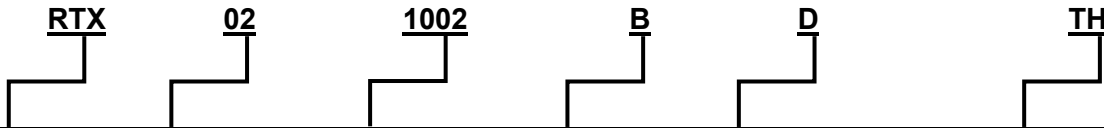


1 Scope:

- 1.1 This specification is applicable to lead and halogen free RTX series thin film chip resistors.
- 1.2 Lead free products mean lead free termination meets RoHS requirement.

2 Explanation Of Part Numbers:

(EX)



Type	Size (Refer to 3.General Specifications)	Nominal Resistance		Resistance Tolerance	TCR	Packaging (Refer to IE-SP-055)
Thin Film Chip Resistors	02(0402)	4- Digit	EX. 10.2Ω=10R2 10KΩ=1002	B =± 0.1% C=± 0.25% D=± 0.5% F=± 1.0%	B =±10ppm/°C C=± 15ppm/°C D=± 25ppm/°C E=± 50ppm/°C	TH : 2 mm Pitch Carrier Tape 10000 pcs

3 General Specifications:

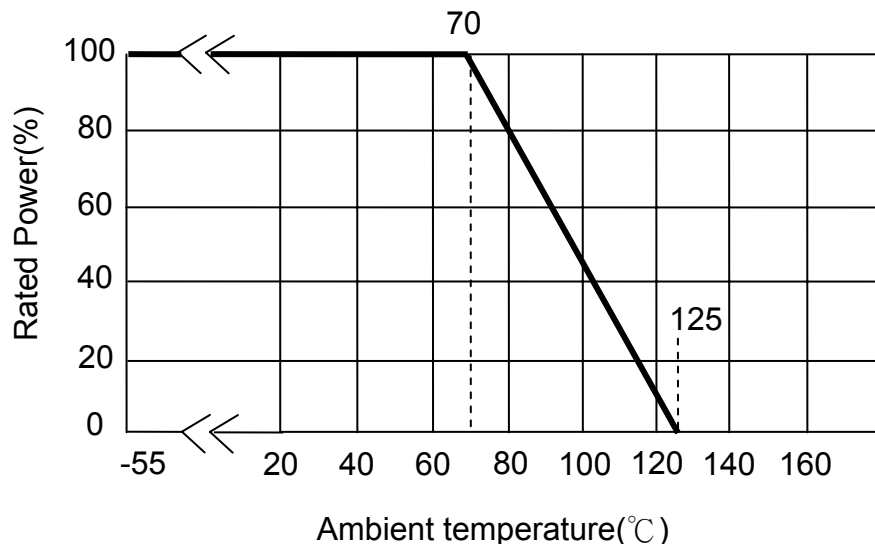
TYPE	Rated Power	Max. Working Voltage	Max. Overload Voltage	T.C.R (ppm/°C)	Resistance Range			
					B(±0.1%) E-96、E-24	C(±0.25%) E-96、E-24	D(±0.5%) E-96、E-24	F(±1%) E-96、E-24
RTX02	1/16 W	50V	100V	±10、±15	20Ω ~ 70KΩ		--	--
				±25	4.7Ω ~ 240KΩ			
				±50	4.7Ω ~ 240KΩ			
RTX03	1/10 W	75V	150V	±10、±15	4.7Ω ~ 332KΩ		--	--
				±25	1Ω ~ 1MΩ			
				±50	1Ω ~ 1MΩ			
RTX05	1/8 W	150V	300V	±10、±15	4.7Ω ~ 800KΩ		--	--
				±25	1Ω ~ 1.5MΩ			
				±50	1Ω ~ 1.5MΩ			
RTX06	1/4 W	200V	400V	±10、±15	5.6Ω ~ 1MΩ		--	--
				±25	1Ω ~ 1.5MΩ			
				±50	1Ω ~ 1.5MΩ			
RTX12	1/4 W	200V	400V	±10、±15	4.7Ω ~ 100KΩ		--	--
				±25	4.7Ω ~ 1MΩ			
				±50	4.7Ω ~ 1MΩ			
RTX20	1/2 W	200V	400V	±10、±15	4.7Ω ~ 100KΩ		--	--
				±25	4.7Ω ~ 1MΩ			
				±50	4.7Ω ~ 1MΩ			
RTX25	3/4 W	200V	400V	±10、±15	4.7Ω ~ 100KΩ		--	--
				±25	4.7Ω ~ 1MΩ			
				±50	4.7Ω ~ 1MΩ			
Operating Temperature Range				-55°C ~ +125°C				

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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)

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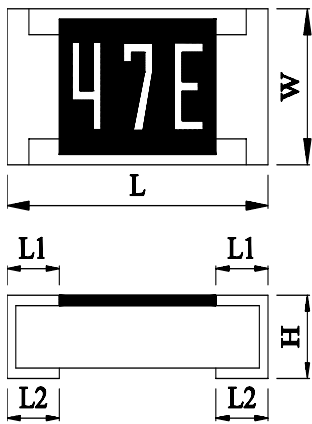
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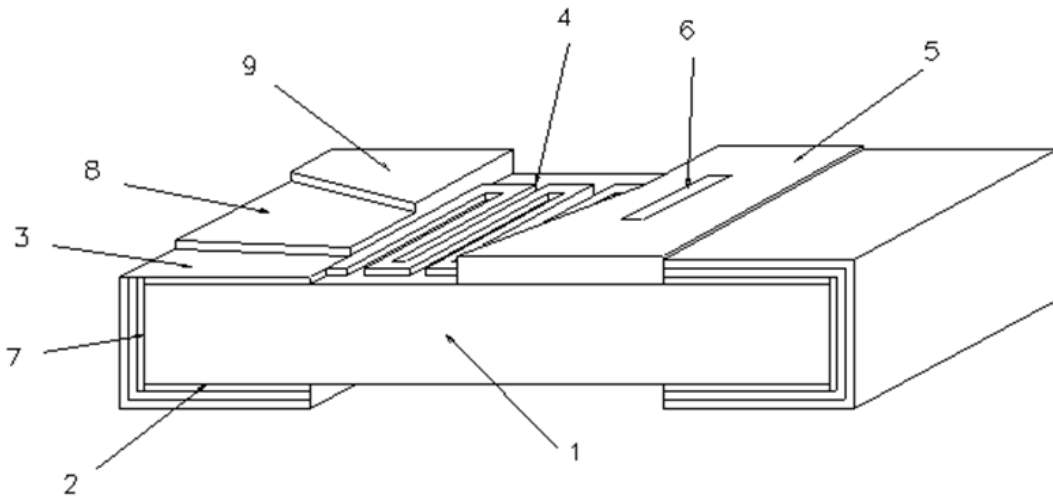
4 Dimensions:



Unit:mm

Dimension		L	W	H	L1	L2
Type	Size Code					
RTX02	0402	1.00±0.10	0.50±0.05	0.30±0.05	0.20±0.10	0.25±0.10
RTX03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.15	0.30±0.15
RTX05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.15
RTX06	1206	3.05±0.10	1.55±0.10	0.50±0.10	0.45±0.20	0.35±0.15
RTX12	1210	3.05±0.10	2.55±0.10	0.55±0.10	0.50±0.20	0.50±0.20
RTX20	2010	5.00±0.20	2.50±0.20	0.55±0.10	0.60±0.20	0.60±0.20
RTX25	2512	6.30±0.20	3.20±0.20	0.55±0.10	0.60±0.20	0.60±0.20

5 Structure Graph:



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

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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	±(0.5%+0.05Ω) 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	≥ 10 ⁹ Ω
Dielectric Withstand Voltage	Put the resistor in the fixture, add VAC (see spec. below) in +, - terminal for. RTX02、03 apply 300 VAC 1 minute. RTX05、06、12、20、25 apply 500 VAC 1 minute. Refer to JIS-C5201-1 4.7	No short or burned on the appearance.

6.2 Mechanical Performance Test

Item	Conditions	Specifications
		Resistors
Terminal Strength	Test1: The resistor mounted on the board applied 5N pushing force on the sample rear for 10 sec. 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: ≥ 5N
Resistance to Solvent	The tested resistor be immersed into isopropyl alcohol of 20~25 °C for 5±0.5 min, then the resistor is left in the room for 48 hrs, and measured its resistance variance rate. Refer to JIS-C5201-1 4.29	±(0.5%+0.05Ω) No evidence of mechanical damage, no G2 overcoating and Sn layer by leaching.

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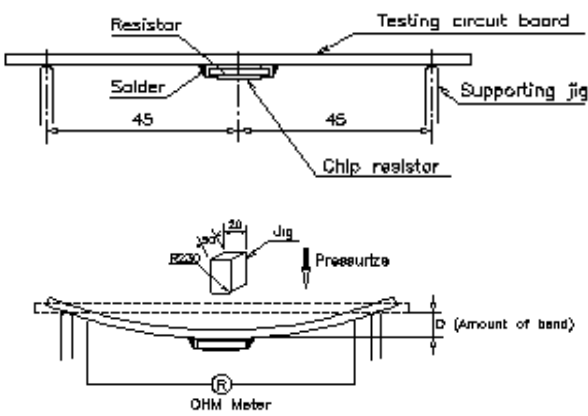
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RALEC 旺詮	RTX Thin Film Chip Resistors Product Specification	Document No.	IE-SP-018
		Released Date	2015/06/18
		Page No.	5/9

Item	Conditions	Specifications
		Resistors
Solderability	Preconditioning: Put the tested resistor in the apparatus of PCT, at a temperature of 105°C, humidity of 100% RH, and pressure of 1.22×10 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±5°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%
Resistance to Soldering Heat	◎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. ◎Test method 2 (Solder pot test): The tested resistor be immersed into molten solder of 260+5/-0°C for 30 seconds. Then the resistor is left as placed under microscope to observe its solder area. ◎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. Refer to JIS-C5201-1 4.18	Test item 1: (1).Variance rate on resistance $\Delta R\% = \pm(1.0\% + 0.05\Omega)$ (2).No evidence of electrode damage. No side conductive peeling off. Test item 2: (1).Solder coverage over 95%. (2).The underlying material (such as ceramic) shall not be visible at the crest corner area of the electrode. Test item 3: (1).Variance rate on resistance $\Delta R\% = \pm(1.0\% + 0.05\Omega)$ (2).No evidence of electrode damage. No side conductive peeling off.
Bending Test	Solder tested resistor on to PC board. Add force in the middle down, and under load measured its resistance variance rate. D: RTX02、03、05=5mm RTX06、12=3mm RTX20、25=2mm  Refer to JIS-C5201-1 4.33	$\pm(0.5\% + 0.05\Omega)$ No evidence of mechanical damage. No terminal peeling off and core body cracked.

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RALEC 旺詮	RTX Thin Film Chip Resistors Product Specification	Document No.	IE-SP-018
		Released Date	2015/06/18
		Page No.	6/9

Item	Conditions	Specifications
		Resistors
Vibration	The resistor shall be mounted by its terminal leads to the supporting terminals on the solid table. The entire frequency range: from 10 Hz to 55 Hz and return to 10 Hz, shall be transferred in 1 min. Amplitude :1.5 mm This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (a total of 6 hrs) Refer to JIS-C5201-1 4.22	±(0.5%+0.05Ω) No evidence of mechanical damage.

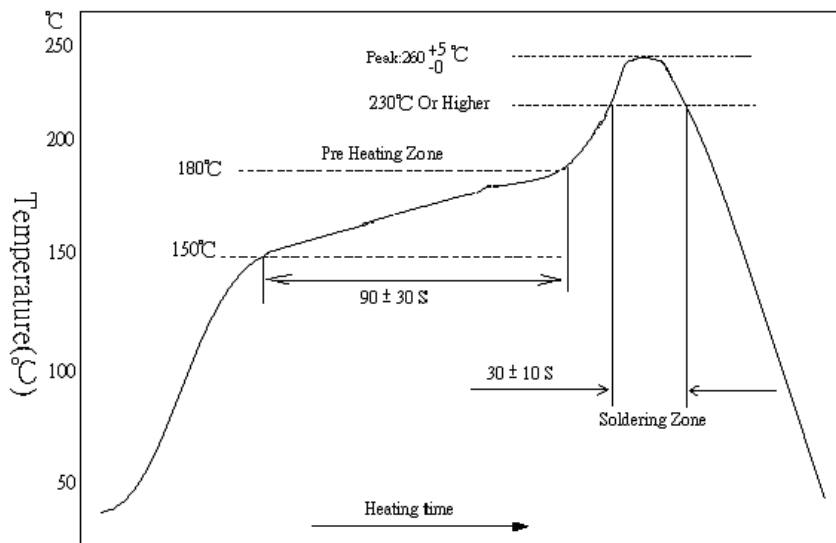
6.3 Environmental Test

Item	Conditions	Specifications								
		Resistors								
Resistance to Dry Heat	Put tested resistor in chamber under temperature 155±5°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	±(0.5%+0.05Ω) No evidence of mechanical damage. No short or burned on the appearance.								
Thermal Shock	Put the tested resistor in the thermal shock 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: 20px;"> <thead> <tr> <th colspan="2">Testing Condition</th> </tr> </thead> <tbody> <tr> <td>Lowest Temperature</td> <td>-55±5°C</td> </tr> <tr> <td>Highest Temperature</td> <td>125±5°C</td> </tr> <tr> <td>Temperature-retaining time</td> <td>15 minutes each</td> </tr> </tbody> </table> Refer to MIL-STD 202 Method 107	Testing Condition		Lowest Temperature	-55±5°C	Highest Temperature	125±5°C	Temperature-retaining time	15 minutes each	±(0.5%+0.05Ω) No evidence of mechanical damage. No short or burned on the appearance.
Testing Condition										
Lowest Temperature	-55±5°C									
Highest Temperature	125±5°C									
Temperature-retaining time	15 minutes each									
Loading Life in Moisture	Put the tested resistor in the chamber under temperature 40±2°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	±(0.5%+0.05Ω) No evidence of mechanical damage. No short or burned on the appearance.								
Load Life	Put the tested resistor in chamber under temperature 70±2°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	±(0.5%+0.05Ω) No evidence of mechanical damage. No short or burned on the appearance. No evidence of mechanical damage. No short or burned on the appearance.								

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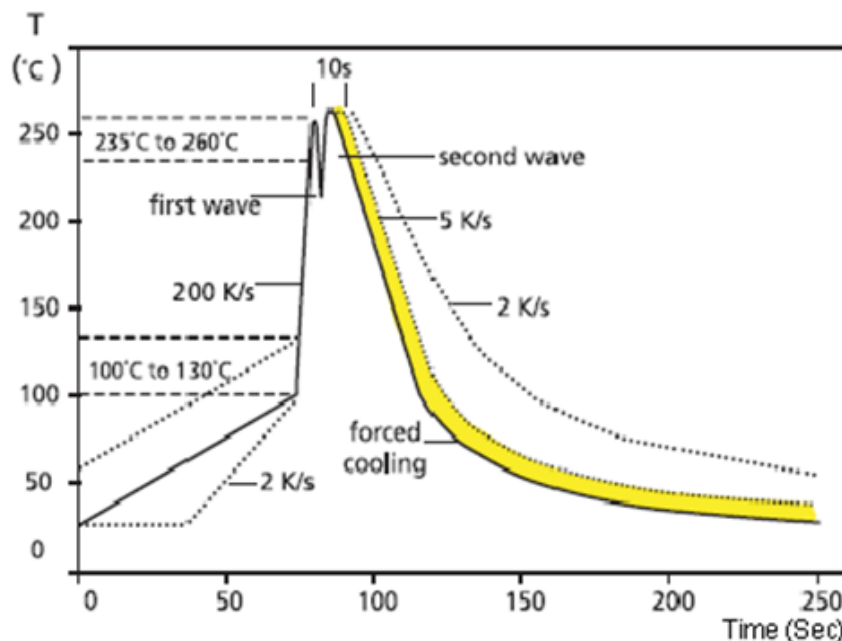
7 Recommend Soldering Method:

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 $350^{\circ}\text{C} \pm 10^{\circ}\text{C}$, dwell time shall be less than 3 sec.

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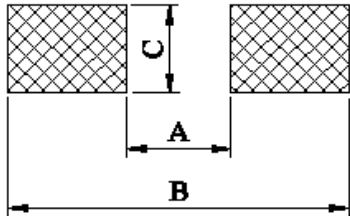
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8 Recommend Land Pattern Design (For Reflow Soldering) :

Unit:mm



DIM TYPE	A	B	C
RTX02	0.5	1.5	0.6
RTX03	0.8	2.1	0.9
RTX05	1.2	3.0	1.3
RTX06	2.2	4.2	1.6
RTX12	2.2	4.2	2.8
RTX20	3.5	6.1	2.8
RTX25	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		
		DIM TYPE	A	B
		RTX02	0.80±0.05	0.24±0.05
RTX03	1.35±0.05	0.35±0.05		
RTX05	1.80 ±0.05	0.34±0.05		
RTX06	2.90 ±0.05	0.35±0.05		
RTX12	2.90 ±0.05	0.35±0.05		
RTX20	4.50 ±0.05	1.15±0.05		
RTX25	5.90 ±0.05	1.60±0.05		

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.

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13 Attachments:

13.1 Document Revise Record (QA-QR-027)

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