

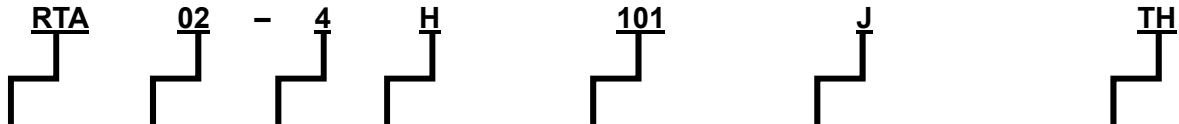
RALEC 旺詮	RTA Series Half Reverse Concave Type Thick Film Chip Resistors Array Product Specification	Document No.	IE-SP-036
		Released Date	2018/09/03
		Page No.	1

1 Scope:

- 1.1 This specification is applicable to lead free and halogen free of RoHS directive for RTA series half reverse concave type thick film chip resistors array .
- 1.2 The product is for general electronic purpose.

2 Explanation Of Part Number:

(EX)



Type	Size	Number of Circuits	Terminal Type	Nominal Resistance		Resistance Tolerance	Packaging(Refer to IE-SP-055)
Thick Film Chip Resistors Array	02(0402)	2:2circuits 4:4circuits	R:Reverse Convex Type	5% (3-Digit)	EX. 10Ω=100 4.7Ω=4R7 Jumper=000	F=± 1% J=± 5%	TH : 2 mm Pitch Carrier Tape 10000 pcs H2 : 2 mm Pitch Carrier Tape 20000 pcs H3 : 2 mm Pitch Carrier Tape 30000 pcs H4 : 2 mm Pitch Carrier Tape 40000 pcs
				1% (3-Digit)	EX. 10.2Ω=10R2 10KΩ=1002 Jumper=0000		

3 General Specifications:

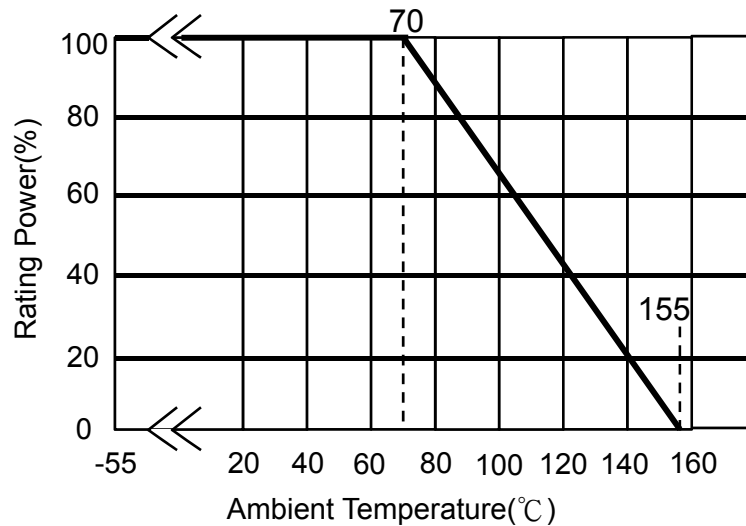
Type	Rated Power at 70°C	Max. Working Voltage	Max. Overload Voltage	T.C.R. (ppm/°C)	Resistance Range		Number of Terminals	Number of Resistors	JUMPER (0Ω) Rated Current	JUMPER (0Ω) Resistance Value
					F(±1%) E-24 · E-96	J(±5%) E-24				
RTA02-2H (0402)	1/16 W	25V	50V	±650	3Ω ≤ R < 10Ω	3Ω ≤ R < 10Ω	4	2	1A	50mΩ MAX.
				±250	10Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 1MΩ				
RTA02-4H (0402)	1/16 W	25V	50V	±400	1Ω ≤ R < 10Ω	1Ω ≤ R < 10Ω	8	4	1A	50mΩ MAX.
				±200	10Ω ≤ R ≤ 1MΩ	10Ω ≤ R ≤ 1MΩ				
Operating Temperature Range				-55°C ~ +155°C						

IE			QA		Remark IT'S NOT UNDER CONTROL FOR PDF FILE PLS NOTE THE VERSION STATED.. Do not copy without permission	Issue Dep.DATA Center. Series No. 60
Written	Checked	Approved	Signing			
张东东	赵斌	刘	许国敏			

3.1 Power Derating Curve:

Temperature Range: $-55^{\circ}\text{C} \sim +155^{\circ}\text{C}$

If the ambient temperature exceeds 70 degrees centigrade to 155 degrees centigrade, the power can be modified by the curve as 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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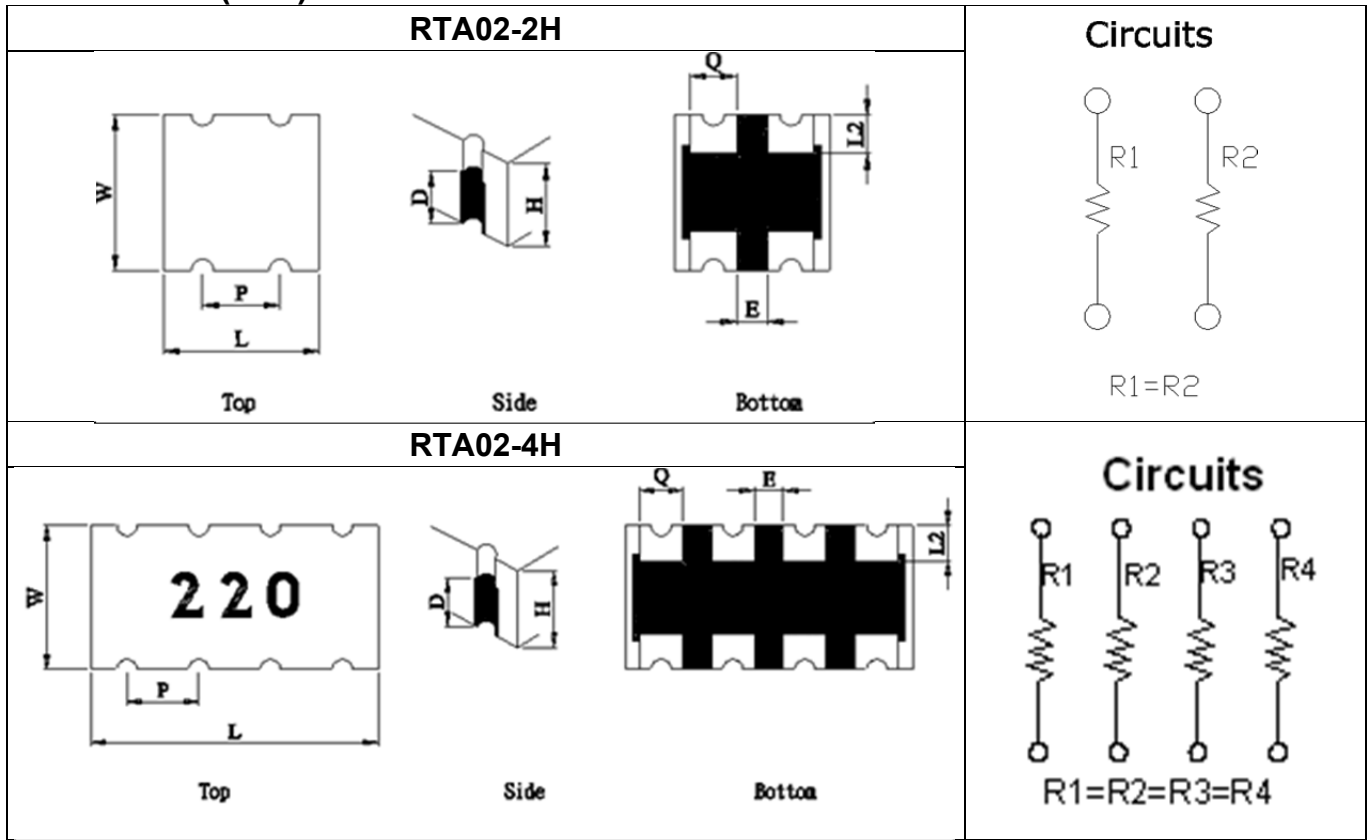
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4 Dimensions(mm):



TYPE / DIM	L	W	H	L2	D	P	Q	E
RTA02-2H (0402)	1.00±0.10	1.00±0.10	0.30±0.10	0.25±0.10	0.6 H (Min.)	(0.50)	0.30±0.10	0.15±0.10
RTA02-4H (0402)	2.00±0.10	1.00±0.10	0.45±0.10	0.25±0.10	0.6 H (Min.)	(0.50)	0.30±0.10	0.15±0.10

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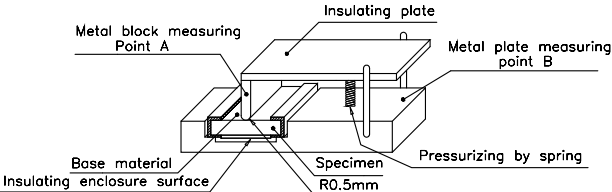
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5 Reliability Test:

5.1 Electrical Performance Test

Item	Conditions	Specifications	
		Resistors	Jump
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 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	1% : $\Delta R = \pm 1.0\%$ 5% : $\Delta R = \pm 2.0\%$	50mΩ Lower
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 300 VAC in + , - terminal for 60 sec. Refer to JIS-C5201-1 4.7	No short or burned on the appearance.	
Intermittent Overload	Put the tested resistor in chamber under temperature $25 \pm 2^\circ C$ and load 2.5 times rated DC voltage for 1 sec on , 25 sec off , 10000^{+400}_0 test cycles, then it be left at no-load for 1 hour , then measure its resistance variance rate. Refer to JIS-C5201-1 4.13	$\Delta R = \pm 5.0\%$	50mΩ Lower

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5.2 Mechanical Performance Test

Item	Conditions	Specifications																															
		Resistors	Jumper																														
Resistance to Solvent	The tested resistor be immersed into isopropyl alcohol of 20~25℃ for 5 minutes, then the resistor is left in the room for 48 hr , then measure its resistance variance rate. Refer to JIS-C5201-1 4.29	$\Delta R = \pm 0.5\%$	50mΩ Lower																														
Resistance to Soldering Heat	<p>◎Test method 1 (Reflow test): The tested resistor should be subject in the following procedure, and after finish each step, it should be left for a duration of 2 hours or longer at a temperature of 30℃ or lower and a humidity of 70% RH or lower.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Procedure</th> <th>Environmental test condition</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Resistance measuring</td> <td>Room temperature</td> </tr> <tr> <td>2</td> <td>Baking</td> <td>125℃ · 24 hours</td> </tr> <tr> <td>3</td> <td>Humidification</td> <td>85℃ · 85% · 168 hours</td> </tr> <tr> <td>4</td> <td>Reflow (1)</td> <td>Reflow temperature curve and component surface temperature Table 1</td> </tr> <tr> <td>5</td> <td>Humidification</td> <td>85℃ · 65% · 24 hours</td> </tr> <tr> <td>6</td> <td>Reflow (2)</td> <td>Reflow temperature curve and component surface temperature Table 2</td> </tr> <tr> <td>7</td> <td>Resistance measuring</td> <td>Room temperature</td> </tr> </tbody> </table> <p>◎Reflow temperature curve</p> <p>◎Component surface temperature</p> <table border="1"> <caption>Table 1 Description example in specification document(1)</caption> <thead> <tr> <th>Temperature-retaining time: 230℃ or higher</th> <th>Peak temperature</th> <th>Temperature measured at the component body surface during preheating</th> </tr> </thead> <tbody> <tr> <td>30 seconds</td> <td>240℃</td> <td>150 to 160 °C</td> </tr> </tbody> </table>	Step	Procedure	Environmental test condition	1	Resistance measuring	Room temperature	2	Baking	125℃ · 24 hours	3	Humidification	85℃ · 85% · 168 hours	4	Reflow (1)	Reflow temperature curve and component surface temperature Table 1	5	Humidification	85℃ · 65% · 24 hours	6	Reflow (2)	Reflow temperature curve and component surface temperature Table 2	7	Resistance measuring	Room temperature	Temperature-retaining time: 230℃ or higher	Peak temperature	Temperature measured at the component body surface during preheating	30 seconds	240℃	150 to 160 °C	$\Delta R = \pm 1.0\%$	50mΩ Lower
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Item	Conditions	Specifications																																								
		Resistors	Jumper																																							
	<p>Table 2 Description example in specification document(2)</p> <table border="1"> <thead> <tr> <th>Temperature</th> <th>Temperature-retaining time</th> <th>Temperature measured at the component body surface during preheating</th> </tr> </thead> <tbody> <tr> <td>220°C or higher</td> <td>90 seconds</td> <td>150 to 160°C</td> </tr> <tr> <td>230°C or higher</td> <td>60 seconds</td> <td></td> </tr> <tr> <td>240°C or higher</td> <td>5 seconds</td> <td></td> </tr> <tr> <td>Peak</td> <td>245°C</td> <td></td> </tr> </tbody> </table> <p>◎Test method 2 (solder pot test): The tested resistor should be subject in the following procedure, and after finish each step, it should be left for a duration of 2 hours or lower at a temperature of 30°C or lower and a humidity of 70% RH or lower.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Procedure</th> <th>Environmental test condition</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Resistance measuring</td> <td>Room temperature</td> </tr> <tr> <td>2</td> <td>Baking</td> <td>125°C , 24 hours</td> </tr> <tr> <td>3</td> <td>Humidification</td> <td>85°C , 85% , 168 hours</td> </tr> <tr> <td>4</td> <td>Solder pot test</td> <td>260±3°C , 10 sec</td> </tr> <tr> <td>5</td> <td>Placed</td> <td>85°C , 65% , 24 hours</td> </tr> <tr> <td>6</td> <td>Solder pot test</td> <td>260±3°C , 10 sec</td> </tr> <tr> <td>7</td> <td>Resistance measuring</td> <td>Room temperature</td> </tr> </tbody> </table> <p>By Sony (SS-00254-5) Refer to JIS-C5201-1 4.18</p>	Temperature	Temperature-retaining time	Temperature measured at the component body surface during preheating	220°C or higher	90 seconds	150 to 160°C	230°C or higher	60 seconds		240°C or higher	5 seconds		Peak	245°C		Step	Procedure	Environmental test condition	1	Resistance measuring	Room temperature	2	Baking	125°C , 24 hours	3	Humidification	85°C , 85% , 168 hours	4	Solder pot test	260±3°C , 10 sec	5	Placed	85°C , 65% , 24 hours	6	Solder pot test	260±3°C , 10 sec	7	Resistance measuring	Room temperature	<p>No evidence of electrode damage. No side conductive peel off.</p>	
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Solderability	<p>Preconditioning: Put the tested resistor in the apparatus of PCT, at a temperature of 105°C, humidity of 100% RH, and pressure of 1.22×10⁵ Pa for a duration of 4 hours. Then after left the tested resistor in room temperature for 2 hours or more. Test method: ◎ solder pot test: 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</p>	<p>Solder coverage over 95%</p>																																								

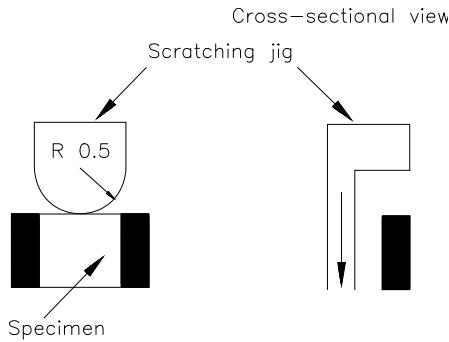
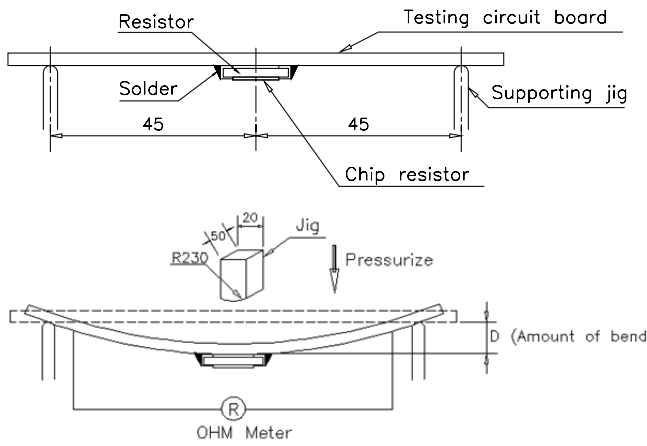
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Item	Conditions	Specifications	
		Resistors	Jumper
Joint Strength of Solder	<p>Preconditioning: Put the tested resistor in the apparatus of PCT, at a temperature of 105°C, humidity of 100% RH, and pressure of 1.22×10^5 Pa for a duration of 4 hours. Then after left the tested resistor in room temperature for 2 hours or more. Test method: ◎Test item 1 (Adhesion): A static load using a R0.5 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 measure its resistance variance rate. Load :RTA02-2H = 10N RTA02-4H = 20N</p>  <p>Refer to JIS-C5201-1 4.32 ◎Test item 2 (Bending Strength): Solder tested resistor on the PC board, add force in the middle down, and under load measure its resistance variance rate . D = 5 mm</p>  <p>Refer to JIS-C5201-1 4.33</p>	<p>Test item 1 : $\Delta R = \pm 1.0\%$</p> <p>Test item 2 : $\Delta R = \pm 1.0\%$</p> <p>Test item3: (1).Adhesion After application of temperature cycle, adhesion should be 50% or more of initial strength. (2).Bending Strength: After application of temperature cycle, bending load should be 50% or more of initial strength.</p>	<p>50mΩ Lower</p>

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Item	Conditions	Specifications											
		Resistors	Jumper										
	◎Test item 3 (Endurance measurement): Put the tested resistor in the chamber under the temperature cycle which shown in table 1 shall be repeated 1000±4 times consecutively. Then separate follow test item 1 and test item 2 50% condition to test, measured its resistance variance rate. <table border="1" style="margin-left: 20px;"> <tr> <th colspan="2">Table 1 Temperature cycle test condition</th> </tr> <tr> <td></td> <td>Testing condition</td> </tr> <tr> <td>Lowest temperature</td> <td>-35±5℃</td> </tr> <tr> <td>Highest temperature</td> <td>105±5℃</td> </tr> <tr> <td>Temperature-retaining time</td> <td>15 minutes each</td> </tr> </table> By SONY (SS-00254-9)	Table 1 Temperature cycle test condition			Testing condition	Lowest temperature	-35±5℃	Highest temperature	105±5℃	Temperature-retaining time	15 minutes each		
Table 1 Temperature cycle test condition													
	Testing condition												
Lowest temperature	-35±5℃												
Highest temperature	105±5℃												
Temperature-retaining time	15 minutes each												
Leaching Test	The tested resistor be immersed into molten solder of 260±5℃ for 30 seconds. Then the resistor is left as placed under microscope to observed its solder area. By SONY (SS-00254-9)	1.Solder coverage over 95%. 2.The underlying material (such as ceramic) shall not be visible at the crest corner area of the electrode.											

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5.3 Environmental Test

Item	Conditions	Specifications									
		Resistors	Jump								
Resistance to Dry Heat	Put tested resistors in chamber under temperature 155±5°C for 1000±4 hours. Then leaving in room temperature for 60 minutes, and measure its resistance variance rate. Refer to JIS-C5201-1 4.25	1% : ΔR=±1.0% 5% : ΔR=±2.0%	50mΩ Lower								
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></th> <th>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	ΔR=±1.0%	50mΩ Lower
	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	1% : ΔR=±2.0% 5% : ΔR=±3.0%	50mΩ Lower								
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	1% : ΔR=±2.0% 5% : ΔR=±3.0%	50mΩ Lower								

6 Plating Thickness:

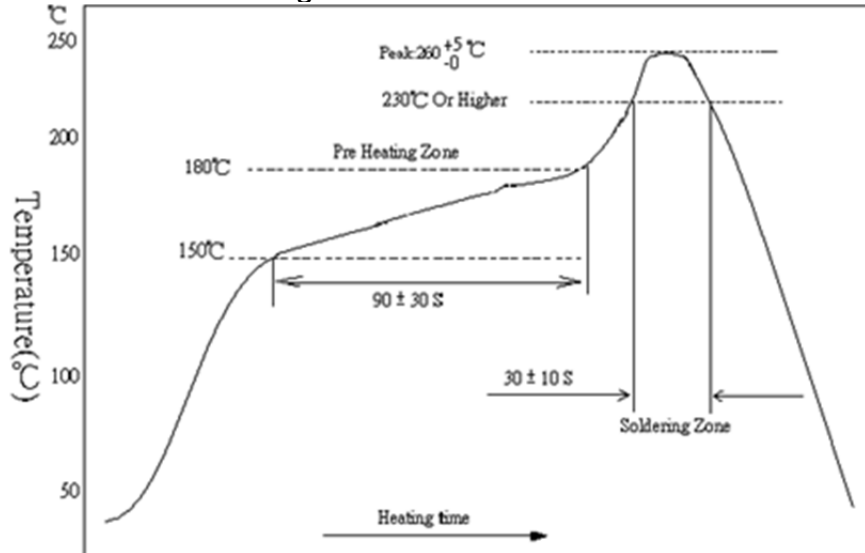
- 6.1 Ni: ≥ 2μm
- 6.2 Sn(Tin): ≥ 3μm
- 6.3 Sn(Tin): Matte Sn

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

7.1 Recommend Soldering Method:

7.1.1 Lead Free IR Reflow Soldering Profile



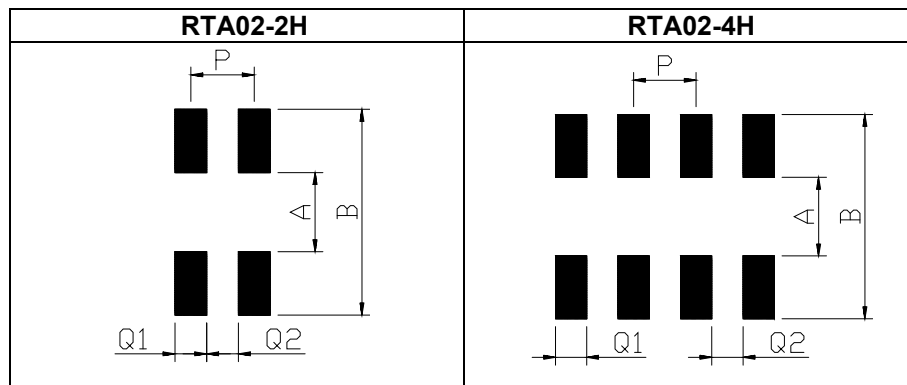
Remark: The peak temperature of soldering heat is 260 +5/-0 °C for 10 seconds

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

7.2 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	P	Q1	Q2
RTA02-2H	0.50	2.00	0.50	0.28	0.22
RTA02-4H	0.50	2.00	0.50	0.28	0.22

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7.3 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 Cl₂、H₂S、NH₃、SO₂ and NO₂.
- (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.

7.4 Momentary Overload Precautions:

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

7.5 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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8 Storage and transportation requirement:

- 8.1 The temperature condition must be controlled as $25\pm 5^{\circ}\text{C}$, and the R.H. must be controlled as $60\pm 15\%$. The stock can maintain quality level in two years.
- 8.2 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 Cl_2 、 H_2S 、 NH_3 、 SO_2 and NO_2 .
- 8.3 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.

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

	
Marking for control of pollution cause by electronic-information products	Marking for package recovery

10 Attachments:

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

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