
Thick Film Chip Array Resistor



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■ INTRODUCTION

Chip array resistors are general passive component which is useful for derating voltage, current controlling in circuit and surface mounting is available.

Samsung electro-mechanics manufactures various types of resistors, from single chip type resistors to more complex array type resistors. That is, chip array resistors have several resistor elements integrated as a single chip component.

Chip array resistors are effective in reducing SMD surface area and costs.

There are two types of chip array resistors. RP(Convex type) expresses the dipping type resistors and RN(Concave type) expresses the through hole type resistors.

Production is increasing with demand for small size & light weight of set product. We provide ultra-small, high-reliability, high-stability resistors.

We have obtained ISO-9002/QS-9000 and ISO-14001 certification.

■ FEATURE AND APPLICATION

● Feature

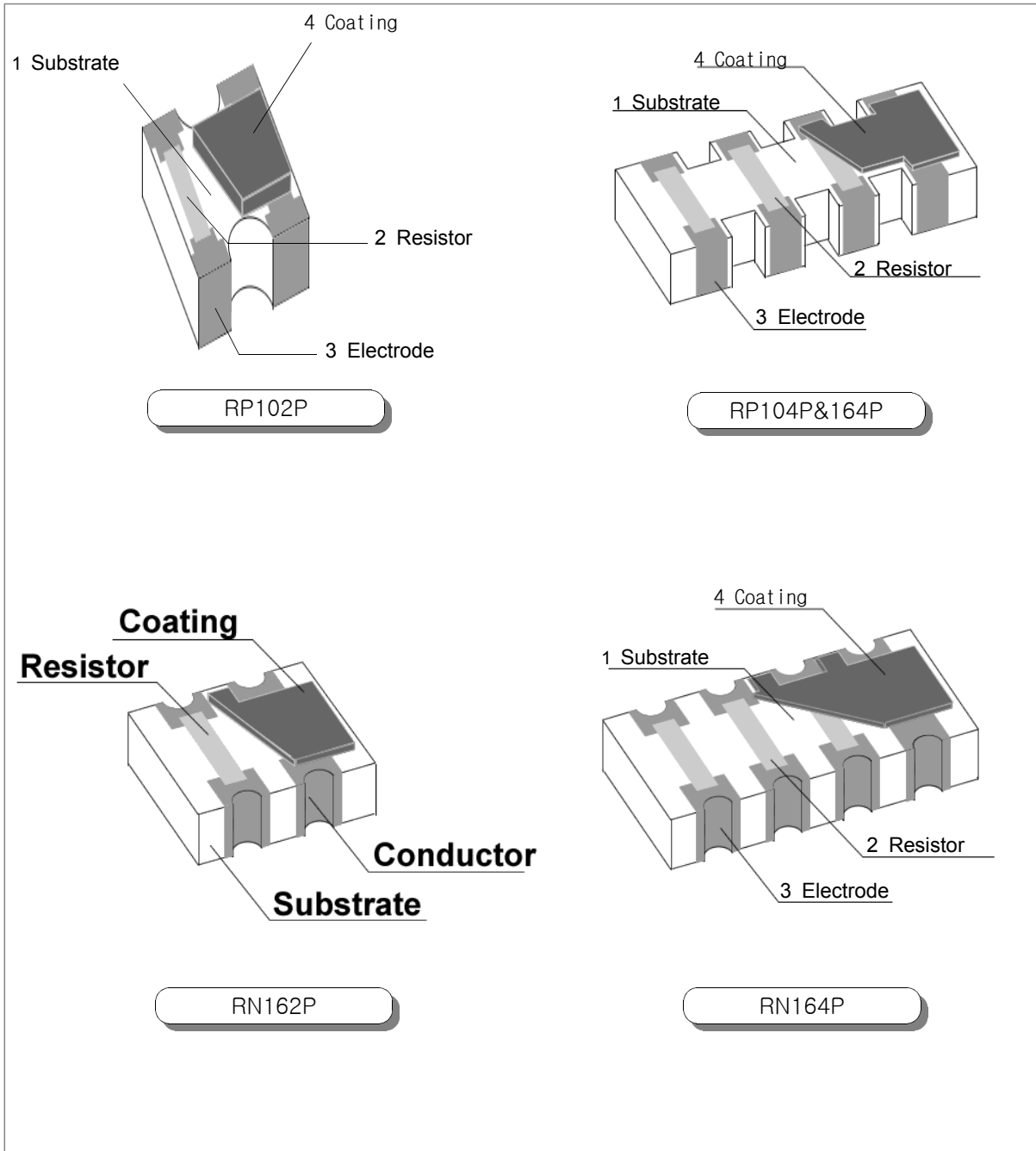
- Reducing SMD surface area (40% reduced).
- Reducing SMD costs (75% reduced).
- Both flow and reflow soldering are applicable.
- Convex & concave type.

● Application

- For semiconductor devices.
- For computers & digital circuits.
- For Printer & CD-ROM.

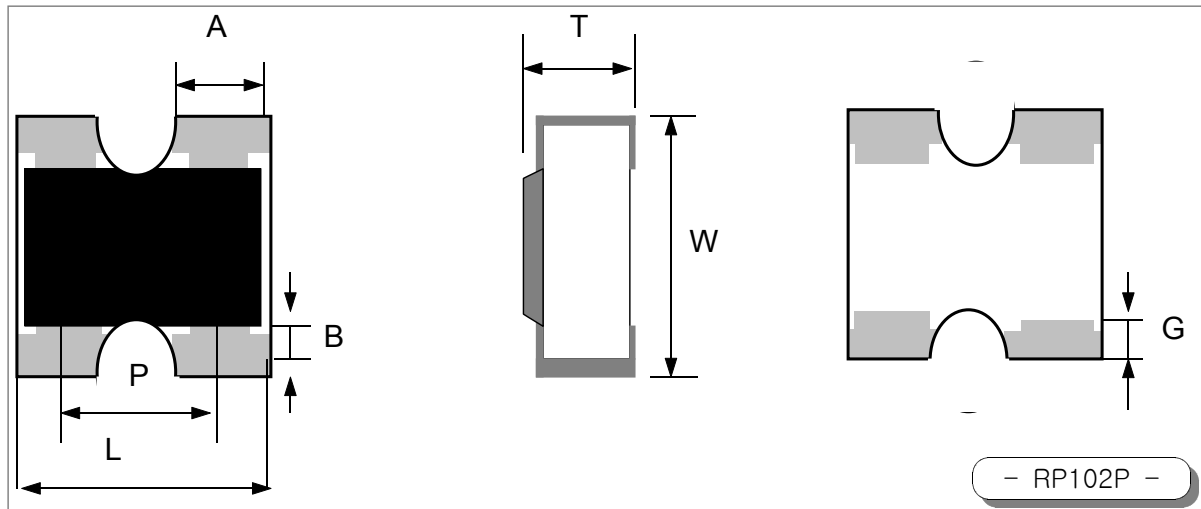
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■ STRUCTURE



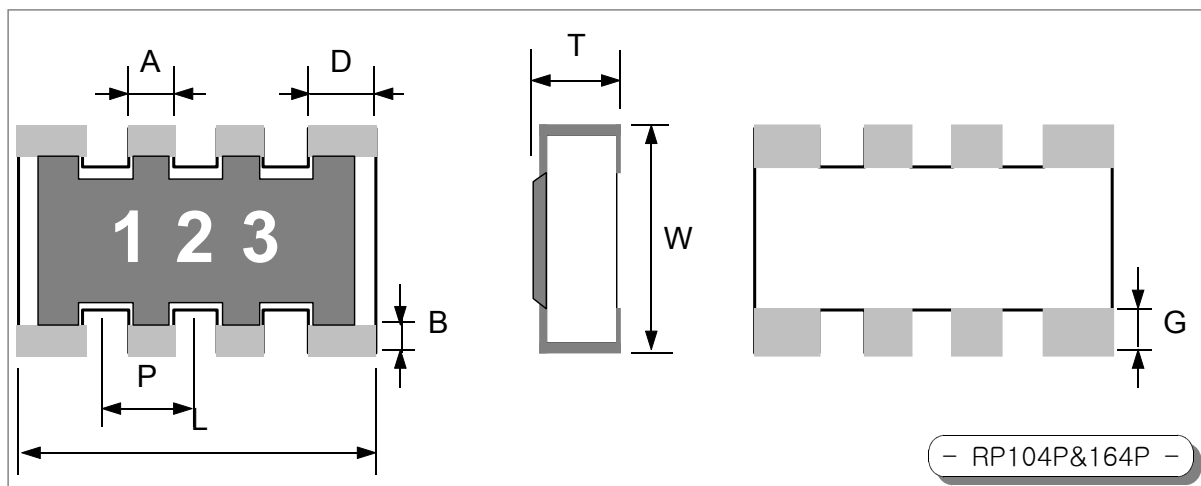
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■ APPEARANCE AND DIMENSION



[Unit : mm]

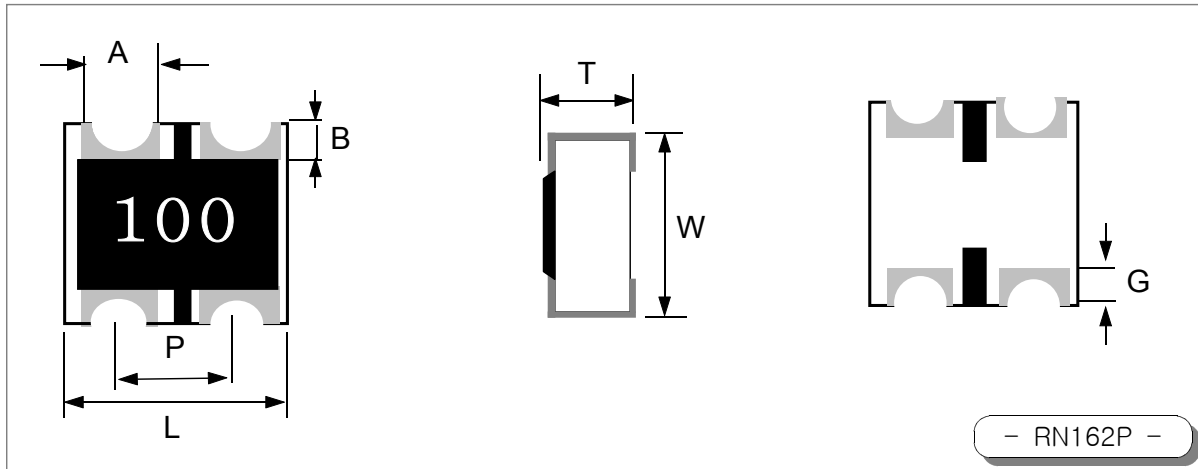
Item	L	W	T	A	B	G	P
RP102P	1.00 ± 0.10	1.00 ± 0.10	0.35 ± 0.10	0.33 ± 0.05	0.20 ± 0.10	0.25 ± 0.10	0.65 ± 0.10



[Unit : mm]

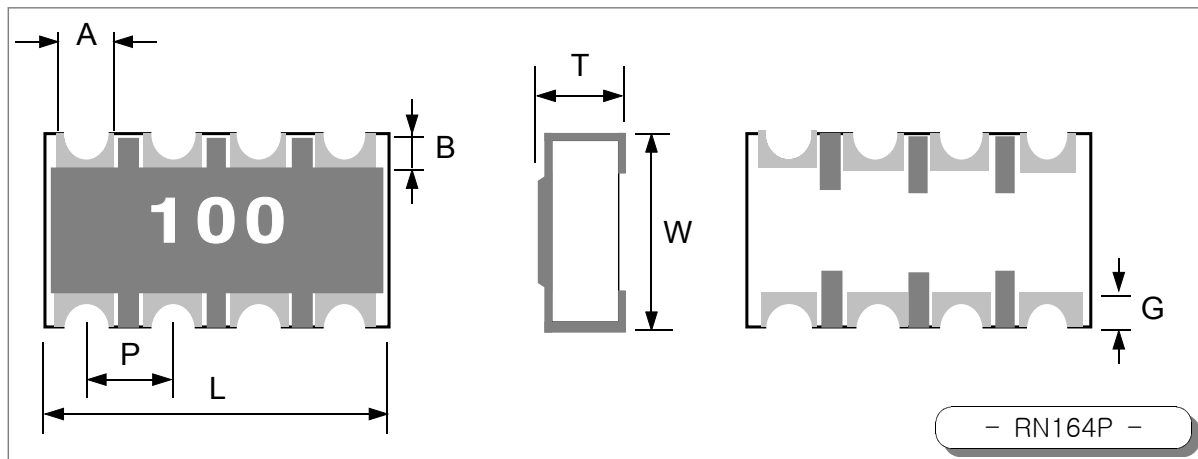
Item	L	W	T	A	D	B	G	P
RP104P	2.00 ± 0.10	1.00 ± 0.10	0.35 ± 0.10	0.30 ± 0.15	0.40 ± 0.15	0.15 ± 0.10	0.25 ± 0.15	0.50 ± 0.15
RP164P	3.20 ± 0.10	1.60 ± 0.10	0.50 ± 0.10	0.40 ± 0.15	0.60 ± 0.15	0.30 ± 0.15	0.30 ± 0.15	0.80 ± 0.15

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[Unit : mm]

Item	L	W	T	A	B	G	P
RN162P	1.60 ± 0.10	1.60 ± 0.10	0.60 ± 0.10	0.45 ± 0.10	0.30 ± 0.15	0.40 ± 0.15	0.80 ± 0.10



[Unit : mm]

Item	L	W	T	A	B	G	P
RN164P	3.20 ± 0.10	1.60 ± 0.10	0.60 ± 0.10	0.45 ± 0.10	0.30 ± 0.15	0.40 ± 0.15	0.80 ± 0.10

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■ PART NUMBERING

RP	164P	J	100	CS
①	②	③	④	⑤

① CODE DESIGNATION

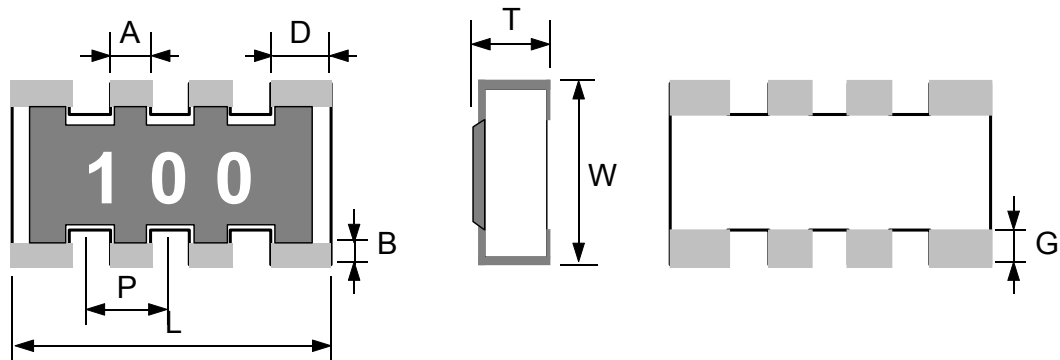
RP(Convex type) : This code expresses the dipping type Resistor that is produced by Samsung Electro-Mechanics CO.LTD.

RN(Concave type) : This code expresses the through hole type Resistor that is produced by Samsung Electro-Mechanics CO.LTD.

② DIMENSION

Left 2 digits are dimension of the resistor, and right 2 digits are number of resistor.<Fig 1>
Ex) 104P = 1005type X 4pcs, 164P = 1608type X 4pcs

<Fig 1>



[Unit : mm]

<Table 1>

Item	L	W	T	A	D	B	G	P
RP104P	2.00±0.10	1.00±0.10	0.35±0.10	0.30±0.15	0.40±0.15	0.15±0.10	0.25±0.15	0.50±0.15
RP164P	3.20±0.10	1.60±0.10	0.50±0.10	0.40±0.15	0.60±0.15	0.30±0.15	0.30±0.15	0.80±0.15

③ RESISTANCE TOLERANCE

The Resistance Tolerance is expressed as 1 digit alphabet by EIAJ standard. <Table 2>

<Table 2>

Item	J
Tolerance (%)	± 5
Producing Series	E-24
Type	RP & RN Series

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④ NOMINAL RESISTANCE VALUE

The Nominal Resistance Value is expressed as 3 or 4 digits by EIAJ standard. <Table 3>

<Table 3>

Item	Contents
Only number	Left 2 digits : Resistance value Right 1 digit : Exponential number of 10.
Number & alphabet "R"	Read alphabet "R" as decimal point.
Example	1) 101 : $10 \times 10^1 = 10 \times 10 = 100\Omega$ 2) 7R5 : $7 \cdot 5 = 7.5\Omega$
Type	RP & RN Series

In case of JUMPER(0 ohm), '000' is marked on the resistor.

※ RP102P type has no marking product.

⑤ PACKAGING CODE

The Packaging Code is expressed as 2 digits alphabet. <Table 4>

<Table 4>

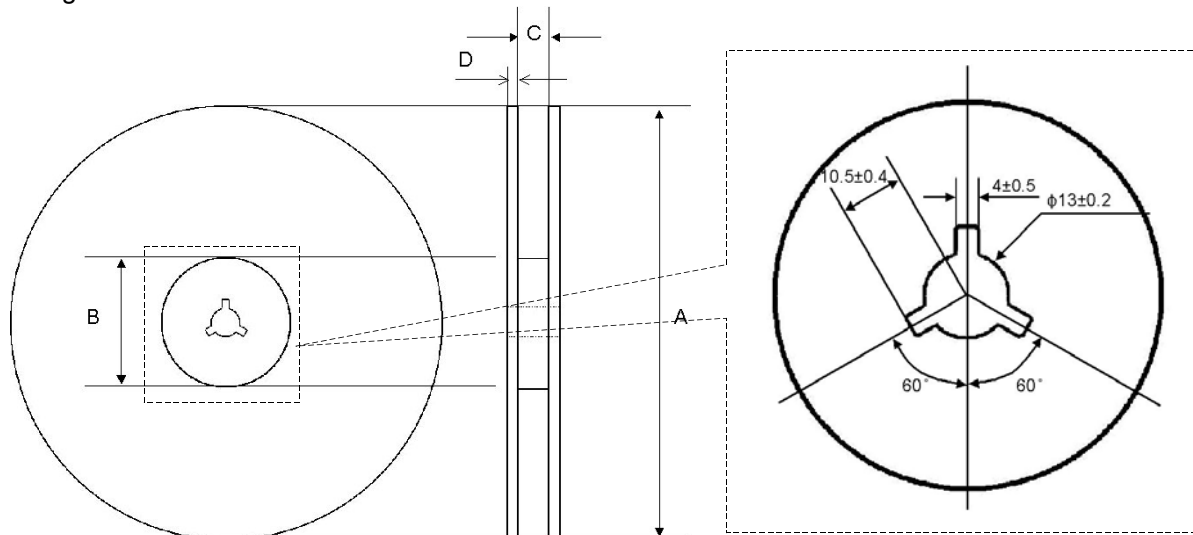
Packaging Code	Description	Type	Dimension	Packaging Q'ty
C S	7" REEL PACKAGING	RP	102P, 104P	10,000 PCS
			164P	5,000 PCS
		RN	162P, 164P	5,000 PCS
A S	13" REEL PACKAGING	RP	102P, 104P	40,000 PCS
			164P	20,000 PCS
		RN	162P, 164P	20,000 PCS

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● REEL DIMENSION

The Reel dimension is classified by the diameter of Reel. <Fig 6> <Table 5>

<Fig 6>



<Table 5>

[Unit : mm]

Packaging Code	Type	Dimension	Diameter	A	B	C	D
C S	RP	102P	7"	178	Φ 70	9.5 ± 0.1	1.2 ± 0.1
		104&164P	7"	178	Φ 70	9.5(13.0) ± 0.1	1.2 ± 0.1
	RN	162P	7"	178	Φ 70	9.5(13.0) ± 0.1	1.2 ± 0.1
		164P	7"	178	Φ 70	9.5(13.0) ± 0.1	1.2 ± 0.1
E S	RP	104&164P	10"	258	Φ 80	9.5 ± 0.1	2.0 ± 0.1
	RN	164P	10"	258	Φ 80	9.5 ± 0.1	2.0 ± 0.1
F S	RP	102P	13"	330	Φ 80	9.5 ± 0.1	2.0 ± 0.1
		104&164P	13"	330	Φ 80	9.5 ± 0.1	2.0 ± 0.1
	RN	164P	13"	330	Φ 80	9.5 ± 0.1	2.0 ± 0.1
A S	RP	102P	13"	330	Φ 80	9.5 ± 0.1	2.0 ± 0.1
		104&164P	13"	330	Φ 80	9.5 ± 0.1	2.0 ± 0.1
	RN	162P	13"	330	Φ 80	9.5 ± 0.1	2.0 ± 0.1
		164P	13"	330	Φ 80	9.5 ± 0.1	2.0 ± 0.1

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■ RELIABILITY TEST DATA

Jumper's reliability test data are only applied to General type resistor.

● ELECTRICAL CHARACTERISTIC

The electrical characteristic test should satisfy the test method, procedure, and standard.
If there is no special comment, Each test performs in standard state.
(temperature 20℃, humidity 65%RH, pressure 1023mbar)

item	Permissible deviation		Test method												
	Resistor	Jumper													
DC resistance	DC resistance value should be within the specified resistance tolerance.	50mΩ Maximum	• Standard : JIS C 5201-1 4.5 • Test voltage : <Table 8> • Applying time : within 5 seconds. • Test board : <Fig 11> <table><tr><th>Range (Ω)</th><th>Voltage (V)</th></tr><tr><td>10 ≤ R < 100</td><td>0.3</td></tr><tr><td>100 ≤ R < 1K</td><td>1.0</td></tr><tr><td>1K ≤ R < 10K</td><td>3.0</td></tr><tr><td>10K ≤ R < 100K</td><td>10</td></tr><tr><td>100K ≤ R < 1M</td><td>25</td></tr></table>	Range (Ω)	Voltage (V)	10 ≤ R < 100	0.3	100 ≤ R < 1K	1.0	1K ≤ R < 10K	3.0	10K ≤ R < 100K	10	100K ≤ R < 1M	25
Range (Ω)	Voltage (V)														
10 ≤ R < 100	0.3														
100 ≤ R < 1K	1.0														
1K ≤ R < 10K	3.0														
10K ≤ R < 100K	10														
100K ≤ R < 1M	25														
Temperature Coefficient of Resistance	<table><tr><th>Range(Ω)</th><th>ppm/℃</th></tr><tr><td>10 ≤ R < 1M</td><td>±200</td></tr></table>	Range(Ω)	ppm/℃	10 ≤ R < 1M	±200	-	• Standard : JIS C 5201-1 4.8 • Temp. : 20℃ → -55℃ → 20℃ → 125℃ → 20℃ • Test board : <Fig 11> • Calculation : TCR(ppm/℃) = $\frac{R-R_0}{R_0} \times \frac{1}{T-T_0} \times 10^6$ T₀ : 20 ± 2℃ R₀ : Resistance at T₀ (Ω) T : Test temperature (-55, 125℃) R : Resistance at T (Ω)								
Range(Ω)	ppm/℃														
10 ≤ R < 1M	±200														
Short time overload (STOL)	1. No mechanical damage 2. ΔR should be within ±(1%+0.1Ω)	50mΩ Maximum	• Standard : JIS C 5201-1 4.13 • Test voltage : 2.5 times of rated voltage Max. surge current at the Jumper. • Applying time : 5 seconds • Test board : <Fig 11>												
Intermittent overload (IOL)	1. No mechanical damage 2. ΔR should be within ±(3%+0.1Ω)	50mΩ Maximum	• Standard : JIS C 5201-1 4.13 • Test voltage : 2.5 times of rated voltage Max. surge current at the Jumper. • Test method : 1 sec ON, 25 sec OFF 10,000⁺⁴⁰⁰cycles • Test board : <Fig 11>												

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item	Permissible deviation		Test method	
	Resistor	Jumper		
Withstanding voltage	No mechanical damage, short circuit, or disconnection.	Same as left	- Standard : JIS C 5201-1 4.7 - Test voltage : AC 100V - Applying time : 60 +10/-0 seconds - Test board : <Fig 13>	
Insulation resistance	Should have more than 1,000MΩ	Same as left	- Standard : JIS C 5201- 4.7 - Test voltage : DC 100V, - Applying time : 60 seconds - Test pressure : 1.0±0.2 N - Test board : <Fig 13>	
Noise	Noise standard <Table 10>	-	Measure equipment : QUAN-TECH NOISE METER (MODEL 315C)	
	Range (Ω)			dB Max.
	1 ≤ R < 100			-10
	100 ≤ R < 1K			0
	1K ≤ R < 100K			15
	100K ≤ R < 1M			20

● MECHANICAL CHARACTERISTIC

The mechanical characteristic test should satisfy the test method, procedure, and standard.
 If there is no special comment, Each test performs in standard state.
 (temperature 20°C, humidity 65%RH, pressure 1023mbar)

item	Permissible deviation		Test method
	Resistor	Jumper	
Solderability	New solder coated more than 95% of termination	Same as left	- Standard : JIS C 5201-1 4.17 - Test temperature : 245 $\pm$ 5°C - Test time : 3 $\pm$ 0.5 sec (dipping both side)
Bending strength	- No mechanical damage ΔR should be within $\pm(0.5\%+0.05\Omega)$	Same as left	- Standard : JIS C 5201-1 4.33 - Test board : <Fig 12> - Test speed : 100mm/min - Test procedure : press until 3mm, then keep 5 seconds <Fig 14>

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item	Permissible deviation		Test method
	Resistor	Jumper	
Termination strength	No mechanical damage, or sign of disconnection	Same as left	- Standard : JIS C 5201-1 4.16 - Test time : applying pressure for 10 seconds - Test tension : 3N (300g · f)
Withstanding soldering heat	1. No mechanical damage 2. ΔR should be within $\pm(1\%+0.05\Omega)$	50m Ω Maximum	- Standard : JIS C 5201-1 4.18 - Temperature : $260 \pm 5^\circ\text{C}$ - Test time : 10 ± 1second (both side dipping) - Test procedure : measures after 24 hours
Vibration	1. No mechanical damage 2. ΔR should be within $\pm(1\%+0.05\Omega)$	50m Ω Maximum	- Standard : JIS C 5201-1 4.22 - Test amplitude : 1.5mm - Test procedure : frequency 10Hz - 55Hz - 10Hz each 2 hours in x, y, z direction.

● ENVIRONMENTAL CHARACTERISTIC

The Environmental characteristic test should satisfy the test method, procedure, and standard.
 If there is no special comment, Each test performs in standard state.
 (temperature 20°C, humidity 65%RH, pressure 1023mbar)

item	Permissible deviation		Test method															
	Resistor	Jumper																
Temperature cycle	1. No mechanical damage 2. ΔR should be within ±(1%+0.1Ω)	50mΩ Maximum	• Standard : JIS C 5201-1 4.19 • Test procedure : <Table 11> • Measure : after 5 cycles of procedure • Test board : <Fig 11> <Table 11> <table><tr><td>item</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>temp(℃)</td><td>-55±2</td><td>5~35</td><td>125±2</td><td>5~35</td></tr><tr><td>time(min)</td><td>30</td><td>15</td><td>30</td><td>15</td></tr></table>	item	1	2	3	4	temp(℃)	-55±2	5~35	125±2	5~35	time(min)	30	15	30	15
item	1	2	3	4														
temp(℃)	-55±2	5~35	125±2	5~35														
time(min)	30	15	30	15														
Moisture resistance life	1. No mechanical damage 2. ΔR should be within <Table 12> <Table 12> <table><tr><td>Range(Ω)</td><td>ΔR MAX</td></tr><tr><td>10 ≤ R < 1M</td><td>±(3%+0.1Ω)</td></tr></table>	Range(Ω)	ΔR MAX	10 ≤ R < 1M	±(3%+0.1Ω)	100mΩ Maximum	• Standard : JIS C 5201-1 4.14 • Test condition : temp 40 ± 3℃, humid 90 ~ 95%RH • Test voltage : rated voltage • Test time : repeat 90min ON, 30min OFF during 1000⁺⁴⁸ hours • Test board : <Fig 11>											
Range(Ω)	ΔR MAX																	
10 ≤ R < 1M	±(3%+0.1Ω)																	

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item	Permissible deviation		Test method
	Resistor	Jumper	
Low temperature exposure	1. No mechanical damage 2. ΔR should be within $\pm(3\%+0.1\Omega)$	50m Ω Maximum	- Standard : JIS C 5201-1 4.23 - Test temperature : $-55 \pm 2^\circ\text{C}$ - Test time : 1000⁺⁴⁸ hours (without load) - Measure : after 1 hour - Test board : <Fig 11>
High temperature exposure	1. No mechanical damage 2. ΔR should be within $\pm(3\%+0.1\Omega)$	50m Ω Maximum	- Standard : JIS C 5201-1 4.23 - Test temperature : $125 \pm 2^\circ\text{C}$ - Test time : 1000⁺⁴⁸ hours (without load) - Measure : after 1 hour - Test board : <Fig 11>
Load life	1. No mechanical damage 2. ΔR should be within <Table 13>	100m Ω Maximum	- Standard : JIS C 5201-1 4.25 - Test temperature : $70 \pm 2^\circ\text{C}$ - Test voltage : rated voltage - Test time : repeat 90min ON, 30min OFF during 1000⁺⁴⁸ hours - Test board : <Fig 11>.
	<Table 13>		
	Range(Ω)		
	ΔR MAX		
	$0.1 \leq R < 1$		
	$1 \leq R < 10$		
	$10 \leq R < 1\text{M}$		
	$1\text{M} \leq R < 10\text{M}$		

● TEST BOARD AND SPECIFICATION

► Soldering

▷ The resistor should be fixed on PCB(printed circuit board) for testing.

- Soldering specification : JIS C 5201-1 4.18

- * Soldering method : Flow type(Dipping type), Reflow type
- * Solder : H63A (JIS Z 3282)
- * FLUX : ROSIN 25WT% (JIS K 5902), IPA 75WT% (JIS K 5901)

- Flow soldering condition

- * FLUX dipping time : 5~10 sec
- * Pre-treatment : None
- * Soldering temp. : $260^\circ\text{C} \pm 5^\circ\text{C}$
- * Soldering time : 10 ± 1 sec

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■ CHARACTERISTIC GRAPH

● RESISTANCE RANGE

The Resistance Range that we produce depends on the Dimension and the Resistance Tolerance of the resistor. <Table 11>

<Table 11>

Tolerance	Range	Type	Dimension
J	10Ω ~ 1MΩ	RP	102P, 104P&164P
		RN	162P, 164P
Jumper	50 mΩ MAX	RP	102P, 104P&164P
		RN	162P, 164P

● RATED POWER

The Rated Power is classified by the dimension of the resistor. <Table 12>

<Table 12>

Item	Range	Type
Rated power	1/16 W (0.063 W)	All
Working Volt.(Max.)	50 V	All
STOL, IOL Volt.(Max.)	100 V	All