



RTW Series Low-Resistance Thick Film Chip Resistors Product Specification

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1 Scope:

- 1.1 This specification is applicable to lead free and halogen free of RoHS directive for RTW series wide terminal Low-Resistance thick film chip resistors.
- 1.2 The product is for general electronic purpose.

2 Explanation Of Part Numbers:

(EX)

RTW	0612	T	R240	F	
Type	Size	Packaging	Nominal Resistance		Resistance Tolerance
Wide Electrode Low-Resistance Thick Film Chip Resistors	0508 0612 1218 1020 1225	T : Taping	4-碼	EX.: 0.24Ω=R240 0.05Ω=R050	F=± 1% J=± 5%

3 General Specifications:

Type	Rated Power at 70°C	Max. Rated Current	Max. Overload Current	T.C.R (ppm / °C)	Resistance Range
					F(±1%) · J(±5%) E-24 · E-96
RTW0508	1/3 W	5.77A	14.43A	±800	10mΩ ≤ R < 30mΩ
				±400	30mΩ ≤ R < 56mΩ
				±200	56mΩ ≤ R < 180mΩ
				±200	180mΩ ≤ R < 1Ω
RTW0612	1W	10A	25A	±2000	10mΩ ≤ R < 30mΩ
				±1000	30mΩ ≤ R < 56mΩ
				±700	56mΩ ≤ R < 180mΩ
				±250	180mΩ ≤ R < 1Ω
RTW1218	1W	10A	25A	±2000	10mΩ ≤ R < 30mΩ
				±1000	30mΩ ≤ R < 56mΩ
				±700	56mΩ ≤ R < 180mΩ
				±250	180mΩ ≤ R < 1Ω
RTW1020	1W	10A	25A	±800	10mΩ ≤ R < 30mΩ
				±400	30mΩ ≤ R < 56mΩ
				±200	56mΩ ≤ R < 180mΩ
				±200	180mΩ ≤ R < 1Ω
RTW1225	2W	14.14A	35.35A	±800	10mΩ ≤ R < 30mΩ
				±400	30mΩ ≤ R < 56mΩ
				±200	56mΩ ≤ R < 180mΩ
				±200	180mΩ ≤ R < 1Ω
Operating Temperature Range				-55°C ~ +155°C	

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Written 王荷花	Checked 	Approved 李昌旺	Signing 許國敏		



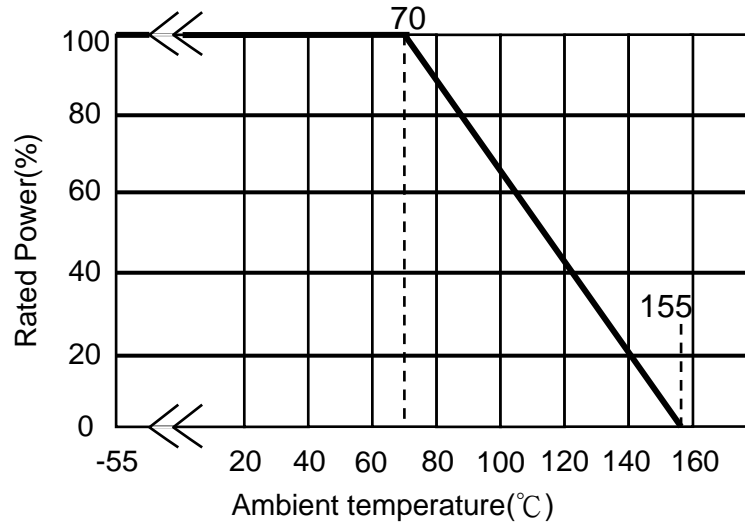
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3.1 Power Derating Curve:

Operating Temperature Range : - 55~155 °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 Current Rating

Rated Current: DC current or AC current (rms) based on the rated power.

The current can be calculated by the following formula. If the calculated value exceeds the Max. current specified in the Table 3.2, the Max. current rating is set as the current rating.

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

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

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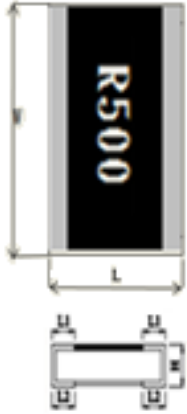


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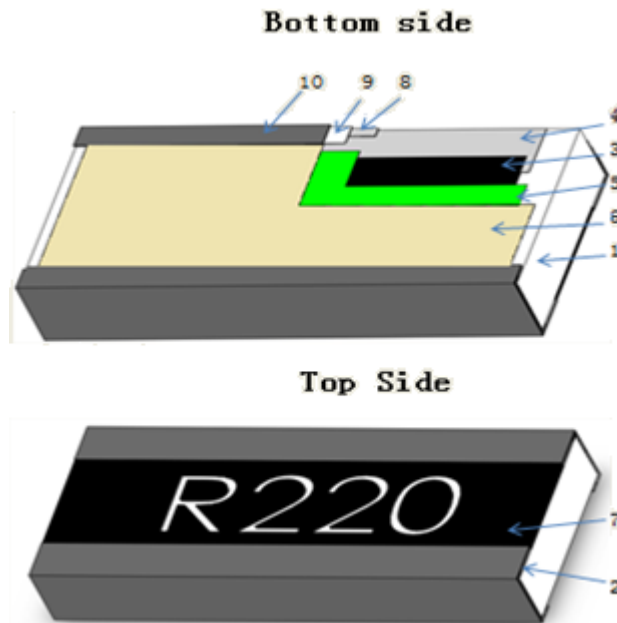
4 Dimensions:

Unit:mm



Type	Dimension Size Code	L	W	H	Dimension	
					L1	L2
RTW	0508	1.20±0.10	2.00±0.10	0.50±0.10	0.20±0.10	0.20±0.15
RTW	0612	1.60±0.20	3.20±0.20	0.55±0.10	0.35±0.15	0.25±0.15
RTW	1218	3.10±0.10	4.60±0.20	0.55±0.10	0.45±0.25	0.40±0.20
RTW	1020	2.50±0.20	5.00±0.20	0.55±0.10	0.25±0.20	0.90±0.20
RTW	1225	3.20±0.20	6.40±0.20	0.55±0.10	0.45±0.20	0.75±0.20

5 Structure Graph:



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

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6 Reliability Test:

6.1 Electrical Performance Test

Item	Conditions	Specifications
		Resistors
Temperature Coefficient of Resistance	$TCR \text{ (ppm / } ^\circ\text{C)} = \frac{(R2 - R1)}{R1 (T2 - T1)} \times 10^6$ 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	RTW05/18/20 applied 2.5 times rated current for 5 seconds, RTW06 applied 2.0 times rated current for 5 seconds, RTW25 applied 2.5 times rated current for 2 seconds, Release the load for about 30 minutes, then measure its resistance variance rate. (Rated current refer to item 3. general specifications) Refer to JIS-C5201-1 4.13	1%、5%:ΔR=±2.0%
Dielectric Withstand Voltage	Put the resistor in the fixture, add VAC (see SPEC below) in +,- terminal for. RTW0508 apply 300VAC 1 minute. RTW0612 apply 400 VAC 1 minute. RTW1218 apply 500 VAC 1 minute. RTW1020 apply 500 VAC 1 minute. RTW1225 apply 500 VAC 1 minute. 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±2°C and load 2.5 times rated DC current 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	ΔR=±5.0%

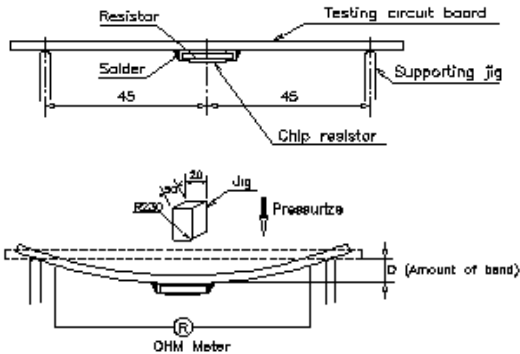
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6.2 Mechanical Performance Test

Item	Conditions	Specifications
		Resistors
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: 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.</p> <p>Refer to JIS-C5201-1 4.17</p>	Solder coverage over 95%
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 +1/-0 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 30 +1/-0 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. Refer to JIS-C5201-1 4.18</p>	<p>Test item 1: (1).Variance rate on resistance ΔR%=±2.0%</p> <p>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.</p> <p>Test item 3: (1).Variance rate on resistance ΔR%=±2.0%</p>
Joint Strength of Solder	<p>◎Bending Strength: Solder tested resistor on to PC board add force in the middle down, and under load measured its resistance variance rate. D:RTW0508、RTW0612=3mm RTW1218、RTW1020、RTW1225=2mm</p>  <p>Refer to JIS-C5201-1 4.33</p>	ΔR%=±2.0%

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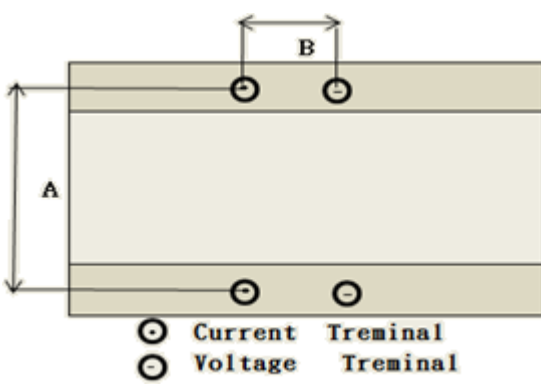
6.3 Environmental Test

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. (RTW0508, RTW0612 for $125\pm 3^{\circ}\text{C}$) Refer to JIS-C5201-1 4.25	1%、5% : $\Delta R = \pm 2.0\%$								
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: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">Testing Condition</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Lowest Temperature</td> <td style="text-align: center;">$-55\pm 5^{\circ}\text{C}$</td> </tr> <tr> <td style="text-align: center;">Highest Temperature</td> <td style="text-align: center;">$125\pm 5^{\circ}\text{C}$</td> </tr> <tr> <td style="text-align: center;">Temperature-retaining time</td> <td style="text-align: center;">15 minutes each</td> </tr> </tbody> </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%、5% : $\Delta R = \pm 2.0\%$
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 current 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%、5% : $\Delta R = \pm 3.0\%$								
Load Life	Put the tested resistor in chamber under temperature $70\pm 2^{\circ}\text{C}$ and load the rated current 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%、5% : $\Delta R = \pm 3.0\%$								

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7 Measurement Point:

Bottom electrode		Unit : mm	
TYPE	DIM	A	B
	RTW0508		1.05±0.05
RTW0612		1.35±0.05	1.30±0.05
RTW1218		2.80±0.05	2.00±0.05
RTW1020		2.10±0.05	2.40±0.05
RTW1225		2.90±0.05	3.00±0.05



⊙ Current Terminal
 ⊙ Voltage Terminal

8 Plating Thickness:

8.1 Ni: $\geq 2 \mu m$

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

8.3 Sn(Tin): Matte Sn

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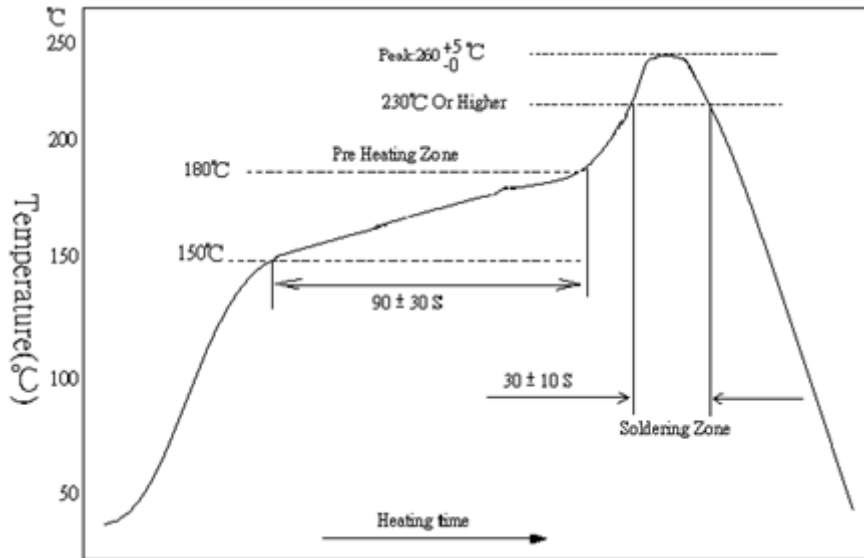
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9 Technical application notes: (This is for recommendation, please customer perform adjustment according to actual application)

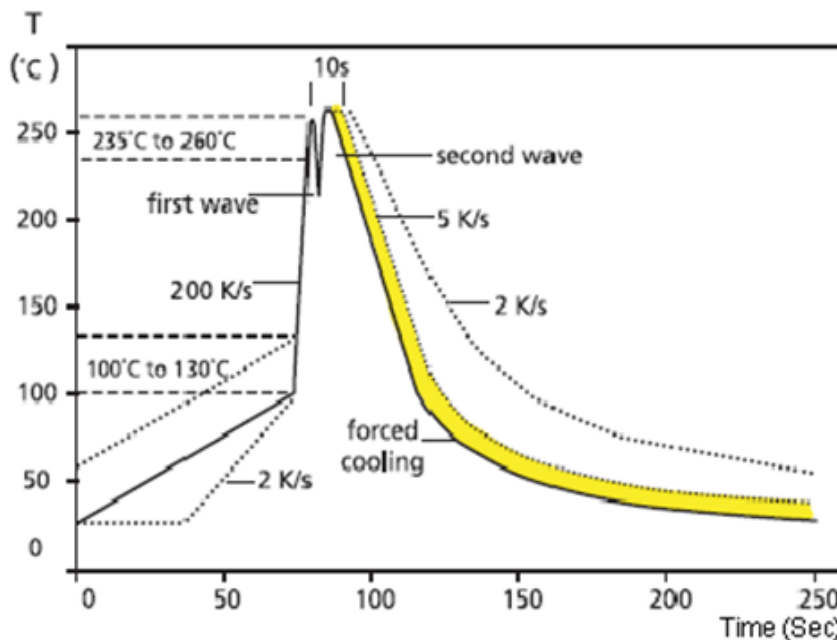
9.1 Recommend Soldering Method:

9.1.1 Lead Free IR Reflow Soldering Profile



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

9.1.2 Lead Free Double-Wave Soldering Profile



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

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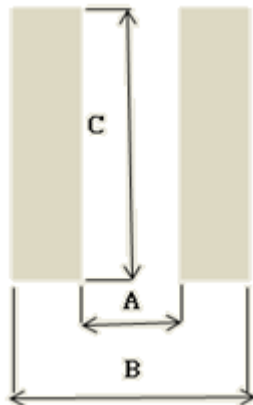
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9.2 Land Pattern Design (For Reflow Soldering):

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
RTW0508	0.6	2.2	2.3
RTW0612	0.7	2.6	3.5
RTW1218	1.9	4.1	4.9
RTW1020	0.5	3.5	5.3
RTW1225	1.3	4.2	6.4

9.3 Environment Precautions:

This specification product is for general electronic use, ABCO 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 ABCO.

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.

9.4 Momentary Overload Precautions:

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

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9.5 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.

10 Storage and transportation requirement:

- 10.1 The temperature condition must be controlled at $25\pm 5^{\circ}\text{C}$, the R.H. must be controlled at $60\pm 15\%$. The stock can maintain quality level in two years.
- 10.2 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 .
- 10.3 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.

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