



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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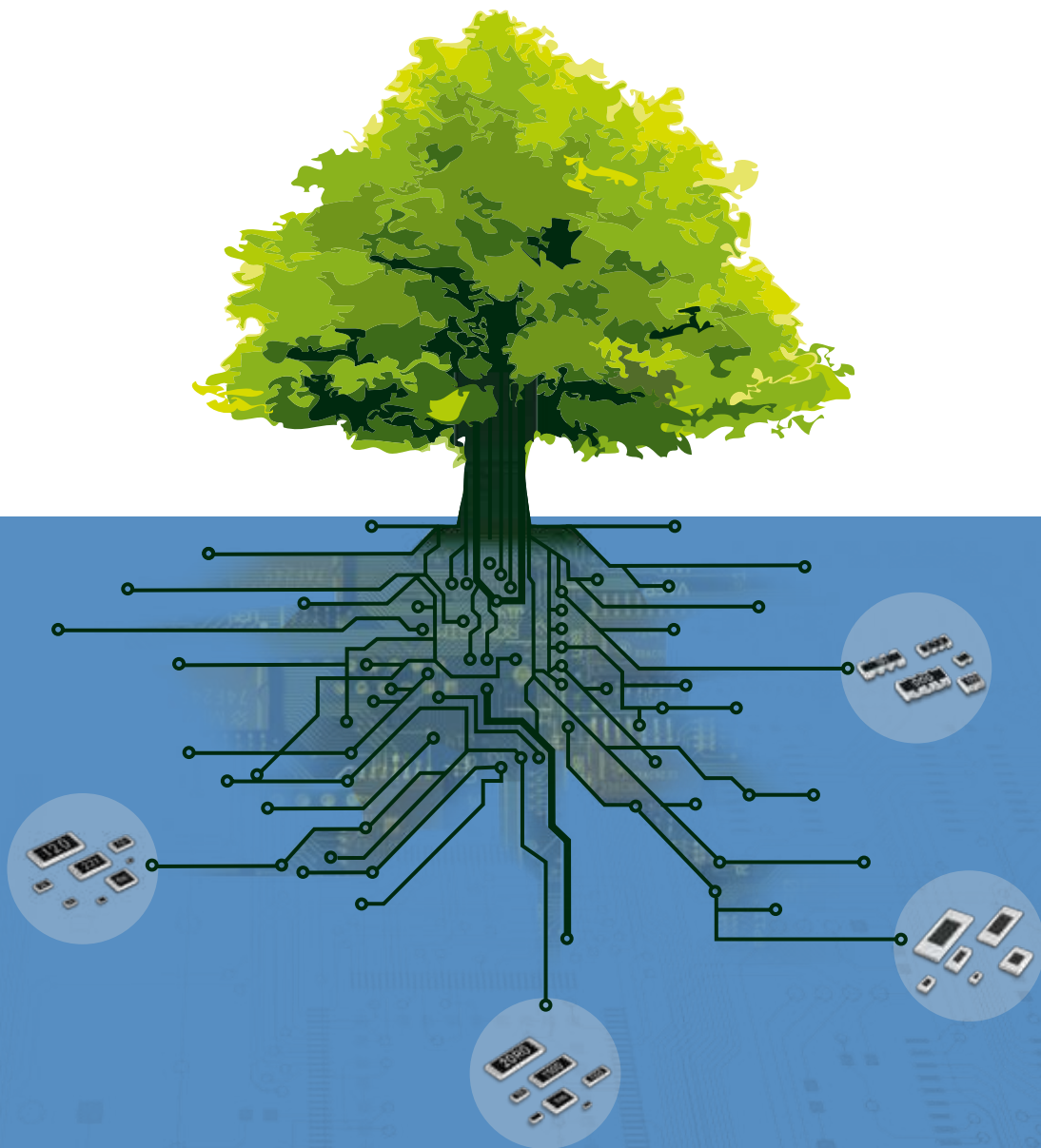
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May 2015



# THICK-FILM CHIP RESISTOR



SAMSUNG  
ELECTRO-MECHANICS





## 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°C or below -55°C - 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<sub>2</sub>S etc.), please contact us beforehand.
- Normal operation temperature ranges : -55°C ~+155°C
- Others (small sizes and flat type arrays) : -55°C ~+125°C
- 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, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>), 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°C ~40°C and the ambient humidity is within 20~70%RH.
  - Chip components may be deformed, if the temperature of packaged components exceeds 40°C .
  - 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 Separation from PCB.

Chip resistor installation on PCB is a similar phenomenon on 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.

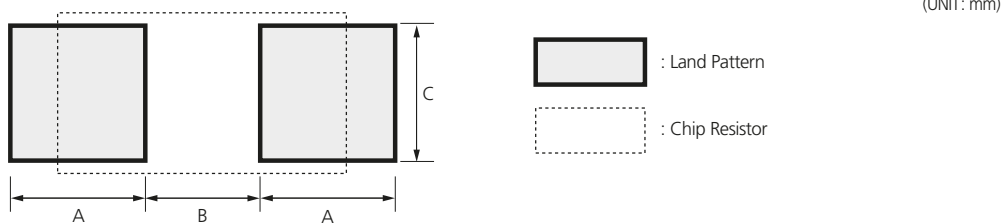
## Others

- 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



### • 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)

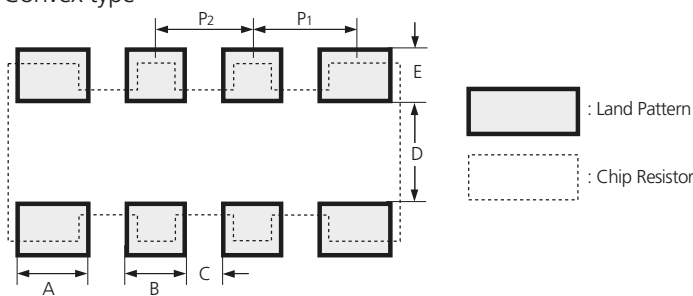
Type	A	B	2A+B	C
1005	0.8	0.5	2.1	0.5
1608	0.8	0.5	2.1	0.8
2012	0.9	0.8	2.6	1.2
3216	1.7	1.2	4.6	1.4
3225	1.7	1.2	4.6	2.4
5025	2.15	1.8	6.1	2.6
6432	2.3	3.0	7.6	3.3

### • 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

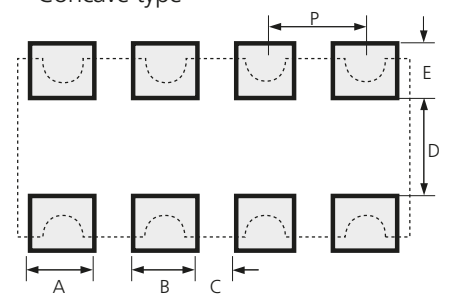
## For Array Type

### • Convex type



Type	A	B	C	D	E	P <sub>1</sub>	P <sub>2</sub>
062P	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	-	0.25	0.5	0.5	0.65	-
102P	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

### • Concave type



Type	A	B	C	D	E	P
102P	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.

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

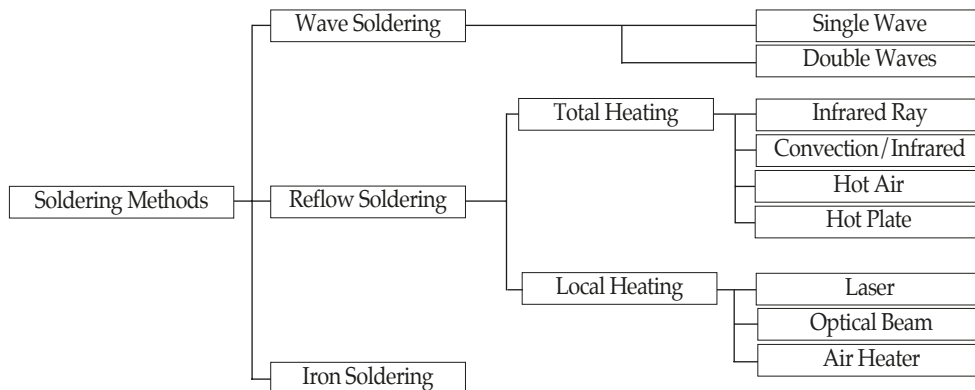
Packaging

Standard Resistance Value

# Recommended Soldering Conditions

## Abstract

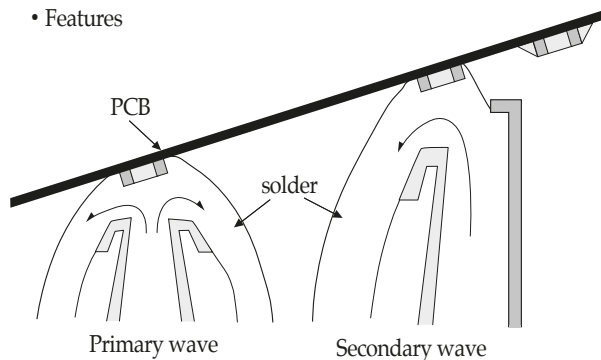
- There are 3 soldering methods.
  - Flow(wave) soldering.
  - Reflow soldering. (Reflow soldering is broadly divided into the total heating method and local heating method.)
  - Iron soldering.



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.

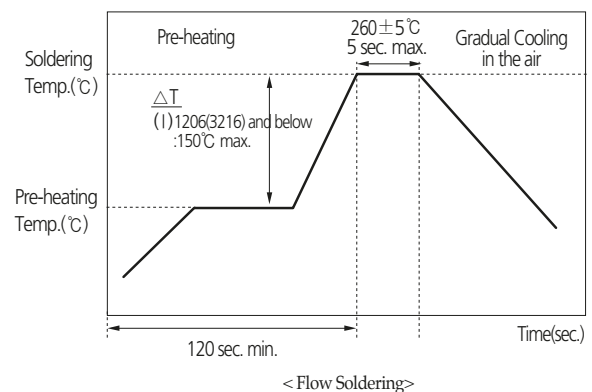
- Preheating

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°C. Also when cooling is done by dipping into solvent, care should be taken to keep the temperature difference within 150°C.

- 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.



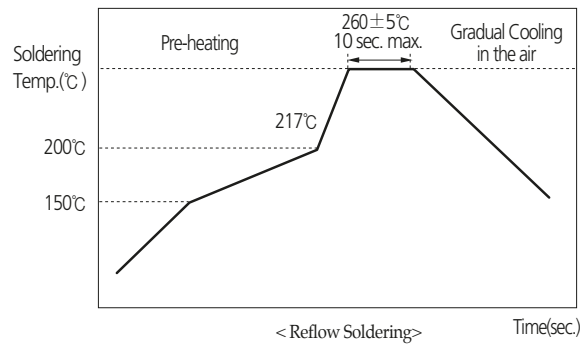
## Reflow Soldering

### • 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°C 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°C.

### • 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.



### • 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 100~300µm.

### • 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.

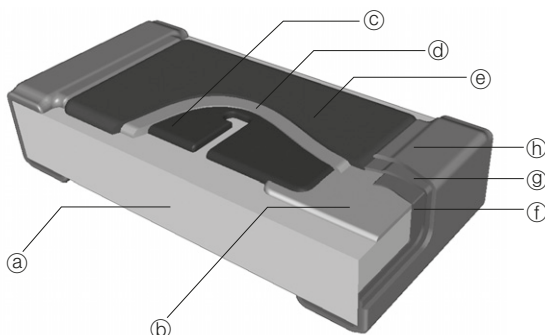
At around the soldering temperature, keep minimum difference of the temperature between the electrodes of a chip.

## 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°C Max.
Soldering iron output	20-Watt Max.
End of soldering iron	∅ 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
(a)	Ceramic Substrate	Al <sub>2</sub> O <sub>3</sub>
(b)	Inner Electrode	Ag
(c)	Resistor	RuO <sub>2</sub>
(d)	Glass Coat	Bi <sub>2</sub> O <sub>3</sub> , SiO <sub>2</sub>
(e)	Protective Coat	Polymer / Glass
(f)	Terminal Coat	Ni-Cr Alloy /Ag
(g)	Ni Plate	Ni
(h)	Sn Plate	Sn

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)

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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)

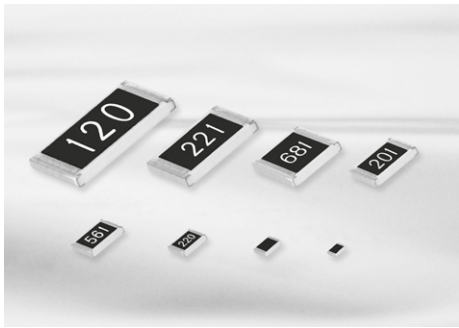
Attenuator

Characteristics Performance

Packaging

Standard Resistance Value





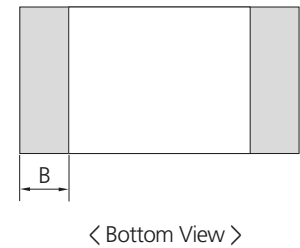
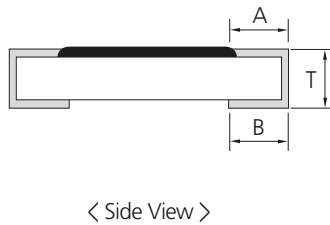
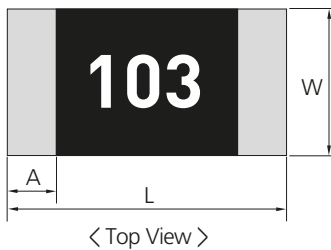
## Feature

- 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



(UNIT: mm)

Type	SIZE(Inch)	L	W	T	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	0.35 ±0.10
RC2012	0805	2.00 ±0.20	1.25 ±0.15	0.55 ±0.10	0.40 ±0.20	0.35 ±0.20
RC3216	1206	3.20 ±0.20	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 marking on top of the chips.

## Parts Numbering System

- The part number system shall be in the following format

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

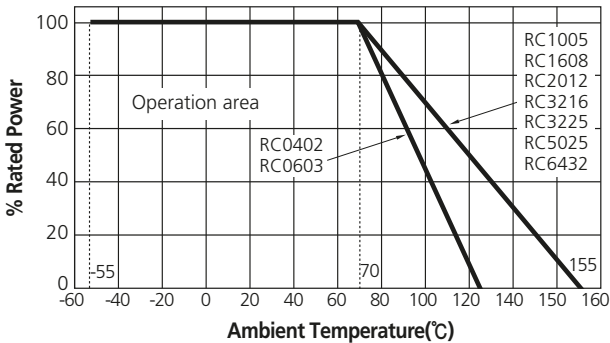
## Specification

Type	Size (inch)	Rated Power (W)	Rated Voltage (V)	Max Working Voltage (V)	Tolerance (%)	Resistance Range (Ω)	T.C.R (ppm/°C)	Working Temp. (°C)	Rated Ambient Temp. (°C)	Moisture Level
RC 0402	01005	1/32	$\sqrt{P \times R}$ P: Rated Power(W) R: Resistance(Ω)	15	±1(F) ±2(G) ±5(J)	1 ~ 99 100 ~ 1M	±300 ±250	-55~125	70	Level 1
RC 0603	0201	1/20		25		1 ~ 9.9 10 ~ 10M				
RC 1005	0402	1/16		50	±0.5(D) ±1(F) ±2(G) ±5(J)	1 ~ 9.9 10 ~ 10M	±300 ±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°C ambient temperature.  
For ambient temperature above 70°C, 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)
<ul style="list-style-type: none"> <li>- Left 2 digits represent significant figures.</li> <li>- Last 1 digit represents exponential number of 10.</li> <li>- Example: <b>103</b> Left 2 digits: 10 Last 1 digit: 3 <math>103 = 10 \times 10^3 \Omega = 10000 \Omega = 10k\Omega</math></li> </ul>	<ul style="list-style-type: none"> <li>- Left 3 digits represent significant figures.</li> <li>- Last 1 digit represents exponential number of 10.</li> <li>- Example: <b>1002</b> Left 3 digits: 100 Last 1 digit: 2 <math>1002 = 100 \times 10^2 \Omega = 10000 \Omega = 10k\Omega</math></li> </ul>
No marking types : RC0402, RC0603, RC1005	No marking types : RC0402, RC0603, RC1005, RC1608

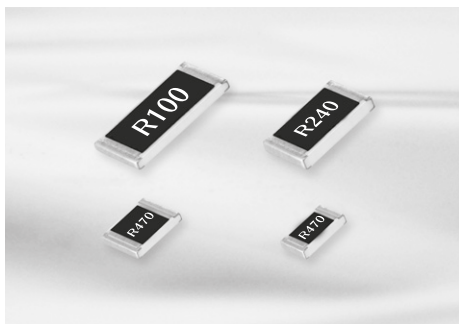
## IEC Code System (E-96, E-24)

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	
150	15	267		475	47	845	82
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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- 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

# Low Ohms(RUT Series)



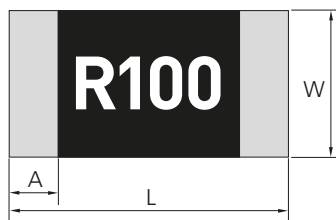
## Feature

- 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 Compliant.

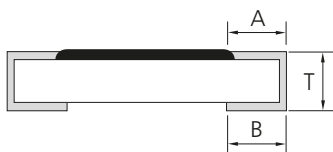
## Application

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

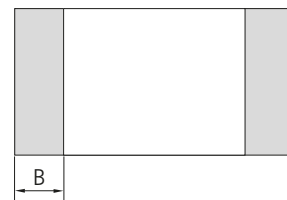
## Structure and Dimensions



< Top View >



< Side View >



< Bottom View >

(UNIT: mm)

Type	SIZE(Inch)	L	W	T	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	0.35±0.10
RUT2012	0805	2.00±0.20	1.25±0.15	0.55±0.10	0.40±0.20	0.35±0.20
RUT3216	1206	3.20±0.20	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 Code Designation	2012 Dimension & Size Code	J Tolerance	R100 Resistance Value	CS Packaging Code
RUT: Current Sensing Resistor Top Mounting (Face-up)	1005: 1.0×0.5(mm) - 0402(inch) 1608: 1.6×0.8(mm) - 0603(inch) 2012: 2.0×1.2(mm) - 0805(inch) 3216: 3.2×1.6(mm) - 1206(inch) 3225: 3.2×2.5(mm) - 1210(inch) 5025: 5.0×2.5(mm) - 2010(inch) 6432: 6.4×3.2(mm) - 2512(inch)	F: ±1% G: ±2% J: ±5%	4-digit coding system	CS: Tape & Reel 7" ES: Tape & Reel 10" AS: Tape & Reel 13"

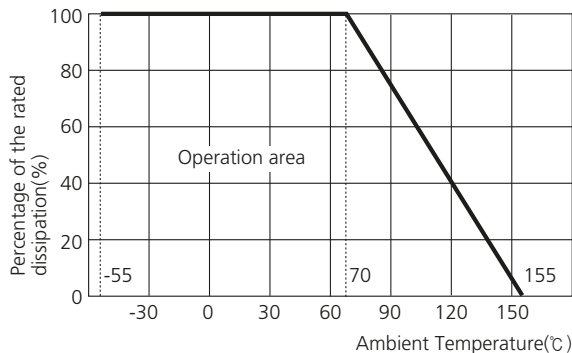
## Specification

Type	Size (inch)	Rated Power (W)	Resistance (Ω)	T.C.R (ppm/°C)	Rated Current (A)	Rated Ambient Temperature (°C)	Working Temperature (°C)
RUT1005	0402	1/10	0.1~0.976	±150	$\sqrt{P/R}$ P: Rated Power(W) 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°C ambient temperature.  
For ambient temperature above 70°C, 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  
 $R100 = .100 = 0.100\Omega = 0.1\Omega$  or  $100m\Omega$



## 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

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)

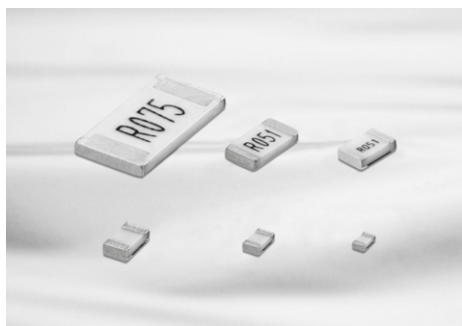
Attenuator

Characteristics Performance

Packaging

Standard Resistance Value

# Ultra Low Ohms(RU Series)



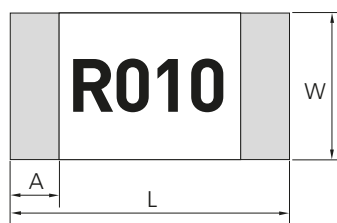
## Feature

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

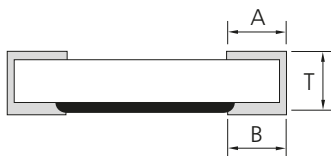
## Application

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

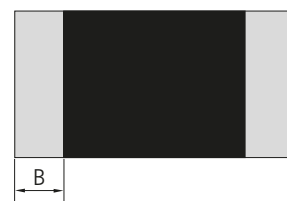
## Structure and Dimensions



< Top View >



< Side View >



< Bottom View >

(UNIT: mm)

Type	SIZE(Inch)	L	W	T	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 R > 0.05 : 0.35 ± 0.20
RU2012	0805	2.00±0.20	1.25±0.15	0.55±0.10	0.40±0.20	R ≤ 0.05 : 0.65 ± 0.20 R > 0.05 : 0.40 ± 0.20
RU3216	1206	3.20±0.20	1.60±0.15	0.60±0.10	0.45±0.20	R ≤ 0.05 : 0.90 ± 0.20 R > 0.05 : 0.60 ± 0.20
RU3225	1210	3.20±0.20	2.55±0.20	0.60±0.10	0.45±0.20	R ≤ 0.05 : 1.20 ± 0.20 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 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 R > 0.05 : 1.10 ± 0.25

## Parts Numbering System

- The part number system shall be in the following format

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

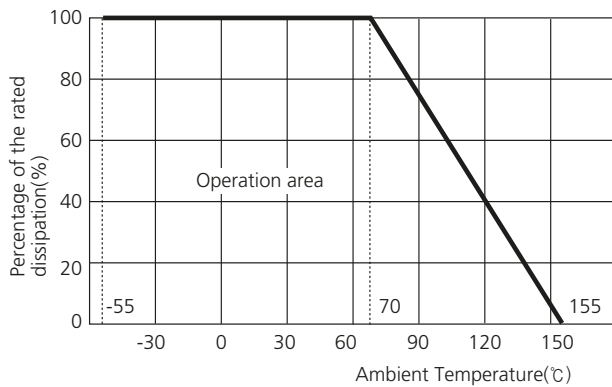
## Specification

Type	Size (inch)	Rated Power (W)	Resistance (Ω)	T.C.R (ppm/°C)	Rated Current (A)	Rated Ambient Temperature (°C)	Working Temperature (°C)
RU1005	0402	1/8	0.02~0.1	R<0.047: ± 500 R≥0.047: ± 150	$\sqrt{P/R}$ P: Rated Power(W) R: Resistance(Ω)	70	-55 ~ +155
RU1608	0603	1/4	0.01~0.1	R≤0.025: ± 600 R<0.033: ± 400 R≥0.033: ± 150			
RU2012	0805	1/3		R≤0.025: ± 500 R<0.033: ± 350 R≥0.033: ± 150			
RU3216	1206	1/2					
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°C ambient temperature. For ambient temperature above 70°C, 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 10mΩ



## 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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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)

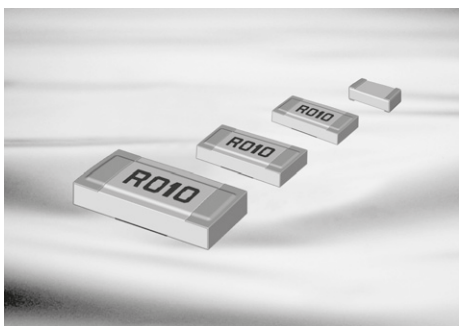
Attenuator

Characteristics Performance

Packaging

Standard Resistance Value

# Ultra Low Ohms(RUK Series)



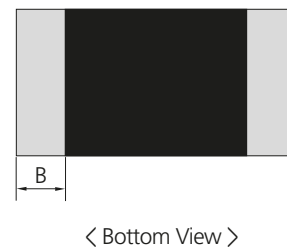
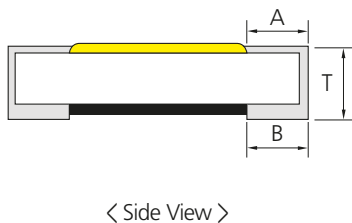
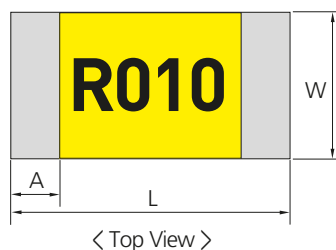
## Feature

- 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



(UNIT: mm)

Type	SIZE(Inch)	L	W	T	A	B
RUK1608	0603	1.60±0.10	0.80±0.10	R<15m: 0.55±0.10 R≥15m: 0.45±0.10	0.35 ±0.20	0.40±0.20
RUK2012	0805	2.00±0.20	1.25±0.15	R<15m: 0.60±0.10 R≥15m: 0.55±0.10	0.40 ±0.20	0.55±0.20
RUK3216	1206	3.20±0.20	1.60±0.15	R<15m: 0.65±0.10 R≥15m: 0.60±0.10	0.45 ±0.20	0.90±0.20
RUK6432	2512	6.30±0.20	3.20±0.20	R<15m: 0.65±0.10 R≥15m: 0.60±0.10	1.15 ±0.20	0.90±0.20

## Parts Numbering System

- The part number system shall be in the following format

RUK	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(mm) - 0603(inch) 2012: 2.0×1.2(mm) - 0805(inch) 3216: 3.2×1.6(mm) - 1206(inch) 6432: 6.4×3.2(mm) - 2512(inch)	F: ±1% G: ±2% J: ±5%	4-digits coding system	CS: Tape & Reel 7" ES: Tape & Reel 10" AS: Tape & Reel 13"

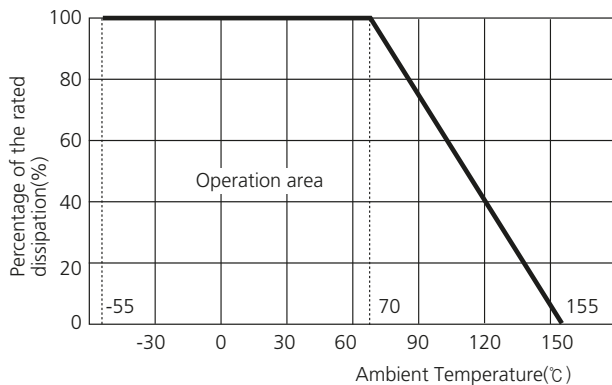
## Specification

Type	Size (inch)	Rated Power (W)	Resistance (Ω)	T.C.R (ppm/°C)	Rated Current (A)	Rated Ambient Temperature (°C)	Working Temperature (°C)
RUK1608	0603	1/2	0.010 ~ 0.030	± 100	$\sqrt{P/R}$ P: Rated Power(W) R: Resistance(Ω)	70	-55 ~ +155
RUK2012	0805	1/2	0.007 ~ 0.009	± 250			
			0.010 ~ 0.030	± 100			
RUK3216	1206	1	0.010 ~ 0.030	± 100			
RUK6432	2512	1	0.007 ~ 0.009	± 500			
			0.010 ~ 0.030	± 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°C ambient temperature. For ambient temperature above 70°C, 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  
 $R010 = .010 = 0.010\Omega$   
 $= 0.01\Omega$  or  $10m\Omega$



## 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

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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

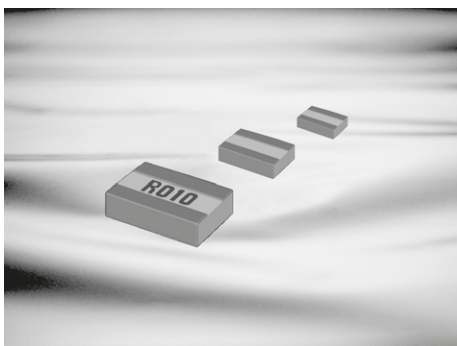
Characteristics Performance

Packaging

Standard Resistance Value



# Ultra Low Ohms(RJ Series)



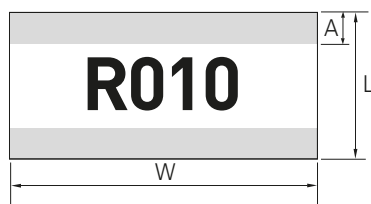
## Feature

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

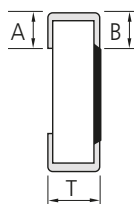
## Application

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

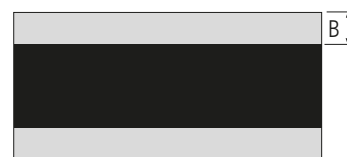
## Structure and Dimensions



< Top View >



< Side View >



< Bottom View >

(UNIT: mm)

Type	SIZE(Inch)	L	W	T	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(mm) - 0306(inch)	F: ±1% G: ±2% J: ±5%	4-digits coding system	CS: Tape & Reel 7"
	1220 : 1.2×2.0(mm) - 0508(inch)			ES: Tape & Reel 10"
	1632 : 1.6×3.2(mm) - 0612(inch)			AS: Tape & Reel 13"
	2037 : 2.0×3.7(mm) - 0815(inch)			
	3264 : 3.2×6.4(mm) - 1225(inch)			

## Specification

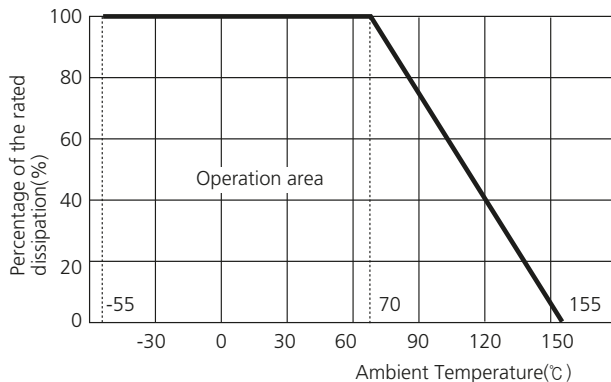
Type	Size (inch)	Rated Power (W)	Resistance (Ω)	T.C.R (ppm/°C)	Rated Current (A)	Rated Ambient Temperature (°C)	Working Temperature (°C)
RJ0816 <sup>(1)</sup>	0306	1/2	0.005 ~ 0.02	± 100	$\sqrt{P/R}$ P: Rated Power(W) R: Resistance(Ω)	70	-55 ~ +155
RJ1220	0508	1	0.005 ~ 0.02				
		1/2	0.021 ~ 0.05	-200 ~ 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 <sup>(1)</sup>	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°C ambient temperature. For ambient temperature above 70°C, 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

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)

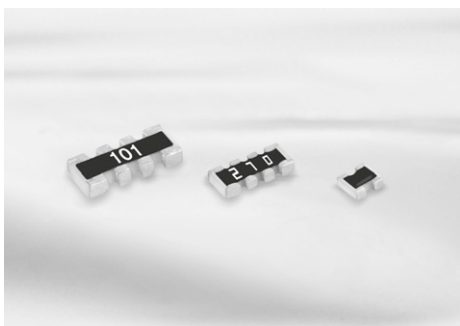
Attenuator

Characteristics Performance

Packaging

Standard Resistance Value

# Arrays(Convex Type)



## Feature

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

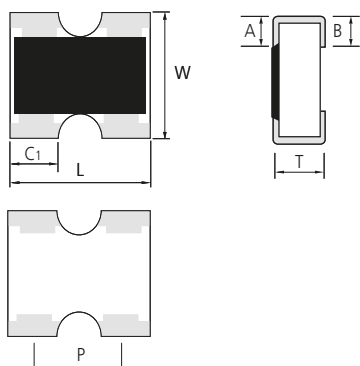
The product of lead-free terminal is RoHS compliant. PbO(lead oxide) is included in the glass of our product which is prescribed on RoHS appendix as an exception.

## Application

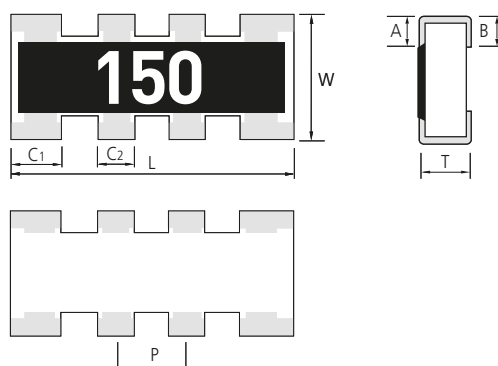
- For semiconductor devices.
- For computers, digital circuits.

## Structure and Dimensions

• 2 Array



• 4 Array



(UNIT: mm)

Type	L	W	T	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	100	CS
Code Designation	Dimension	Resistors	Tolerance	Resistance Value	Packaging Code
RP: Convex	10 : 0402 Array 16 : 0603 Array	2P: 2 Pieces 4P: 4 Pieces	J : ±5% ※ Jumper : J	3 digits coding system (IEC coding system) E-24 series ※ Jumper : '000'	CS : Tape Packaging 7" ES : Tape Packaging 10" AS : Tape Packaging 13"

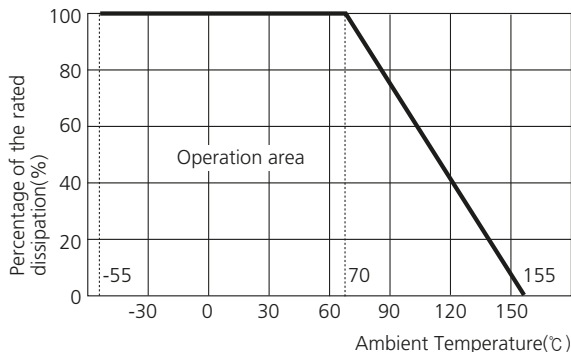
## Specification

Type	Size (inch)	Rated Power (W)	Rated Voltage (V)	Max Working Voltage (V)	Tolerance (%)	Resistance Range (Ω)	T.C.R (ppm/°C)	Working Temp. (°C)	Rated Ambient Temp. (°C)	Moisture Level
RP102P	0404	1/16	$\sqrt{P \times R}$ P: Rated Power(W) R: Resistance(Ω)	25	±5(J)	1 ~ 9.9 10 ~ 1M	±300 ±200	-55~155	70	Level 1
RP104P	0804	1/16		25						
RP164P	1206	1/16		50						

• Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

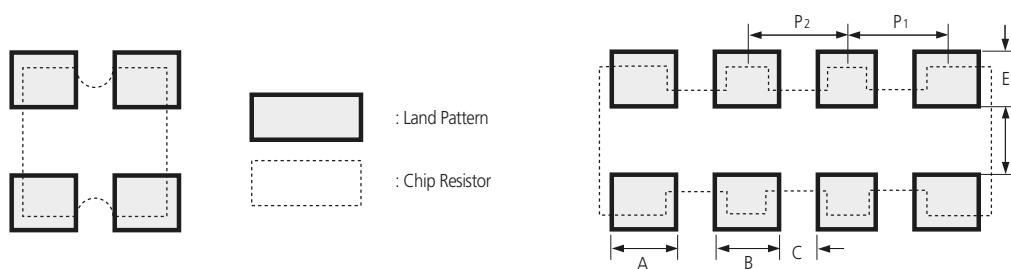
The rated power is the maximum continuous loading power at 70°C ambient temperature.  
For ambient temperature above 70°C, the loading power follows the below power derating curve.



## 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	P1	P2
RP10AT	0.4	-	0.25	0.5	0.5	0.65	-
RP102P	0.4	-	0.25	0.5	0.5	0.65	
RP104P	0.5	0.3	0.2	0.5	0.5	0.55	0.5
RP164P	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)

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)

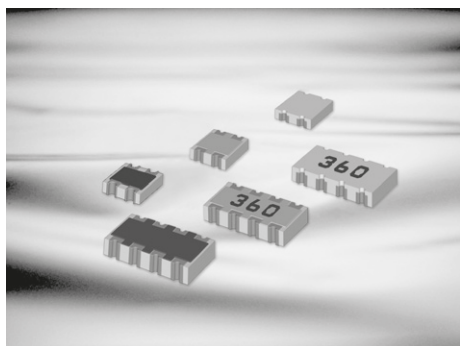
Attenuator

Characteristics Performance

Packaging

Standard Resistance Value

# Arrays(Concave Type)



## Feature

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

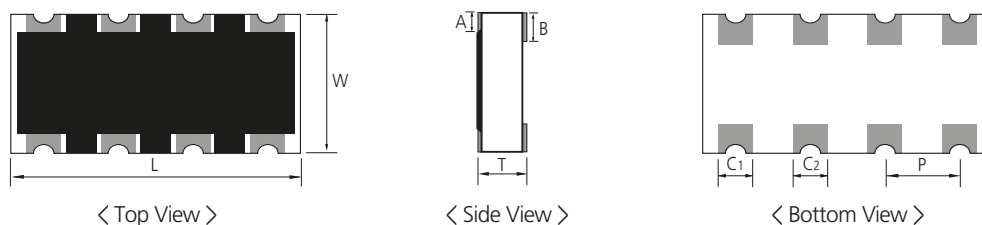
The product of lead-free terminal is RoHS compliant.  
PbO(lead oxide) is included in the glass of our product which is prescribed on RoHS appendix as an exception.

## Application

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

## Structure and Dimensions

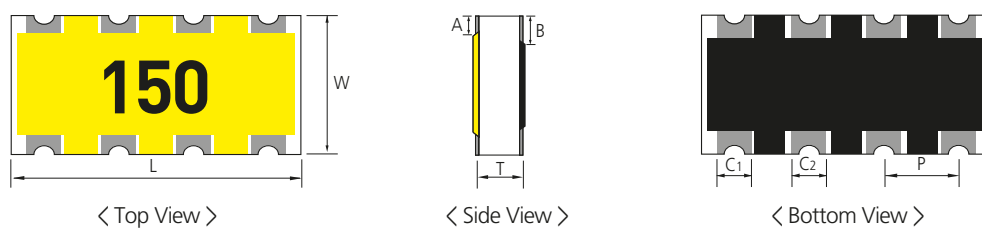
(1) Concave Type



(UNIT: mm)

Type	L	W	T	A	B	C <sub>1</sub>	C <sub>2</sub>	P
RN102P	1.00±0.10	1.00±0.10	0.35±0.10	0.15±0.10	0.25±0.15	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±0.15	0.30±0.10	0.30±0.10	0.50±0.10

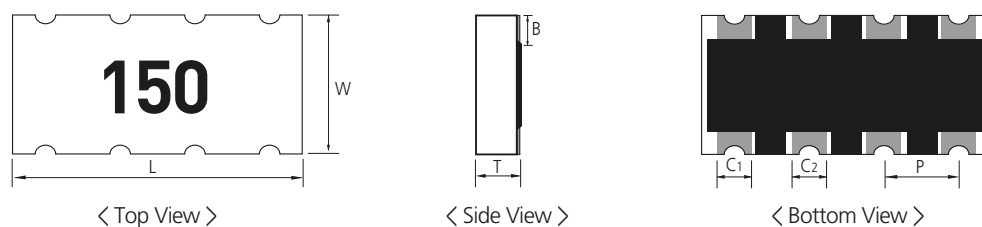
(2) Inverted Concave Type



(UNIT: mm)

Type	L	W	T	A	B	C <sub>1</sub>	C <sub>2</sub>	P
RM102P	1.00±0.10	1.00±0.10	0.35±0.10	0.15±0.10	0.25±0.15	0.33±0.10	-	0.50±0.10
RM104P	2.00±0.10	1.00±0.10	0.45±0.10	0.15±0.10	0.25±0.15	0.30±0.10	0.30±0.10	0.50±0.10

(3) Short-free & Inverted Concave Type



(UNIT: mm)

Type	L	W	T	A	B	C <sub>1</sub>	C <sub>2</sub>	P
RK102P	1.00±0.10	1.00±0.10	0.35±0.10	-	0.25±0.15	0.33±0.10	-	0.50±0.10
RK104P	2.00±0.10	1.00±0.10	0.45±0.10	-	0.25±0.15	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	100	CS
Code Designation	Dimension	Resistors	Tolerance	Resistance Value	Packaging Code
RN : Concave RM : Inverted Concave RK : Short-free & Inverted	10: 0402 Array	2P: 2 Pieces 4P: 4 Pieces	F: ±1% J: ±5% * Jumper : J	3 digit coding system (IEC coding system) E-24 series * Jumper : '000'	CS : Tape & Reel 7" ES : Tape & Reel 10" AS : Tape & Reel 13"

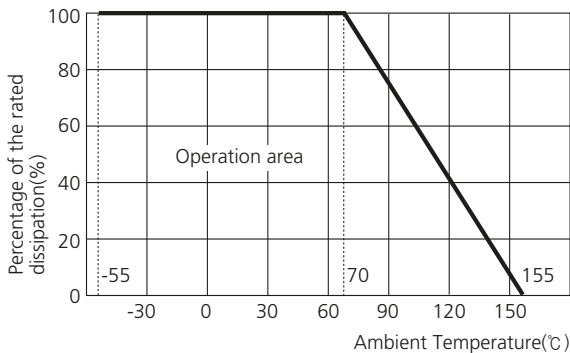
## Specification

Type	Size (inch)	Rated Power (W)	Rated Voltage (V)	Max Working Voltage (V)	Tolerance (%)	Resistance Range (Ω)	T.C.R (ppm/°C)	Working Temp. (°C)	Rated Ambient Temp. (°C)	Moisture Level
102P	0404	1/16	$\sqrt{P \times R}$	25	±1(F) ±2(G) ±5(J)	1 ~ 9.9	±300	-55~155	70	Level 1
104P	0804	1/16	P: Rated Power(W) R: Resistance(Ω)	25		10 ~ 1M	±200			

- Please contact our sales representatives or engineers for other specifications

## Power Derating Curve

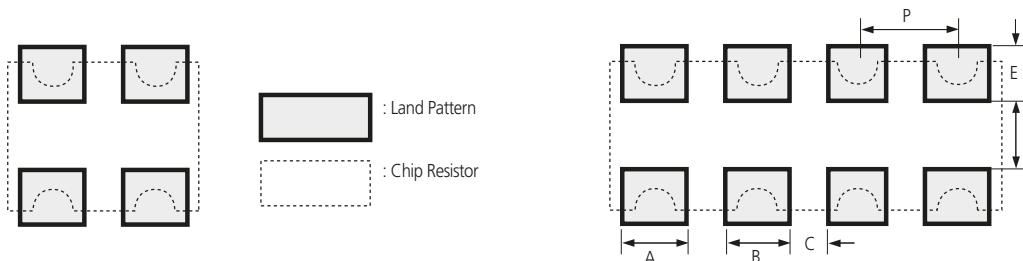
The rated power is the maximum continuous loading power at 70°C ambient temperature. For ambient temperature above 70°C, the loading power follows the below power derating curve.



## 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	-	0.2	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)

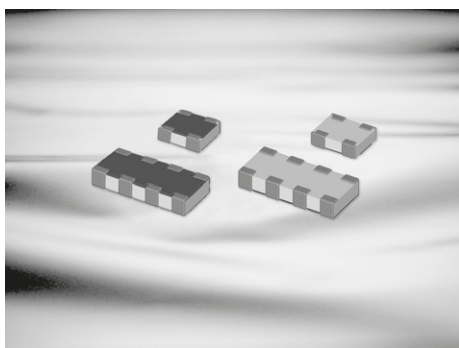
Attenuator

Characteristics Performance

Packaging

Standard Resistance Value

# Arrays(Flat Type)



## Feature

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

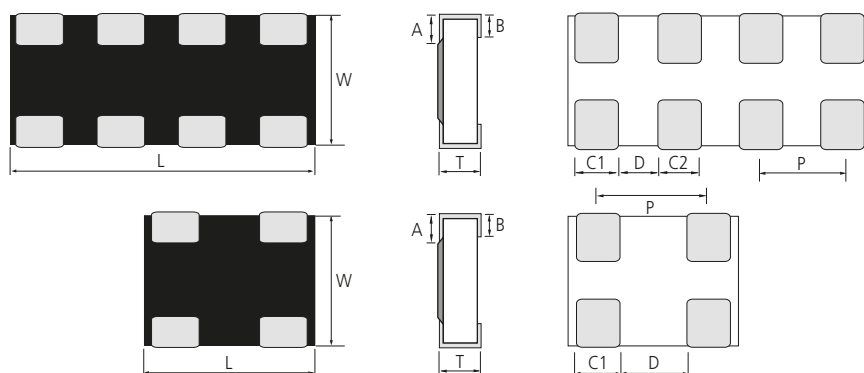
The product of lead-free terminal is RoHS compliant.  
PbO(lead oxide) is included in the glass of our product which is prescribed on RoHS appendix as an exception.

## Application

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

## Structure and Dimensions

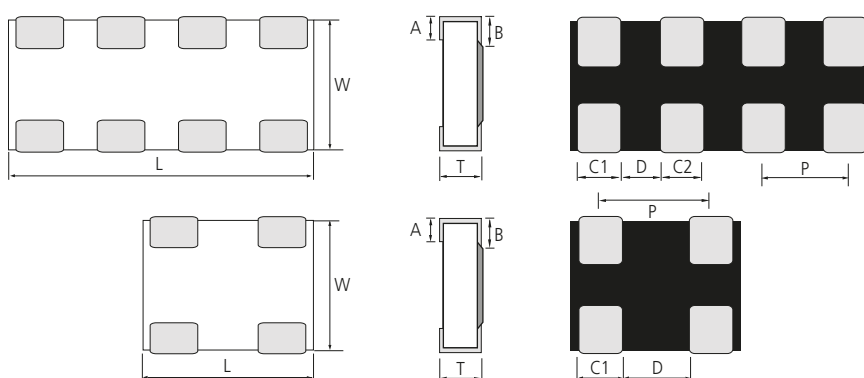
(1) Flat Type Array



(UNIT: mm)

Type	L	W	T	A	B	C1	C2	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	T	A	B	C1	C2	P
RM062P	0.80±0.05	0.60±0.05	0.23±0.10	0.15±0.10	0.20±0.10	0.20±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	0.20±0.10	0.20±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 RM : Inverted & Flat	06: 0201 Array	2P: 2 Pieces 4P: 4 Pieces	J: ±5% ※ Jumper : J	3 digit coding system (IEC coding system) E-24 series ※ Jumper : '000'	CS : Tape & Reel 7" ES : Tape & Reel 10" AS : Tape & Reel 13"

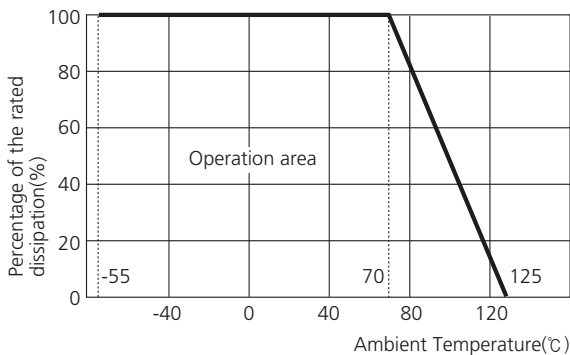
## Specification

Type	Size (inch)	Rated Power (W)	Rated Voltage (V)	Max Working Voltage (V)	Tolerance (%)	Resistance Range (Ω)	T.C.R (ppm/°C)	Working Temp. (°C)	Rated Ambient Temp. (°C)	Moisture Level
062P	0302	1/32	$\sqrt{P \times R}$ P: Rated Power(W) R: Resistance(Ω)	12.5	±5(J)	10 ~ 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

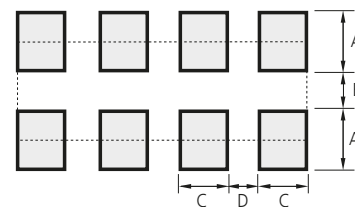
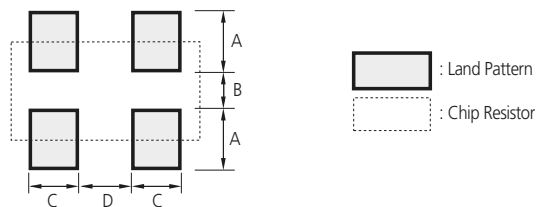
The rated power is the maximum continuous loading power at 70°C ambient temperature.  
For ambient temperature above 70°C, the loading power follows the below power derating curve.



## 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				
	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

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



# Anti-Sulfur Resistors



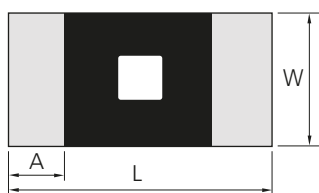
## Feature

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

## Application

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

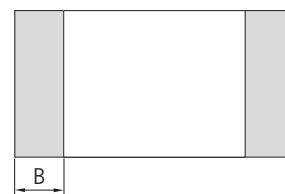
## Structure and Dimensions



< Top View >



< Side View >



< Bottom View >

(UNIT: mm)

Type	SIZE(Inch)	L	W	T	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	0.20±0.10	0.25±0.10
RCS1608	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.35±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	0603: 0.6×0.3(mm) - 0201(inch) 1005: 1.0×0.5(mm) - 0402(inch) 1608: 1.6×0.8(mm) - 0603(inch) 2012: 2.0×1.2(mm) - 0805(inch) 3216: 3.2×1.6(mm) - 1206(inch) 3225: 3.2×2.5(mm) - 1210(inch) 5025: 5.0×2.5(mm) - 2010(inch) 6432: 6.4×3.2(mm) - 2512(inch)	D: ±0.5% F: ±1% G: ±2% J: ±5% ※ Jumper : J	3 or 4 digits coding system (IEC coding system) 3digits (E-24 series) 4digits (E-96 series) ※ Jumper : '000'	CS: Tape & Reel 7" ES: Tape & Reel 10" AS: Tape & Reel 13"

## Specification

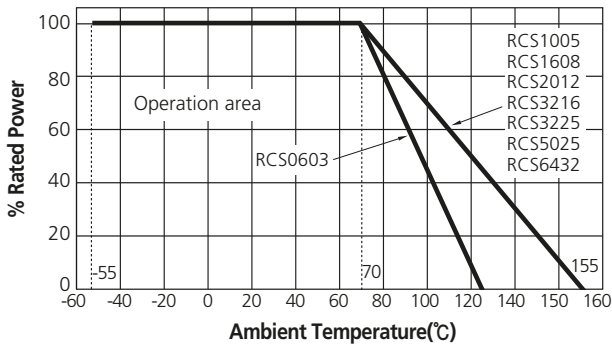
Type	Size (inch)	Rated Power (W)	Rated Voltage (V)	Max Working Voltage (V)	Tolerance (%)	Resistance Range (Ω)	T.C.R (ppm/°C)	Working Temp. (°C)	Rated Ambient Temp. (°C)	Moisture Level
RCS0603	0201	1/20	$\sqrt{P \times R}$ P: Rated Power(W) R: Resistance (Ω)	25	±1(F) ±2(G) ±5(J)	1 ~ 9.9 10 ~ 10M	±300 ±250	-55~125	70	Level 1
RCS1005	0402	1/16		50	±0.5(D) ±1(F) ±2(G) ±5(J)	1 ~ 9.9 10 ~ 10M	±300 ±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°C ambient temperature.

For ambient temperature above 70°C, the loading power follows the below power derating curve.

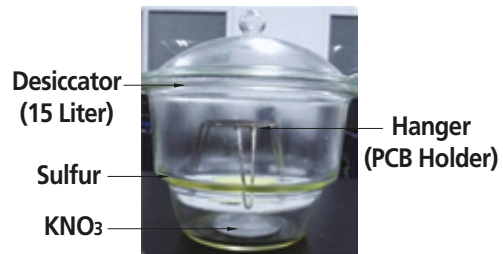


## Jumper Rating

Type	Size (inch)	Rated Current (A)	Resistance (Ω)
RCS0603	0201	0.5	0.05 Max
RCS1005	0402	1.0	
RCS1608	0603		
RCS2012	0805		
RCS3216	1206	2.0	
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 KNO <sub>3</sub> 200 g DI water 200ml	50°C	720hrs	ΔR < ±1%
Dry Sulfur (IBM recommended)	Sulfur 50 g	105°C	720hrs	ΔR < ±1%



[ Test Equipment ]

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