

**1 Scope:**

- 1.1 This specification is applicable to lead and halogen free RTH series high power thick film chip resistors.
- 1.2 Lead free products mean lead free termination meets RoHS requirement. Pb contained in glass material of resistor element are exempted by RoHS directive.

**2 Explanation Of Part Numbers:**

(EX)

RTH	02	100	J	TH
Type	Size	Nominal Resistance	Resistance Tolerance	Packaging(Refer to IE-SP-055)
High Power Thick Film Chip Resistors	01(0201) 02(0402) 03(0603) 05(0805) 06(1206) 12(1210) 20(2010) 25(2512)	3-Digit EX. 10Ω=100 4.7Ω=4R7 JUMPER=000	F=± 1% G=± 2% J=± 5%	TH : 2 mm Pitch Carrier Tape 10000 pcs . . . . BA : Bulk Case
	4-Digit EX. 10.2Ω=10R2 10KΩ=1002 JUMPER=0000			

**3 General Specifications:**

**3.1 Resistance Range: ≥ 1Ω&0Ω**

Type	Rated Power at 70°C	Max. Working Voltage	Max. Overload Voltage	T.C.R (ppm/°C)	Resistance Range				JUMPER Rated Power		JUMPER Resistance Value	
					B(±0.1%) E-24、E-96	D(±0.5%) E-24、E-96	F(±1%) E-24、E-96	G(±2%)、J(±5%) E-24	J (±5%)	F (±1%)	J (±5%)	F (±1%)
RTH01 (0201)	1/16 W	25V	50V	-200 +400 ±200	-----	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω	--	--	--	--
					10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 10MΩ					
RTH02 (0402)	1/10 W	50V	100V	±100	100Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 20MΩ	1.5A	2A	50mΩ MAX.	20mΩ MAX.
				±200	-----	-----	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω				
RTH03 (0603)	1/8 W	75V	150V	±100	100Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 20MΩ	1.5A	2.5A	50mΩ MAX.	20mΩ MAX.
				±200	-----	-----	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω				
RTH05 (0805)	1/4 W	150V	300V	±100	100Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 20MΩ	2.5A	3.5A	50mΩ MAX.	20mΩ MAX.
				±200	-----	-----	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω				
RTH06 (1206)	1/2 W	200V	400V	±100	10Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 20MΩ	3A	5A	50mΩ MAX.	20mΩ MAX.
				±200	3Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω				
RTH12 (1210)	3/4 W	200V	400V	±100	100Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 20MΩ	4A	6A	50mΩ MAX.	20mΩ MAX.
				±200	-----	-----	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω				
RTH20 (2010)	1W	200V	400V	±100	-----	-----	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 10MΩ	4.5A	7A	50mΩ MAX.	20mΩ MAX.
				±200	-----	-----	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω				
RTH25 (2512)	2W	200V	400V	±100	-----	-----	10Ω ≤ R ≤ 10MΩ	10Ω ≤ R ≤ 10MΩ	6A	10A	50mΩ MAX.	20mΩ MAX.
				±200	-----	-----	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω				
<b>Operating Temperature Range</b>					-55°C ~ +155°C (0201:-55°C ~ +125°C)							

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3.2 Resistance Range: < 1Ω

Type	Rated Power at 70°C	Max. Rated Current	Max. Overload Current	T.C.R (ppm / °C)	Resistance Range	
					F(±1%) E-24、E-96	G(±2%)、J((±5%) E-24
RTH02 (0402)	1/10W	2A	5A	±1500	25 mΩ ≤ R < 37 mΩ	
				±1200	37 mΩ ≤ R < 60 mΩ	
				±600	60 mΩ ≤ R < 200 mΩ	
				±300	200 mΩ ≤ R < 400 mΩ	
				±250	400 mΩ ≤ R < 600 mΩ	
				±200	600 mΩ ≤ R < 1000 mΩ	
RTH03 (0603)	1/8W	3.5A	8.84A	±1500	10 mΩ ≤ R < 37 mΩ	
				±1200	37 mΩ ≤ R < 60 mΩ	
				±600	60 mΩ ≤ R < 100 mΩ	
				±300	100 mΩ ≤ R < 200 mΩ	
				±600	200 mΩ ≤ R < 500 mΩ	
				±400	500 mΩ ≤ R < 1000 mΩ	
RTH05 (0805)	1/4W	5A	12.5A	±1500	10 mΩ ≤ R < 19 mΩ	
				±1200	19 mΩ ≤ R < 33 mΩ	
				±800	33 mΩ ≤ R < 50 mΩ	
				±600	50 mΩ ≤ R < 100 mΩ	
				±200	100 mΩ ≤ R < 1000 mΩ	
RTH06 (1206)	1/2W	7.07A	17.68A	±1500	10 mΩ ≤ R < 19 mΩ	
				±1200	19 mΩ ≤ R < 25 mΩ	
				±1000	25 mΩ ≤ R < 50 mΩ	
				±600	50 mΩ ≤ R < 100 mΩ	
				±200	100 mΩ ≤ R < 1000 mΩ	
RTH12 (1210)	3/4W	8.66A	21.6A	±1000	10 mΩ ≤ R < 25 mΩ	
				±700	25 mΩ ≤ R < 50 mΩ	
				±400	50 mΩ ≤ R < 100 mΩ	
				±200	100 mΩ ≤ R < 1000 mΩ	
RTH20 (2010)	1W	10A	25A	±200	50 mΩ ≤ R < 150 mΩ	
				±100	150 mΩ ≤ R < 1000 mΩ	
RTH25 (2512)	2W	14.14A	35.36A	±200	50 mΩ ≤ R < 150 mΩ	
				±100	150 mΩ ≤ R < 1000 mΩ	
<b>Operating Temperature Range</b>				<b>-55°C ~ +155°C</b>		

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**3.3 Power Derating Curve:**

Type	RTH01 (0201)	Other
Operating Temperature Range	-55°C ~ +125°C	-55°C ~ +155°C
Explain	For resistors operated in ambient temperatures above 70°C, power rating shall be derated in accordance with figure below..	For resistors operated in ambient temperatures above 70°C, power rating shall be derated in accordance with figure below.
Figure	<p>Detailed description: A line graph with 'Rated Power (%)' on the y-axis (0 to 100) and 'Ambient temperature (°C)' on the x-axis (-55 to 160). The curve is horizontal at 100% from -55°C to 70°C. At 70°C, it begins a linear descent, reaching 0% at 125°C. A dashed vertical line marks the 70°C point.</p>	<p>Detailed description: A line graph with 'Rated Power (%)' on the y-axis (0 to 100) and 'Ambient temperature (°C)' on the x-axis (-55 to 160). The curve is horizontal at 100% from -55°C to 70°C. At 70°C, it begins a linear descent, reaching 0% at 155°C. A dashed vertical line marks the 70°C point.</p>

**3.4 Voltage Rating or Current Rating**

**3.4.1 Resistance Range: ≥ 1Ω**

Rated Voltage: The resistor shall have a DC continuous working voltage or a rms. AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined from the following:

$$E = \sqrt{R \times P}$$

E= Rated voltage (v)  
P= Power rating (w)  
R= Nominal resistance(Ω)

**3.4.2 Resistance Range: < 1Ω**

Rated Current: The resistor shall have a DC continuous working current or a rms. AC continuous working current at commercial-line frequency and wave form corresponding to the power rating, as determined from the following:

$$I = \sqrt{P/R}$$

I= Rated current (A)  
P= Power rating (w)  
R= Nominal resistance(Ω)

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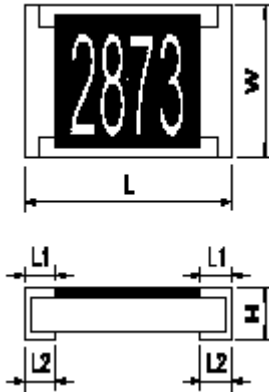
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**4 Dimensions:**

4.1 Resistance Range:  $\geq 1\Omega$

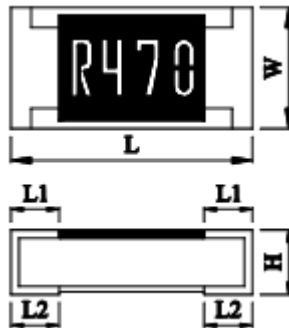
Unit:mm



Dimension		L	W	H	L1	L2
Type	Size Code					
RTH01	0201	0.60±0.03	0.30±0.03	0.23±0.03	0.15±0.05	0.15±0.05
RTH02	0402	1.00±0.10	0.50±0.05	0.30±0.05	0.20±0.10	0.25±0.10
RTH03	0603	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.15	0.30±0.15
RTH05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.15
RTH06	1206	3.05±0.10	1.55±0.10	0.50±0.10	0.45±0.20	0.35±0.15
RTH12	1210	3.05±0.10	2.55±0.10	0.55±0.10	0.50±0.20	0.50±0.20
RTH20	2010	4.95±0.10	2.45±0.10	0.70±0.10	0.65±0.20	0.60±0.20
RTH25	2512	6.40±0.20	3.20±0.20	1.05±0.10	0.60±0.20	1.25±0.20

4.2 Resistance Range:  $< 1\Omega$

Unit:mm



Dimension		L	W	H	L1	L2
Type	Size Code					
RTH02	0402	1.00±0.10	0.50±0.10	0.35±0.10	0.25±0.10	0.20±0.15
RTH03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.35±0.15
RTH05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.20
RTH06	1206	3.05±0.10	1.55±0.10	0.50±0.10	0.45±0.20	0.65±0.15
RTH12	1210	3.05±0.10	2.55±0.10	0.55±0.10	0.50±0.20	0.50±0.20
RTH20	2010	4.95±0.10	2.45±0.10	0.70±0.10	0.65±0.20	0.70±0.20
RTH25	2512	6.40±0.20	3.20±0.20	1.05±0.10	0.72±0.20	1.25±0.20

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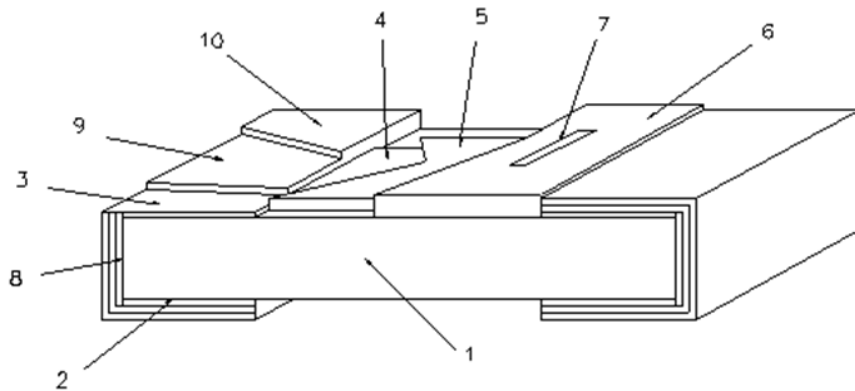
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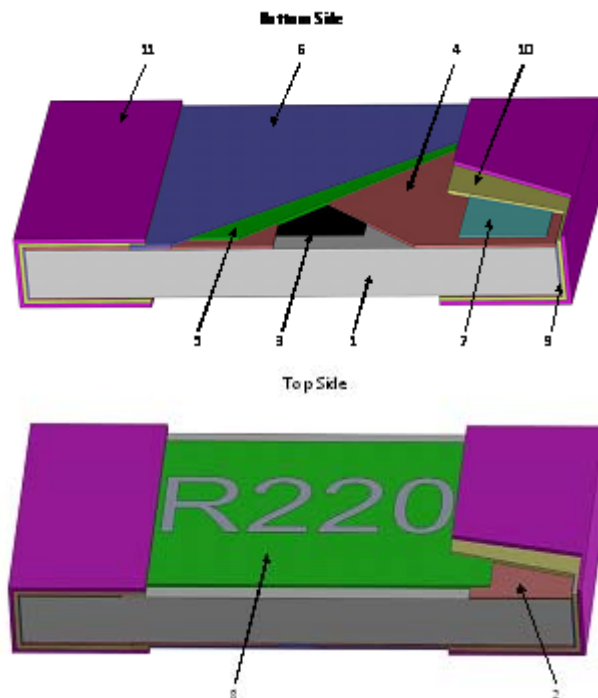
**5 Structure Graph:**

5.1 Resistance Range:  $\geq 1\Omega$  & RTH20/RTH25  $100m\Omega \leq R < 1\Omega$



1	Ceramic substrate	6	2nd Protective coating
2	Bottom inner electrode	7	Marking
3	Top inner electrode	8	Terminal inner electrode
4	Resistive layer	9	Ni plating
5	1st Protective coating	10	Sn plating

5.2 Resistance Range:  $< 1\Omega$  (Except RTH20/RTH25)



1	Ceramic substrate	7	2nd Top inner electrode
2	1st Top inner electrode	8	G2 layer+Marking
3	Resistive layer	9	Terminal inner electrode
4	Bottom inner electrode	10	Ni plating
5	1st Protective coating	11	Sn plating
6	2nd Protective coating		

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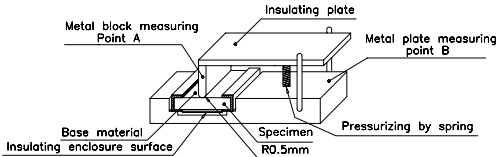
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**6 Reliability Test:**

**6.1 Electrical Performance Test**

Item	Conditions	Specifications														
		Resistors														
Temperature Coefficient of Resistance	$TCR (ppm/^\circ C) = \frac{(R2 - R1)}{R1 (T2 - T1)} \times 10^6$ R1: Resistance at room temperature R2: Resistance at -55°C or +125°C T1: Room temperature T2: Temperature -55°C or +125°C Refer to JIS-C5201-1 4.8	Refer to item 3. general specifications														
Short Time Overload	Applied 2.5 times rated voltage for 5 seconds and release the load for about 30 minutes , then measure its resistance variance rate.(Rated voltage refer to item 3. general specifications)  Refer to JIS-C5201-1 4.13	1. Resistance Range: $\geq 1\Omega$ 1%: $\pm(1.0\%+0.05\Omega)$ 2%、5%: $\pm(2.0\%+0.10\Omega)$ 2. Resistance Range: $< 1\Omega$ 1%、2%、5%: $\pm(2.0\%+0.001\Omega)$  No evidence of mechanical damage. No short or burned on the appearance.														
Insulation Resistance	Put the resistor in the fixture, add 100 VDC in +, - terminal for 60 sec then measured the insulation resistance between electrodes and insulating enclosure or between electrodes and base material. Refer to JIS-C5201-1 4.6  	$\geq 10^9\Omega$														
Dielectric Withstand Voltage	Put the resistor in the fixture, add VAC (see spec. below) in +, - terminal for. RTH05、06、12、20、25 apply 500 VAC 1 minute. RTH02、03 apply 300 VAC 1 minute. Refer to JIS-C5201-1 4.7	No short or burned on the appearance.														
Noise Level	Refer to JIS-C5201-1 4.12	<table border="1"> <thead> <tr> <th>Resistance</th> <th>Noise</th> </tr> </thead> <tbody> <tr> <td><math>R &lt; 100\Omega</math></td> <td><math>\leq -10db (0.32 uV/V)</math></td> </tr> <tr> <td><math>100\Omega \leq R &lt; 1K\Omega</math></td> <td><math>\leq 0db (1.0 uV/V)</math></td> </tr> <tr> <td><math>1K\Omega \leq R &lt; 10K\Omega</math></td> <td><math>\leq 10db (3.2 uV/V)</math></td> </tr> <tr> <td><math>10K\Omega \leq R &lt; 100K\Omega</math></td> <td><math>\leq 15db (5.6 uV/V)</math></td> </tr> <tr> <td><math>100K\Omega \leq R &lt; 1M\Omega</math></td> <td><math>\leq 20db (10 uV/V)</math></td> </tr> <tr> <td><math>1M\Omega \leq R</math></td> <td><math>\leq 30db (32 uV/V)</math></td> </tr> </tbody> </table>	Resistance	Noise	$R < 100\Omega$	$\leq -10db (0.32 uV/V)$	$100\Omega \leq R < 1K\Omega$	$\leq 0db (1.0 uV/V)$	$1K\Omega \leq R < 10K\Omega$	$\leq 10db (3.2 uV/V)$	$10K\Omega \leq R < 100K\Omega$	$\leq 15db (5.6 uV/V)$	$100K\Omega \leq R < 1M\Omega$	$\leq 20db (10 uV/V)$	$1M\Omega \leq R$	$\leq 30db (32 uV/V)$
Resistance	Noise															
$R < 100\Omega$	$\leq -10db (0.32 uV/V)$															
$100\Omega \leq R < 1K\Omega$	$\leq 0db (1.0 uV/V)$															
$1K\Omega \leq R < 10K\Omega$	$\leq 10db (3.2 uV/V)$															
$10K\Omega \leq R < 100K\Omega$	$\leq 15db (5.6 uV/V)$															
$100K\Omega \leq R < 1M\Omega$	$\leq 20db (10 uV/V)$															
$1M\Omega \leq R$	$\leq 30db (32 uV/V)$															

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**6.2 Mechanical Performance Test**

Item	Conditions	Specifications
		Resistors
Core Body Strength	Applied R0.5 test probe at its central part then pushing 10N { 1.02Kgf } force on the sample for 10 sec. 1.RTH02、03 : probe R0.2mm 2.RTH05、06、12、20、25 : probe R0.5mm  Refer to JIS-C5201-1 4.15	1.Resistance Range: $\geq 1\Omega$ $\pm(1.0\%+0.05\Omega)$ 2.Resistance Range: $<1\Omega$ $\pm(1.0\%+0.001\Omega)$  No evidence of mechanical damage. No side conductive peeling off.
Terminal Strength	Test1:The resistor mounted on the board applied 5N (RTH01:3N)pushing force on the sample rear for 10sec. Test2:The resistor mounted on the board slowly add force on the sample rear until the sample termination is breakdown. Refer to JIS-C5201-1 4.16	Test1:No evidence of mechanical damage.  Test2:RTH01 $\geq 3N$ Other type $\geq 5N$
Resistance to Solvent	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 5 minutes, then the resistor is left in the room for 48 hrs, and measured its resistance variance rate.  Refer to JIS-C5201-1 4.29	1.Resistance Range: $\geq 1\Omega$ RTH01: $\pm(1.0\%+0.05\Omega)$ Other type: $\pm(0.5\%+0.05\Omega)$ 2.Resistance Range: $<1\Omega$ $\pm(1.0\%+0.001\Omega)$  No evidence of mechanical damage. No G2 overcoating and Sn layer by leaching.
Solderability	Preconditioning: Put the tested resistor in the apparatus of PCT, at a temperature of 105°C, humidity of 100% RH, and pressure of $1.22 \times 10^5$ Pa for a duration of 4 hours. Then after left the tested resistor in room temperature for 2 hours or more. Test method: The resistor be immersed into solder pot in temperature $235 \pm 5^\circ\text{C}$ for 2 sec, then the resistor is left as placed under microscope to observed its solder area. Refer to JIS-C5201-1 4.17	Solder coverage over 95%

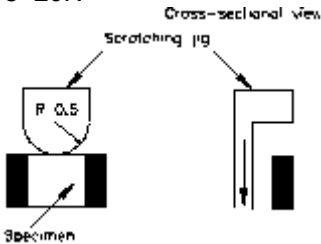
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Item	Conditions	Specifications
		Resistors
Resistance to Soldering Heat	<p>◎Test method 1 (solder pot test): The tested resistor be immersed into molten solder of 260+5/-0°C for 10 seconds. Then the resistor is left in the room for 1 hour.</p> <p>◎Test method 2 (solder pot test): The tested resistor be immersed into molten solder of 260+5/-0°C for 10 seconds. Then the resistor is left as placed under microscope to observe its solder area.</p> <p>◎Test method 3 (Electric iron test): Preheating temperature : 350±10°C Electric iron preheating time : 3+1/-0 sec Preheating the electric iron on electrode termination, as after that step placed the iron over 60 min. and measured its resistance variance rate.</p> <p>Refer to JIS-C5201-1 4.18</p>	<p>Test item 1:</p> <p>(1).Variance rate on resistance 1.Resistance Range: ≥ 1Ω ΔR%=±(1.0%+0.05Ω) 2.Resistance Range:&lt;1Ω ΔR%=±(1.0%+0.001Ω)</p> <p>(2)No evidence of electrode damage. No side conductive peeling off.</p> <p>Test item 2:</p> <p>(1)Solder coverage over 95%. (2)The underlying material (such as ceramic) shall not be visible at the crest corner area of the electrode.</p> <p>Test item 3:</p> <p>(1).Variance rate on resistance 1.Resistance Range: ≥ 1Ω ΔR%=±(1.0%+0.05Ω) 2.Resistance Range:&lt;1Ω ΔR%=±(1.0%+0.001Ω)</p> <p>(2)No evidence of electrode damage. No side conductive peeling off.</p>
Joint Strength of Solder	<p>Preconditioning: Put tested resistor in the apparatus of PCT, at a temperature of 105°C, humidity of 100% RH, and pressure of 1.22×10<sup>5</sup> Pa for a duration of 4 hours. Then after left the specimen in a temperature for 2 hours or more.</p> <p>Test method: ◎Test item 1(Adhesion): A static load using a R0.5 (RTH01:R0.1) scratch tool shall be applied on the core of the component and in the direction of the arrow and held for 10 seconds and under load measured its resistance variance rate.</p> <p>Load: 1.RTH01=5N 2.RTH02=10N 3.Other type=20N</p> <div style="text-align: center;">  </div> <p>Refer to JIS-C5201-1 4.32</p>	<p>Test item 1:</p> <p>(1).Variance rate on resistance 1.Resistance Range: ≥ 1Ω ΔR%=±(1.0%+0.05Ω) 2.Resistance Range:&lt;1Ω ΔR%=±(1.0%+0.001Ω)</p> <p>(2).No evidence of mechanical damage. No terminal peeling off.</p> <p>Test item 2:</p> <p>(1).Variance rate on resistance 1.Resistance Range: ≥ 1Ω ΔR%=±(1.0%+0.05Ω) 2.Resistance Range:&lt;1Ω ΔR%=±(1.0%+0.001Ω)</p> <p>(2).No evidence of mechanical damage. No terminal peeling off and core body cracked.</p>

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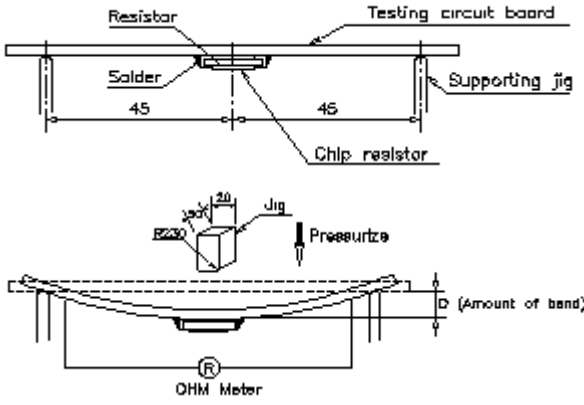
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Item	Conditions	Specifications
	<p>◎Test item 2 (Bending Strength): Solder tested resistor on to PC board. Add force in the middle down, and under load measured its resistance variance rate. D:RTH02、03、05=5mm RTH01、06、12=3mm RTH20、25=2mm</p>  <p>Refer to JIS-C5201-1 4.33</p>	<p>Resistors</p>
Vibration	<p>The resistor shall be mounted by its terminal leads to the supporting terminals on the solid table. The entire frequency range: from 10Hz to 55Hz and return to 10Hz, shall be transferred in 1 min. Amplitude :1.5mm This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (a total of 6 hrs)</p> <p>Refer to JIS-C5201-1 4.22</p>	<p>1. Resistance Range : <math>\geq 1 \Omega</math> 1% : <math>\pm(0.5\% + 0.05\Omega)</math> 2%、5% : <math>\pm(1.0\% + 0.05\Omega)</math> 2. Resistance Range : <math>&lt; 1 \Omega</math> 1%、2%、5% : <math>\pm(1.0\% + 0.001\Omega)</math> No evidence of mechanical damage.</p>

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**6.3 Environmental Test**

Item	Conditions	Specifications								
		Resistors								
Resistance to Dry Heat	Put tested resistor in chamber under temperature $155\pm 5^{\circ}\text{C}$ for 1000 +48/-0 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate. Refer to JIS-C5201-1 4.25	1. Resistance Range: $\geq 1\Omega$ 1%: $\pm(1.0\%+0.05\Omega)$ 2%、5%: $\pm(2.0\%+0.10\Omega)$ 2. Resistance Range: $<1\Omega$ 1%、2%、5%: $\pm(1.0\%+0.001\Omega)$ No evidence of mechanical damage. No short or burned on the appearance.								
Thermal Shock	Put the tested resistor in the chamber under the Thermal Shock which shown in the following table shall be repeated 300 times consecutively. Then leaving the tested resistor in the room temperature for 1 hours, and measure its resistance variance rate. <table border="1" style="margin-left: 40px;"> <tr> <th colspan="2">Testing Condition</th> </tr> <tr> <td>Lowest Temperature</td> <td><math>-55\pm 5^{\circ}\text{C}</math></td> </tr> <tr> <td>Highest Temperature</td> <td><math>125\pm 5^{\circ}\text{C}</math></td> </tr> <tr> <td>Temperature-retaining time</td> <td>15 minutes each</td> </tr> </table> Refer to MIL-STD 202 Method 107	Testing Condition		Lowest Temperature	$-55\pm 5^{\circ}\text{C}$	Highest Temperature	$125\pm 5^{\circ}\text{C}$	Temperature-retaining time	15 minutes each	1. Resistance Range: $\geq 1\Omega$ 1%: $\pm(0.5\%+0.05\Omega)$ 2%、5%: $\pm(1.0\%+0.05\Omega)$ 2. Resistance Range: $<1\Omega$ 1%、2%、5%: $\pm(1.0\%+0.001\Omega)$ No evidence of mechanical damage. No short or burned on the appearance.
Testing Condition										
Lowest Temperature	$-55\pm 5^{\circ}\text{C}$									
Highest Temperature	$125\pm 5^{\circ}\text{C}$									
Temperature-retaining time	15 minutes each									
Loading Life in Moisture	Put the tested resistor in the chamber under temperature $40\pm 2^{\circ}\text{C}$ , relative humidity 90~95% and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.  Refer to JIS-C5201-1 4.24	1. Resistance Range: $\geq 1\Omega$ 1%: $\pm(0.5\%+0.05\Omega)$ 2%、5%: $\pm(2.0\%+0.10\Omega)$ 2. Resistance Range: $<1\Omega$ 1%、2%、5%: $\pm(2.0\%+0.001\Omega)$ s No evidence of mechanical damage. No short or burned on the appearance.								
Load Life	Put the tested resistor in chamber under temperature $70\pm 2^{\circ}\text{C}$ and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.  Refer to JIS-C5201-1 4.25	1. Resistance Range: $\geq 1\Omega$ 1%: $\pm(0.5\%+0.05\Omega)$ 2%、5%: $\pm(2.0\%+0.10\Omega)$ 2. Resistance Range: $<1\Omega$ 1%、2%、5%: $\pm(2.0\%+0.001\Omega)$ No evidence of mechanical damage. No short or burned on the appearance.								
Low Temperature Operation	Put the tested resistor in the chamber at room temperature $25^{\circ}\text{C}$ . Decreasing the temperature to $-55^{\circ}\text{C}$ and keep the temperature at $-55^{\circ}\text{C}$ for 1 hour. Then load the rated voltage for 45 minutes on, and 15 minutes off. Then leaving the tested resistor in room temperature for $8\pm 1$ hours, and measure its resistance variance rate.  Refer to MIL-R-55342D 4.7.4	1. Resistance Range: $\geq 1\Omega$ 1%: $\pm(0.5\%+0.05\Omega)$ 2%、5%: $\pm(1.0\%+0.05\Omega)$ 2. Resistance Range: $<1\Omega$ 1%、2%、5%: $\pm(1.0\%+0.001\Omega)$ No evidence of mechanical damage. No short or burned on the appearance.								

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Item	Conditions	Specifications	
		Resistors	
Whisker Test	◎Test item 1 (Thermal Shock test):	Max. 50µm	
	Testing Condition		
	Minimum storage temperature		-55+0/-10°C
	Maximum storage temperature		85+10/-0°C
	Temperature-retaining time		10 min.
	Number of temperature cycles	1,500	
	◎Inspection: Inspect for whisker formation on specimens that underwent the acceleration test specified in subclause 4.2, with a magnifier (stereo microscope) of about 40 or higher magnification. If judgment is hard in this method, use a scanning electron microscope (SEM) of about 1,000 or higher magnification. By JESD Standard NO.22A121 class 2.		

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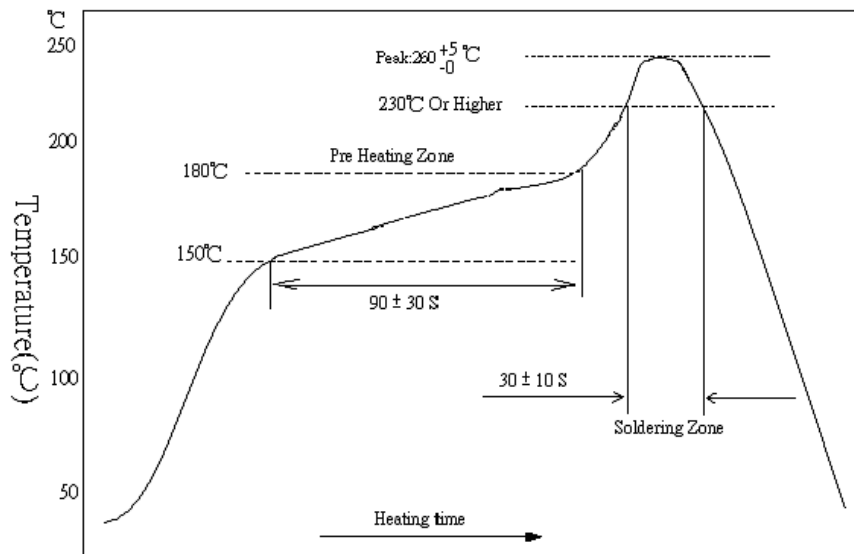
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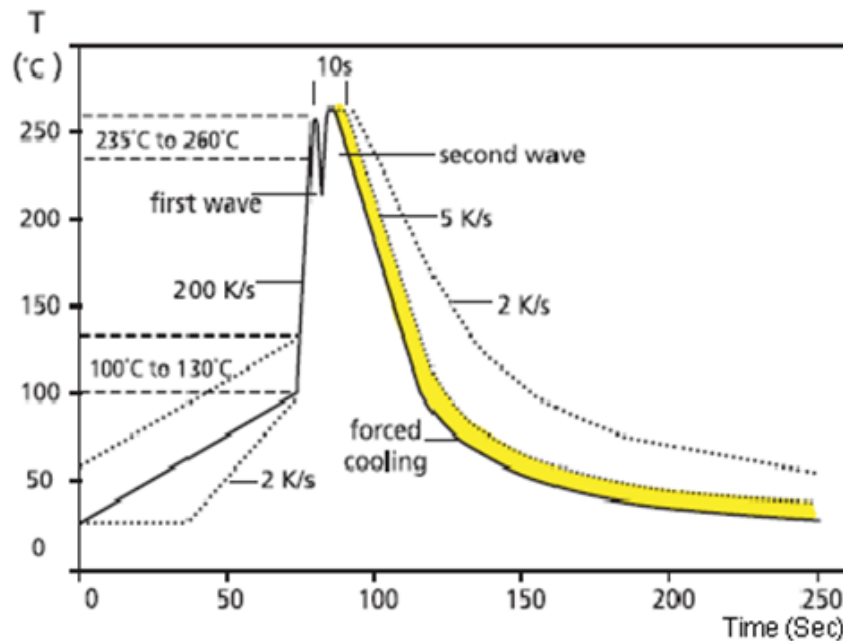
**7 Recommend Soldering Method:**

**7.1 Lead Free IR Reflow Soldering Profile**



Remark: The peak temperature of soldering heat is 260 +5/-0 °C for 10 seconds

**7.2 Lead Free Double-Wave Soldering Profile. (This applies to 0603 size inclusive above products)**



**7.3 Soldering Iron: temperature 350°C±10°C , dwell time shall be less than 3 sec.**

Remark

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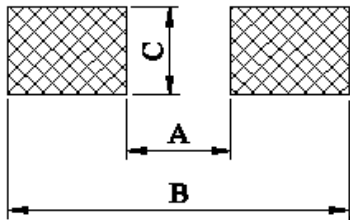
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**8 Recommend Land Pattern Design (For Reflow Soldering):**

Unit:mm



TYPE	DIM		
	A	B	C
RTH01	0.3	1.0	0.4
RTH02	0.5	1.5	0.6
RTH03	0.8	2.1	0.9
RTH05	1.2	3.0	1.3
RTH06	2.2	4.2	1.6
RTH12	2.2	4.2	2.8
RTH20	3.5	6.1	2.8
RTH25	3.8	8.0	3.5

**9 Plating Thickness:**

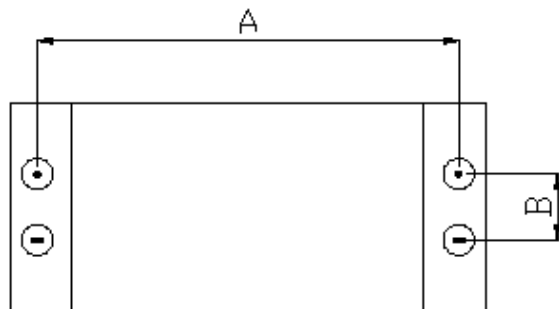
9.1 Ni:  $\geq 2 \mu m$

9.2 Sn(Tin):  $\geq 3 \mu m$

9.3 Sn(Tin): Matte Sn

**10 Measurement Point:**

Bottom electrode		Unit : mm	
TYPE	DIM	A	B
		RTH01	0.44±0.05
RTH02	0.80±0.05	0.24±0.05	
RTH03	1.35±0.05	0.35±0.05	
RTH05	1.80±0.05	0.35±0.05	
RTH06	2.90±0.05	0.35±0.05	
RTH12	2.90±0.05	0.35±0.05	
RTH20	4.50±0.05	1.15±0.05	
RTH25	5.90±0.05	1.60±0.05	



⊕ **Current Terminal**

⊖ **Voltage Terminal**

**11 Stock period:**

11.1 The temperature condition must be controlled at  $25 \pm 5^\circ C$ , the R.H. must be controlled at  $60 \pm 15\%$ . The stock can maintain quality level in two years.

Remark



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**12 The carton packaged for electronic-information products is made by the symbol as follows: (For china)**

	
<p>Marking for control of pollution cause by electronic-information products</p>	<p>Marking for package recovery</p>

**13 Attachments:**

13.1 Document Revise Record Paper (QA-QR-027)

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