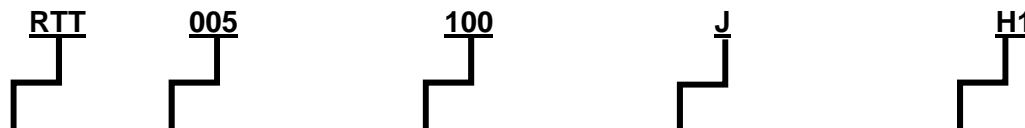


**1 Scope:**

- 1.1 This specification is applicable t to lead free and halogen free of RoHS directive for 01005 thick film chip resistors.
- 1.2 The product is for general electronic purpose.

**2 Explanation Of Part Numbers:**

(EX)



Type	Size	Nominal Resistance		Resistance Tolerance	Packaging (Refer to IE-SP-055)
Lead-Free Thick Film Chip Resistors	005(01005)	5% (3-Digit)	EX. 10Ω=100 4.7Ω=4R7 JUMPER=000	D=± 0.5% F=± 1% J=± 5%	H1 : 2 mm Pitch Carrier Tape 20000 pcs H8 : 2 mm Pitch Carrier Tape 80000 pcs
		0.5% 1% (4-Digit)	EX. 10.2Ω=10R2 10KΩ=1002 JUMPER=0000		

**3 General Specifications:**

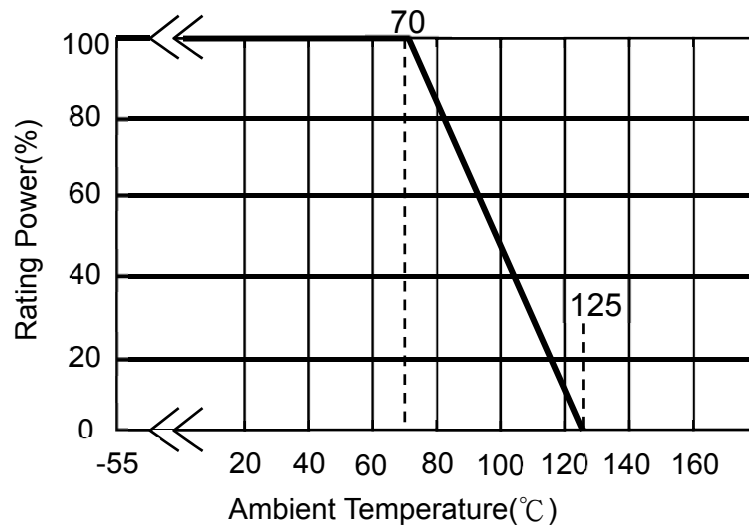
Type	Rated Power at 70°C	Max. Working Voltage	Max. Overload Voltage	TCR (ppm/°C)	Resistance Range			Jumper Rated Current	Jumper Resistance Value
					D(±0.5%) E-24、E-96	F(±1%) E-24、E-96	J(±5%) E-24		
RTT005 (01005)	1/32 W	15V	30V	-200 +600	1Ω ≤ R < 10Ω			0.5A	50mΩ MAX
				±250	10Ω ≤ R ≤ 10MΩ				
<b>Operating Temperature Range</b>					-55°C ~ +125°C				

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Written 王荷花	Checked 	Approved 	Signing 			
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**3.1 Power Derating Curve:**

Operating Temperature Range : -55°C ~ +125°C

For resistors operated in ambient temperatures above 70°C, power rating shall be derated in accordance with figure below.



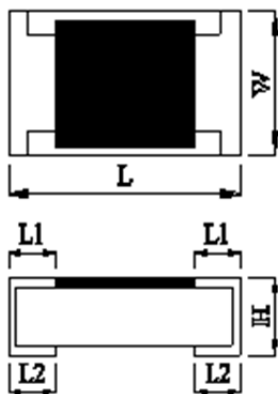
**3.2 Voltage Rating:**

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)

**4 Dimensions:**



Dimension		Unit:mm				
Type	Size Code	L	W	H	L1	L2
RTT005	01005	0.40±0.02	0.20±0.02	0.13±0.02	0.10±0.03	0.10±0.03

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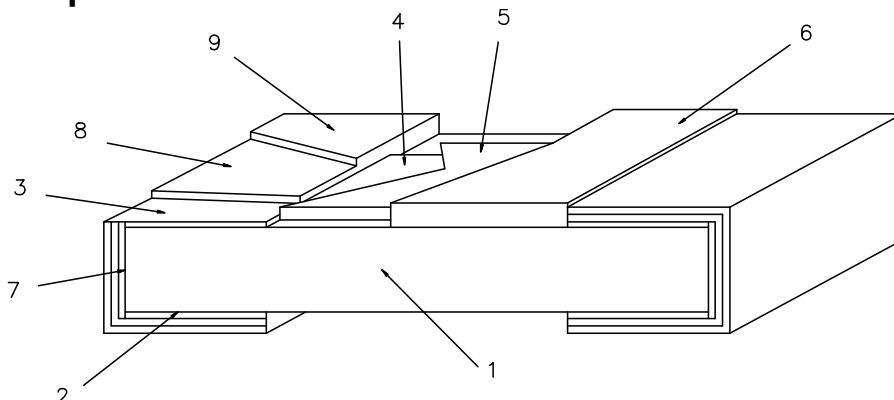
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**5 Structure Graph:**



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

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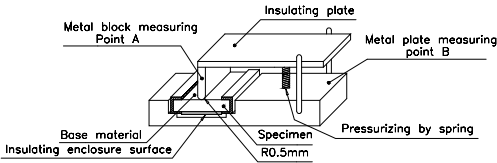
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**6 Reliability Test**

**6.1 Electrical Performance Test**

Item	Conditions	Specifications	
		Resistors	Jumper
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	NA
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	ΔR=±2.0%	Refer to item 3. general specifications
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  	≥ 10 <sup>9</sup> Ω	

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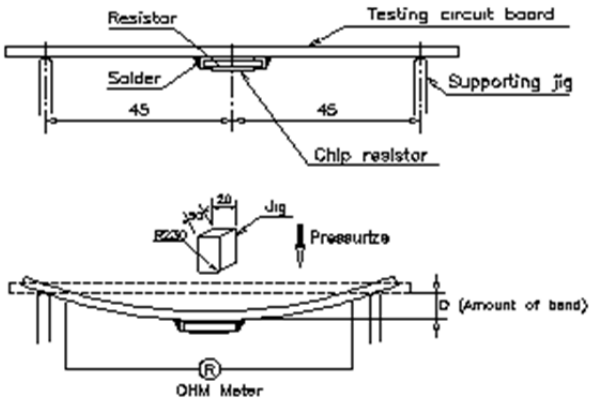
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6.2 Mechanical Performance Test

Item	Conditions	Specifications	
		Resistors	Jumper
Resistance to Solvent	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 5minutes, then the resistor is left in the room for 48 hrs, and measure its resistance variance rate. Refer to JIS-C5201-1 4.29	$\Delta R = \pm 1.0\%$	
Solderability	Add flux into tested resistors, immersion into solder bath in temperature $235 \pm 3^\circ\text{C}$ for $2 \pm 0.5$ seconds. Refer to JIS-C5201-1 4.17	1. Test item 1: Solder coverage over 95% 2. Test item 2: Zero cross time within 3 seconds.	
Resistance to Soldering Heat	The tested resistor be immersed into molten solder of $260 \pm 5^\circ\text{C}$ for 10 seconds, then the tested resistor is left in the room for 1 hour, and measure its resistance variance rate. Refer to JIS-C5201-1 4.18	$\Delta R = \pm 2.0\%$	Refer to item 3. general specifications
Bending Strength	Solder tested resistor on to PC board. add force in the middle down, and under load measured its resistance variance rate. D:3mm   Refer to JIS-C5201-1 4.33	$\Delta R = \pm 1.0\%$	Refer to item 3. general specifications

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**6.3 Environmental Test**

Item	Conditions	Specifications									
		Resistors	Jumper								
Resistance to Dry Heat	Put tested resistor in chamber under temperature $125\pm 5^{\circ}\text{C}$ 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	$\Delta R = \pm 2.0\%$	Refer to item 3. general specifications								
Thermal Shock	Put the tested resistor in the chamber under the temperature cycle 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: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">Test Condition</th> </tr> </thead> <tbody> <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> </tbody> </table> Refer to MIL-STD 202 Method 107	Test Condition		Lowest Temperature	$-55\pm 5^{\circ}\text{C}$	Highest Temperature	$125\pm 5^{\circ}\text{C}$	Temperature-retaining time	15 minutes each	$\Delta R = \pm 2.0\%$	Refer to item 3. general specifications
Test 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	$\Delta R = \pm 5.0\%$	Refer to item 3. general specifications								
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	$\Delta R = \pm 5.0\%$	Refer to item 3. general specifications								

**7 Plating Thickness :**

7.1 Ni:  $\geq 1\mu\text{m}$

7.2 Sn(Tin):  $\geq 3\mu\text{m}$

7.3 Sn(Tin): Matte Sn

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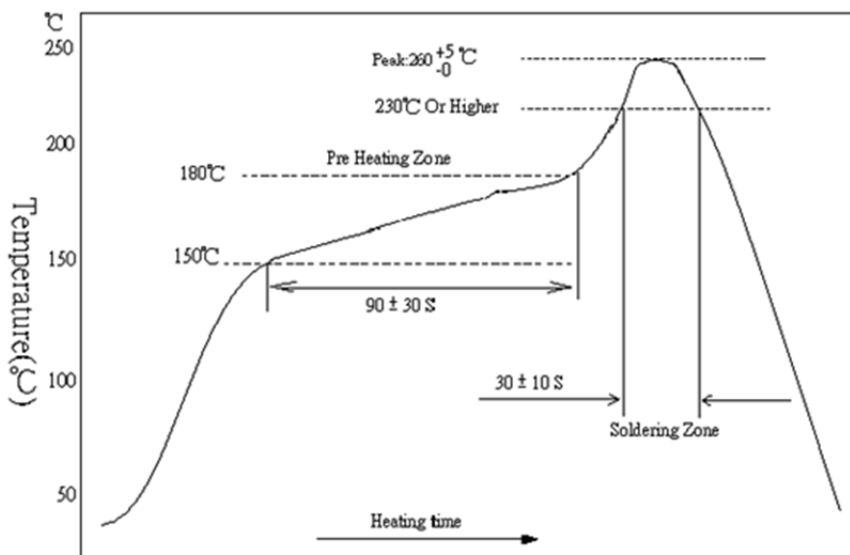
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**8 Technical application notes:(This is for recommendation, please customer perform adjustment according to actual application)**

**8.1 Recommend Soldering Method:**

**8.1.1 Lead Free Reflow Soldering Profile:Sn-3.0Ag-0.5Cu**



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

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

When a component is soldered, the resistance after soldering changes slightly depending on the size of the soldering area and the amount of soldering. When designing a circuit, it is necessary to consider the effect of a decrease or increase in its resistance.

Unit:mm

TYPE	DIM		
	A	B	C
RTT005	0.20	0.50	0.20

The diagram shows a cross-section of a chip resistor with dimensions A (width), B (total length), and C (height). The land pattern is shown as a hatched area on a substrate.

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### 8.3 Environment Precautions:

This specification product is for general electronic use, RALEC will not be responsible for any damage, cost or loss caused by using this specification product in any special environment. If other applications need to confirm with RALEC.

If consumer intends to use our Company product in special environment or condition (including but not limited to those mentioned below), then will need to make individual recognition of product features and reliability accordingly.

- (a) Used in high temperature and humidity environment
- (b) Exposed to sea breeze or other corrosive gas, such as Cl<sub>2</sub>、H<sub>2</sub>S、NH<sub>3</sub>、SO<sub>2</sub> and NO<sub>2</sub>.
- (c) Used in non-verified liquids including water, oil, chemical and organic solvents.
- (d) Using non-verified resin or other coating material to seal or coat our Company product.
- (e) After soldering, it is necessary to use water-soluble detergents to clean residual solder fluxes, even though no-clean fluxes are recommended.

### 8.4 Momentary Overload Precautions:

The product might be out of function when momentary overloaded. Please make sure to avoid momentary overloading while using and preserving。

### 8.5 Operation and Processing Precautions:

- (a) Avoid damage to the edge of resistor and protective layer caused by mechanical stress.
- (b) Handle with care when printing circuit board (PCB) is divided or fixed on support body, because bending of printing circuit board (PCB) mounting will make mechanical stress for resistors.
- (c) Make sure the power rating is under the limit when using the resistor. When power rating is over the limit, the resistor will be overloaded. There might be machinery damage due to the climbing temperature.
- (d) If the resistor will be exposed under massive impact load (shock wave) in a short period of time, the working environment must be set up well before use.
- (e) Please make evaluation and confirmation when the product is well used in your company and have a through consideration of it's fail-safe design to ensure the system safety.

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**9 Storage and transportation requirement:**

- 9.1 The temperature condition must be controlled at 25±5°C, the R.H. must be controlled at 60±15%. The stock can maintain quality level in one years。
- 9.2 Please avoid the mentioned harsh environment below when storing to ensure product performance and its' weldability. Places exposed to sea breeze or other corrosive gas, such as Cl2、 H2S、 NH3、 SO2 and NO2.
- 9.3 When the product is moved and stored, please ensure the correct orientation of the box. Do not drop or squeeze the box. Otherwise, the electrode or the body of the product may be damaged.

**10 Attachments:**

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

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