than ±(1%±0.1Ω) of the initial value. | 50mΩ Max. | JIS C 5201-1 4.19<br>Perform 100 cycles as follows.<br>Test Condition: -55℃/30min ↔ 125℃/30min<br>sweep time: 5 min<br>Test board: <FIG. 1> | |
| | Visual | No evidence of mechanical damage. | | | |
| Load Life | △R | Less than ±(3%±0.1Ω) of the initial value. | 50mΩ Max. | JIS C 5201-1 4.25<br>Test Voltage: rated voltage Test temp.: 70±2℃<br>Time: 1,000$^{+48}$ hours(90 min; ON, 30 min; OFF)<br>Test board: <FIG. 1> | |
| | Visual | No evidence of mechanical damage. | | | |
| Low Temp. Exposure | △R | Less than ±(3%±0.1Ω) of the initial value. | 50mΩ Max. | JIS C 5201-1 4.23<br>Dwell in -55℃ chamber without loading for 1,000$^{+48}$ hours.<br>Stabilize for 60 minutes at room temperature.<br>Measure value.<br>Test board: <FIG. 1> | |
| | Visual | No evidence of mechanical damage. | | | |
| High Temp. Exposure | △R | Less than ±(3%±0.1Ω) of the initial value. | 50mΩ Max. | JIS C 5201-1 4.23<br>Dwell in 125℃ ±2℃ or 155℃ ±2℃ chamber without loading for 1,000$^{+48}$ hours. Stabilize for 60 minutes at room temperature.<br>Measure value.<br>Test board: <FIG. 1> | |
| | Visual | No evidence of mechanical damage. | | | |
| Moisture Resistance | △R | Less than ±(3%±0.1Ω) of the initial value. | 50mΩ Max. | JIS C 5201-1 4.14<br>Test Voltage: rated voltage Test temp.: 40±2℃<br>Time: 1,000$^{+48}$ hours(90 min; ON, 30 min; OFF)<br>Humidity: 90~95% RH Stabilize for 1 hrs & Measure.<br>Test board: <FIG. 1> | |
| | Visual | No evidence of mechanical damage. | | | |

※ These characteristics apply to 1Ω ~10MΩ. In case of other resistance range, please contact us.
※ The next is specification in our company for flow soldering and test boards.

## Flow soldering Conditions

| Item | Specification | Dipping |
|---|---|---|
| Flux | ROSIN 25%, IPA 75% | Time: 5~10 sec. |
| Solder | Sn-3.0Ag-0.5Cu | Time: 10 sec max.<br>Temp.: 260±5℃. |

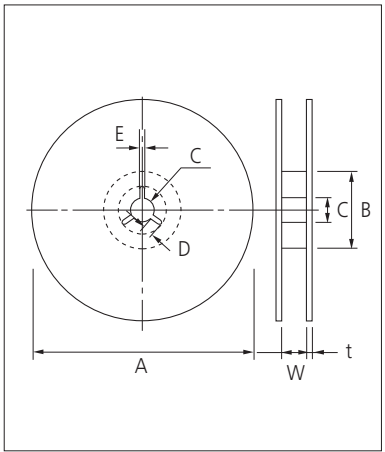
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## Taping Type

• Reel dimensions

Unit: mm

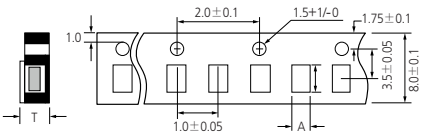
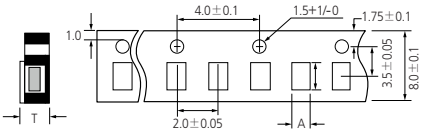
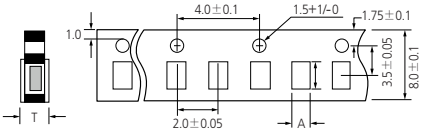
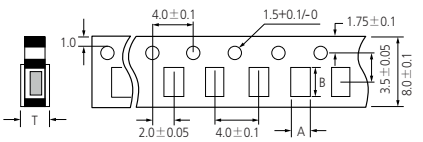
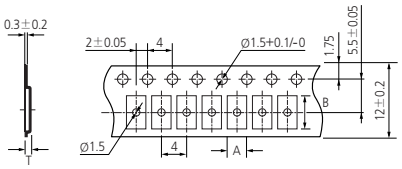



| Symbol | Tape Width | A | B | C | D |
|---|---|---|---|---|---|
| 7" Reel | 8mm | Ø 180+0/-3 | Ø 60±1.0 | Ø 13±0.3 | 4±0.2 |
| | 12mm | Ø 180+0/-3 | Ø 60±1.0 | Ø 13±0.3 | 4±0.2 |
| 10" Reel | 8mm | Ø 258+0/-3 | Ø 80±1.0 | Ø 13±0.3 | 4±0.2 |
| | 12mm | Ø 258+0/-3 | Ø 80±1.0 | Ø 13±0.3 | 4±0.2 |
| 13" Reel | 8mm | Ø 330±2.0 | Ø100±1.0 | Ø 13±0.3 | 4±0.2 |
| | 12mm | Ø 330±2.0 | Ø 80±1.0 | Ø 13±0.3 | 4±0.2 |

| Symbol | Tape Width | E | W | t |
|---|---|---|---|---|
| 7" Reel | 8mm | 2.0±0.5 | 9±0.5 | 1.2±0.2 |
| | 12mm | 2.0±0.5 | 13±0.5 | 1.2±0.2 |
| 10" Reel | 8mm | 2.0±0.5 | 9±0.5 | 1.8±0.2 |
| | 12mm | 2.0±0.5 | 13±0.5 | 1.8±0.2 |
| 13" Reel | 8mm | 3.3±0.5 | 9±0.5 | 2.2±0.2 |
| | 12mm | 3.3±0.5 | 13±0.5 | 2.2±0.2 |

• Tape dimensions

(UNIT: mm)

| Type | Pitch | Carrier Width | Dimensions |
|---|---|---|---|
| Pressed Paper | 1mm | 8mm |  |
| Pressed Paper | 2mm | 8mm |  |
| Punched Paper | 2mm | 8mm |  |
| Punched Paper | 4mm | 8mm |  |
| Embossed Plastic | 4mm | 12mm |  |











| Type | Size | Size (inch) | A | B | T |
|---|---|---|---|---|---|
| RC/RCS/RCM | 0402 | 01005 | 0.24±0.03 | 0.45±0.03 | 0.36±0.02 |
| | 0603 | 0201 | 0.38±0.05 | 0.68±0.05 | 0.47±0.05 |

| Type | Size | Size (inch) | A | B | T |
|---|---|---|---|---|---|
| RC/RCS/RCM | 0402 | 01005 | 0.24±0.03 | 0.45±0.03 | 0.36±0.02 |
| | 0603 | 0201 | 0.38±0.05 | 0.68±0.05 | 0.47±0.05 |

| Type | Size | Size (inch) | A | B | T |
|---|---|---|---|---|---|
| RC/RCS/RCM /RU/RUT | 1005 | 0402 | 0.65±0.10 | 1.15±0.10 | 0.53±0.07 |
| RF/RFS/ RM/RMS | 062P | 0302 | 0.70±0.10 | 0.90±0.10 | 0.30±0.05 |
| | 064P | 0502 | 0.70±0.10 | 1.60±0.10 | 0.30±0.05 |
| RP/RPS/RPM | 102P | 0404 | 1.17±0.10 | 1.17±0.10 | 0.53±0.07 |
| | 104P | 0804 | 1.20±0.10 | 2.20±0.10 | 0.53±0.07 |
| | 10AT | 0404 | 1.17±0.10 | 1.71±0.10 | 0.53±0.07 |
| RN/RM/RK/ RNS/RMS/RKS | 102P | 0404 | 1.20±0.10 | 1.20±0.10 | 0.53±0.07 |
| | 104P | 0804 | 1.20±0.10 | 2.20±0.10 | 0.70±0.10 |

| Type | Size | Size (inch) | A | B | T |
|---|---|---|---|---|---|
| RC/RCS/RCM /RU/RUT/RUK /RJ | 1608 0816 | 0603 0306 | 1.10±0.10 | 1.90±0.10 | 0.70±0.10 |
| | 2012 1220 | 0805 0508 | 1.65±0.10 | 2.40±0.10 | 0.85±0.10 |
| | 3216 1632 | 1206 0612 | 2.00±0.20 | 3.60±0.20 | 0.85±0.10 |
| | 3225 | 1210 | 2.90±0.20 | 3.60±0.20 | 0.85±0.10 |
| RC/RPS/RPM | 164P | 1206 | 2.00±0.20 | 3.60±0.20 | 0.85±0.10 |

| Type | Size | Size (inch) | A | B | T |
|---|---|---|---|---|---|
| RC/RCS/RCM /RU/RUT/RUK /RJ | 2037 | 0815 | 2.30±0.20 | 4.00±0.20 | 1.00±0.10 |
| | 5025 | 2010 | 2.80±0.20 | 5.30±0.20 | 1.00±0.10 |
| | 6432 3264 | 2512 1225 | 3.50±0.20 | 6.75±0.20 | 1.00±0.10 |

## Packaging Table

| TYPE (mm) | TYPE (inch) | Taping Packaging | | | | |
|---|---|---|---|---|---|---|
| | | Code | Reel | Carrier Tape | Quantity | Weight(g) |
| | | CS | 7″ | Pressed Paper | 20,000 | 138 |
| 0603 | 0201 | CS | 7″ | Pressed Paper | 15,000 | 121 |
| | | DS | 7″ | Pressed Paper | 20,000 | 149 |
| | | DP | 7″ | Punched PE | 20,000 | 149 |
| | | AS | 13″ | Pressed Paper | 60,000 | 573 |
| | | FS | 13″ | Pressed Paper | 50,000 | 474 |
| | | FP | 13″ | Punched PE | 50,000 | 474 |
| | | WS | 13″ | Pressed Paper | 150,000 | 695 |
| 1005 | 0402 | CS | 7″ | Punched Paper | 10,000 | 87 |
| | | DS | 7″ | | 20,000 | 147 |
| | | DP | 7″ | Punched PE | 20,000 | 147 |
| | | ES | 10″ | Punched Paper | 30,000 | 331 |
| | | AS | 13″ | | 40,000 | 539 |
| | | FS | 13″ | | 50,000 | 548 |
| 1608<br>0816* | 0603<br>0306* | CS | 7″ | | 5,000 | 120 |
| | | ES | 10″ | | 10,000 | 324 |
| | | AS | 13″ | | 20,000 | 561 |
| 2012<br>1220* | 0805<br>0508* | CS | 7″ | | 5,000 | 144 |
| | | ES | 10″ | | 10,000 | 360 |
| | | AS | 13″ | | 20,000 | 658 |
| 3216<br>1632* | 1206<br>0612* | CS | 7″ | | 5,000 | 152 |
| | | ES | 10″ | | 10,000 | 382 |
| | | AS | 13″ | | 20,000 | 695 |
| 3225 | 1210 | CS | 7″ | | 5,000 | 178 |
| | | ES | 10″ | | 10,000 | 463 |
| | | AS | 13″ | | 20,000 | 674 |
| 2037* | 0815* | CS | 7″ | Embossed Plastic | 4,000 | 145 |
| 5025 | 2010 | CS | 7″ | | 4,000 | 197 |
| 6432<br>3264* | 2512<br>1225* | CS | 7″ | | 4,000 | 262 |
| | | AS | 13″ | | 15,000 | 1,041 |
| 062P | 0201X2R | CS | 7″ | Punched Paper | 15,000 | 126 |
| | | AS | 13″ | | 60,000 | 573 |
| 064P | 0201X2R | CS | 7″ | | 15,000 | 126 |
| | | AS | 13″ | | 60,000 | 573 |
| 102P | 0402X2R | CS | 7″ | | 10,000 | 95 |
| | | AS | 13″ | | 40,000 | 485 |
| 104P | 0402X4R | CS | 7″ | | 10,000 | 131 |
| | | AS | 13″ | | 40,000 | 610 |
| 165P | 0603X4R | CS | 7″ | | 5,000 | 152 |
| | | AS | 13″ | | 20,000 | 695 |
| 10AT | 0404 | CS | 7″ | | 10,000 | 95 |
| | | AS | 13″ | | 40,000 | 485 |

- General type, Precision, Low ohms, High ohms.
- Packaging style can be modified when you want.
- (*) Wide Terminal Type

The specifications and designs contained herein may be subject to change without notice.
Please contact our sales representatives or product engineers before order.

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Anti-Sulfur Resistor Arrays (Flat Type)
Automotive Anti-sulfur
Automotive Anti-sulfur Arrays (Convex Type)
Attenuator
Characteristics Performance
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Standard Resistance Value

# Standard Resistance Value

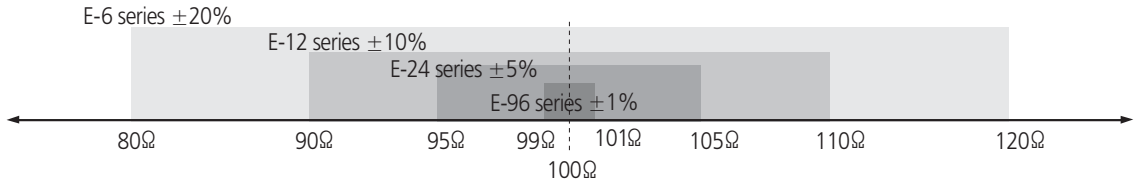
## Tolerance Code Table

| Tolerance Code | D | F | G | J | K | M |
|---|---|---|---|---|---|---|
| Digit Number | 4 digit | | | 3 digit | | |
| IEC-Code System | E-192 | E-96 | E-48 | E-24 | E-12 | E-6 |
| Specification | ±0.5% | ±1% | ±2% | ±5% | ±10% | ±20% |

## Significant Figure of Resistance Value

| E-192 | E-96 | E-48 | E-24 | E-192 | E-96 | E-48 | E-24 | E-192 | E-96 | E-48 | E-24 | E-192 | E-96 | E-48 | E-24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 100 | 100 | 10 | 178 | 178 | 178 | | 316 | 316 | 316 | | 562 | 562 | 562 | 56 |
| 101 | | | | 180 | | | 18 | 320 | | | | 569 | | | |
| 102 | 102 | | | 182 | 182 | | | 324 | 324 | | | 576 | 576 | | |
| 104 | | | | 184 | | | | 328 | | | | 583 | | | |
| 105 | 105 | 105 | | 187 | 187 | 187 | | 332 | 332 | 332 | 33 | 590 | 590 | 590 | |
| 106 | | | | 189 | | | | 336 | | | | 597 | | | |
| 107 | 107 | | | 191 | 191 | | | 340 | 340 | | | 604 | 604 | | |
| 109 | | | | 193 | | | | 344 | | | | 612 | | | |
| 110 | 110 | 110 | 11 | 196 | 196 | 196 | | 348 | 348 | 348 | | 619 | 619 | 619 | |
| 111 | | | | 198 | | | | 352 | | | | 626 | | | 62 |
| 113 | 113 | | | 200 | 200 | | 20 | 357 | 357 | | | 634 | 634 | | |
| 114 | | | | 203 | | | | 361 | | | 36 | 642 | | | |
| 115 | 115 | 115 | | 205 | 205 | 205 | | 365 | 365 | 365 | | 649 | 649 | 649 | |
| 117 | | | | 208 | | | | 370 | | | | 657 | | | |
| 118 | 118 | | | 210 | 210 | | | 374 | 374 | | | 665 | 665 | | |
| 120 | | | 12 | 213 | | | | 379 | | | | 673 | | | |
| 121 | 121 | 121 | | 215 | 215 | 215 | | 383 | 383 | 383 | | 681 | 681 | 681 | 68 |
| 123 | | | | 218 | | | | 388 | | | | 690 | | | |
| 124 | 124 | | | 221 | 221 | | 22 | 392 | 392 | | 39 | 698 | 698 | | |
| 126 | | | | 223 | | | | 397 | | | | 706 | | | |
| 127 | 127 | 127 | | 226 | 226 | 226 | | 402 | 402 | 402 | | 715 | 715 | 715 | |
| 129 | | | | 229 | | | | 407 | | | | 723 | | | |
| 130 | 130 | | 13 | 232 | 232 | | | 412 | 412 | | | 732 | 732 | | |
| 132 | | | | 234 | | | | 417 | | | | 741 | | | |
| 133 | 133 | 133 | | 237 | 237 | 237 | | 422 | 422 | 422 | | 750 | 750 | 750 | 75 |
| 135 | | | | 240 | | | 24 | 427 | | | | 759 | | | |
| 137 | 137 | | | 243 | 243 | | | 432 | 432 | | 43 | 768 | 768 | | |
| 138 | | | | 246 | | | | 437 | | | | 777 | | | |
| 140 | 140 | 140 | | 249 | 249 | 249 | | 442 | 442 | 442 | | 787 | 787 | 787 | |
| 142 | | | | 252 | | | | 448 | | | | 796 | | | |
| 143 | 143 | | | 255 | 255 | | | 453 | 453 | | | 806 | 806 | | |
| 145 | | | | 258 | | | | 459 | | | | 816 | | | |
| 147 | 147 | 147 | | 261 | 261 | 261 | | 464 | 464 | 464 | | 825 | 825 | 825 | 82 |
| 149 | | | | 264 | | | | 470 | | | 47 | 835 | | | |
| 150 | 150 | | 15 | 267 | 267 | | | 475 | 475 | | | 845 | 845 | | |
| 152 | | | | 271 | | | 27 | 481 | | | | 856 | | | |
| 154 | 154 | 154 | | 274 | 274 | 274 | | 487 | 487 | 487 | | 866 | 866 | 866 | |
| 156 | | | | 277 | | | | 493 | | | | 876 | | | |
| 158 | 158 | | | 280 | 280 | | | 499 | 499 | | | 887 | 887 | | |
| 160 | | | 16 | 284 | | | | 505 | | | | 898 | | | |
| 162 | 162 | 162 | | 287 | 287 | 287 | | 511 | 511 | 511 | 51 | 909 | 909 | 909 | |
| 164 | | | | 291 | | | | 517 | | | | 920 | | | 91 |
| 165 | 165 | | | 294 | 294 | | | 523 | 523 | | | 931 | 931 | | |
| 167 | | | | 298 | | | | 530 | | | | 942 | | | |
| 169 | 169 | 169 | | 301 | 301 | 301 | 30 | 536 | 536 | 536 | | 953 | 953 | 953 | |
| 172 | | | | 305 | | | | 542 | | | | 965 | | | |
| 174 | 174 | | | 309 | 309 | | | 549 | 549 | | | 976 | 976 | | |
| 176 | | | | 312 | | | | 556 | | | | 988 | | | |

• Example



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ISO/TS 16949 | ISO 14001 | OHSAS 18001 | QC080000




## *Quality System Certification List*

Table 1:Certification list of Samsung Factory

| Certification | Section | High Tech(China) |
|---|---|---|
| ISO / TS 16949 | Authority | BSI |
| | Number | TS 91430-008 |
| | Date | 2014 - 11 - 19 |
| | Validity | 2017 - 11 - 18 |
| ISO 14001 | Authority | BSI |
| | Number | EMS 585307 |
| | Date | 2012 - 04 - 17 |
| | Validity | 2015 - 04 - 16 |
| OHSAS 18001 | Authority | BSI |
| | Number | OHS 585308 |
| | Date | 2012 - 04 - 17 |
| | Validity | 2015 - 04 - 16 |
| QC080000 | Authority | UL |
| | Number | PRC-HSPM-1767-1 |
| | Date | 2013 - 07 - 08 |
| | Validity | 2016 - 07 - 26 |

## Note

## Note

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