1 Scope:

1.1 This specification is applicable to lead free and halogen free of RoHS directive for RHW series wide terminal thick film chip resistors.

1.2 The product is for general electronic purpose.

2 Explanation Of Part Numbers:

(EX)

RHW **06** **100** **J** **TP**

Type	Size	Nominal Resistance		Resistance Tolerance	Packaging(Refer to IE-SP-055)
Wide Terminal High Power Thick Film Chip Resistors	06(0612)	5% (3- Digit)	EX. 10Ω=100 4.7Ω=4R7	D=± 0.5% F=± 1% J=± 5%	TP：4 mm Pitch Carrier Tape 5000 pcs P2：4 mm Pitch Carrier Tape10000 pcs P3：4 mm Pitch Carrier Tape15000 pcs P4：4 mm Pitch Carrier Tape20000 pcs
		0.5% 1% (4-Digit)	EX. 10.2Ω=10R2 10KΩ=1002		

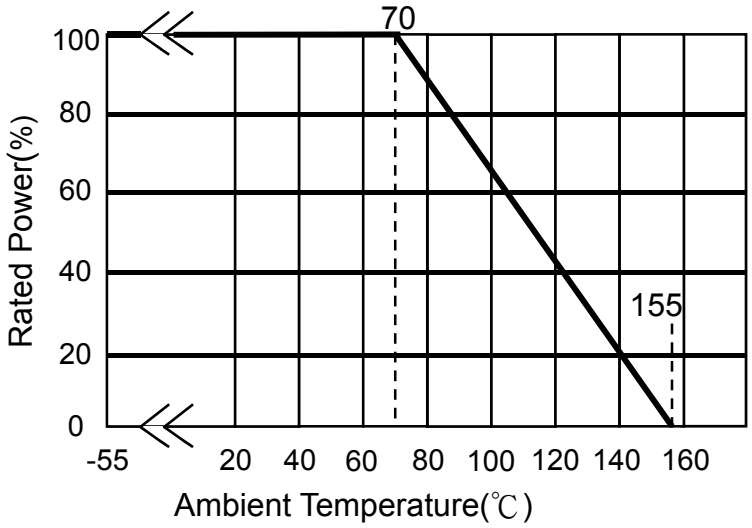
3 General Specifications:

Type	Rated Power At70℃	Max. Working Voltage	Max. Overload Voltage	T.C.R (ppm/℃)	Resistance Range	
					D(±0.5%)F(±1%) E-24、E-96	J(±5%) E-24
RHW06 (0612)	1W	200V	400V	±200	1Ω≦R＜10Ω	1Ω≦R＜10Ω
				±100	10Ω≦R≦10KΩ	10Ω≦R≦10KΩ
Operating Temperature Range				-55℃ ~ +155℃		

3.1 Power Derating Curve:

Operating Temperature Range:- 55 ~155 ℃

If the ambient temperature exceeds 70 degrees centigrade to 155 degrees, the power can be modified by the curve as blow.



3.2 Voltage Rating:

Rated Voltage: DC voltage or AC voltage (rms) based on the rated power.

The voltage can be calculated by the following formula. If the calculated value exceeds the Max voltage specified in the Table 3, the Max voltage rating is set as the voltage rating.

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

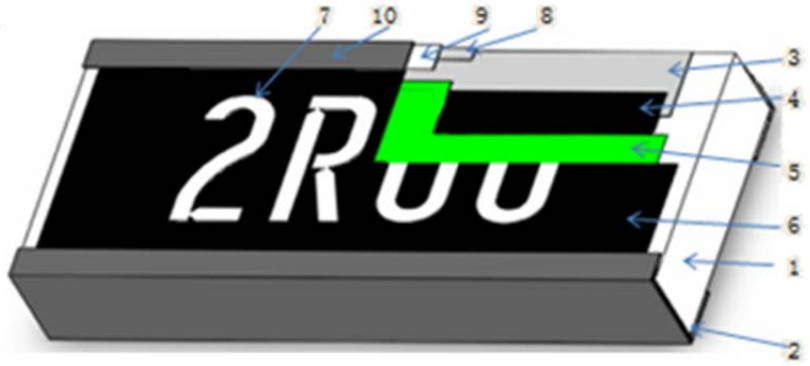
E= Rated voltage(V)
P= Power rating(W)
R= Nominal resistance(Ω)

4 Dimensions:

Unit:mm

Type / Dimension	Size Code	L	W	H	L1	L2
RHW06	**0612**	1.60±0.20	3.20±0.20	0.55±0.10	0.35±0.15	0.25±0.15

5 Structure Graph:



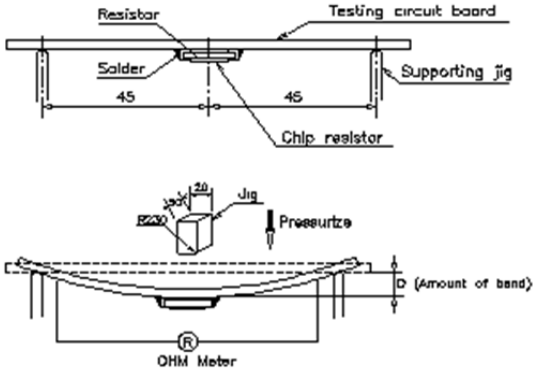
1	Ceramic substrate	6	2nd Protective coating
2	Bottom inner electrode	7	Marking
3	Top inner electrode	8	Terminal inner electrode
4	Resistive layer	9	Ni plating
5	1st Protective coating	10	Sn plating

6 Reliability Test:

6.1 Electrical Performance Test

Item	Conditions	Specifications	
		Resistors	Jumper
Temperature Coefficient of Resistance	TCR（ppm / ℃）$= \frac{(R2-R1)}{R1(T2-T1)} \times 10^6$ R1: Resistance at room temperature(Ω) R2: Resistance at -55℃or +125℃(Ω) T1: Room temperature(℃) T2:Temperature -55℃ or +125℃(℃). Refer to JIS-C5201-1 4.8	Refer to item 3. General specifications	NA
Short Time Overload	RHW06 apply 2.5 times the rated voltage for 2 seconds and let stand for more than 30 minutes before measuring the resistance change rate. (Rated voltage refer to item 3. general specifications) Refer to JIS-C5201-1 4.13	△R=±2.0%	Refer to item 3. general specifications
Dielectric Withstand Voltage	Put the resistor in the fixture, add VAC (see SPEC below) in +,- terminal for. RHW06(0612) apply 400VAC 1 minute. Refer to JIS-C5201-1 4.7	No short or burned on the appearance.	
Intermittent Overload	Put it in the thermostat, apply 2.0 times rated voltage, 1 second ON, 25 seconds OFF, count 10000+400/-0 times, take it out and stand for 60 minutes, then measure the change of resistance value. Refer to JIS-C5201-1 4.13	△R=±5.0%	Refer to item 3. general specifications

6.2 Mechanical Performance Test

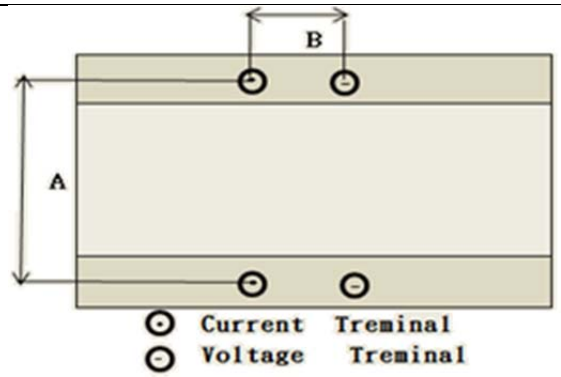
Item	Conditions	Specifications	
		Resistors	Jumper
Solderability	Pre-treatment: The chip resistor was placed in the PCT machine, and the aging test was conducted for 4 hours under the saturation condition of 105℃, 100% humidity and 1.22×10^5Pa air pressure. Then, the chip resistor was placed at room temperature for 2 hours Test method： The resistor be immersed into solder pot in temperature 235±5℃ for 2 sec. Then take out to observe its solder area under microscope. 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℃for10+1/-0seconds，let stand for more than 1 hour before measuring the resistance change rate ◎Test method 2 (Solder pot test): The tested resistor be immersed into molten solder of 260+5/-0℃ for 30+1/-0seconds.Then remove and wash it to observe the solder area under a microscope. ◎Test method 3 (Electric iron test): Preheating temperature : 350±10℃ Electric iron preheating time : 3+1/-0 sec Preheating the electric iron on electrode termination, as after that step placed the iron over 60mins, and measured its resistance variance rate. Refer to JIS-C5201-1 4.18	Test item 1: (1)Variance rate on resistance △R=±1.0% 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. △R=±1.0%	Refer to item 3. general specifications
Joint Strength of Solder	◎Bending Strength Test: Solder chip resistors on to bending test plate and placed on the bending test machine. Apply pressure in the center of the test plate and measure the rate of change of resistance under load D:RHW06=3mm  Refer toJIS-C5201-1 4.33	△R%=±1.0%	Refer to item 3. general specifications

6.3 Environmental Test

Item	Conditions	Specifications	
		Resistors	Jumper
Resistance to Dry Heat	Put tested resistor in the oven under temperature 155±5℃ for 1000 +48/-0 hours. Then take out and let stand for more than 1 hour before measuring the resistance change rate PS:RHW0612 for 125±3℃. Refer to JIS-C5201-1 4.25	△R=±2.0%	Refer to item 3. general specifications
Thermal Shock	Put chip resistors in the thermal shock machine ,and the temperature was -55℃ for 15 minutes and +125℃ for 15 minutes, the total of 300 times and then removed, let stand for more than 1 hour before measuring the resistance change rate. Testing Condition: Lowest Temperature -55±5℃; Highest Temperature 125±5℃; Temperature-retaining time 15 minutes each Refer to MIL-STD 202 Method 107	△R=±1.0%	Refer to item 3. general specifications
Loading Life in Moisture	Put the tested resistor in the constant temperature and humidity tank, under temperature 40±2℃, relative humidity 90~95% and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then take out and let stand for more than 1 hour before measuring the resistance change rate Refer to JIS-C5201-1 4.24	±5.0%	Refer to item 3. general specifications
Load Life	Put the tested resistor in the oven under temperature 70±2℃and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then take out and let stand for more than 1 hour before measuring the resistance change rate Refer toJIS-C5201-1 4.25	±5.0%	Refer to item 3. general specifications

7 Measurement Point：

Bottom electrode



Unit : mm

TYPE \ DIM	A	B
RHW06 (0612)	1.35±0.05	1.30±0.05

8 Plating Thickness：

8.1 Ni:≧2μm

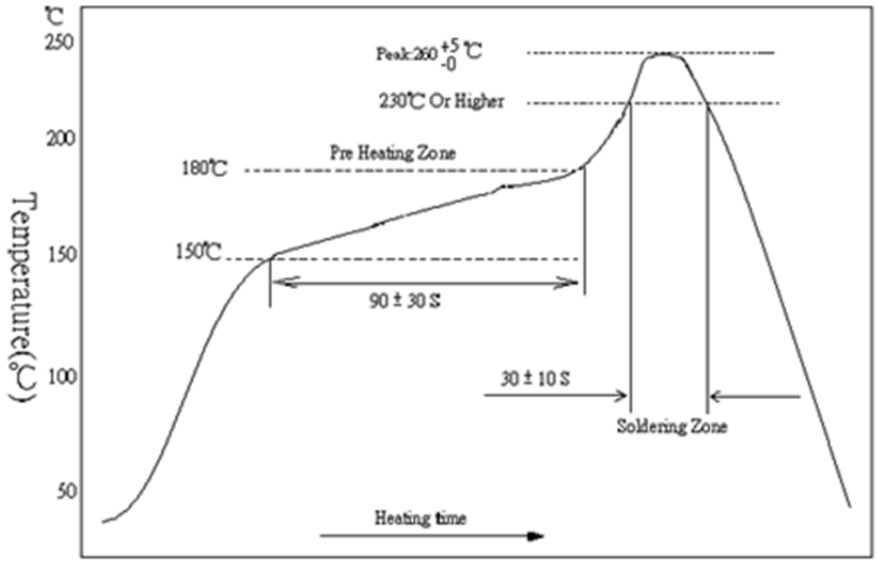
8.2 Sn(Tin):≧3μm

8.3 Sn(Tin):Matte Sn

9 Technical application notes:(This is a recommendation ,please adjust it according to actual application)

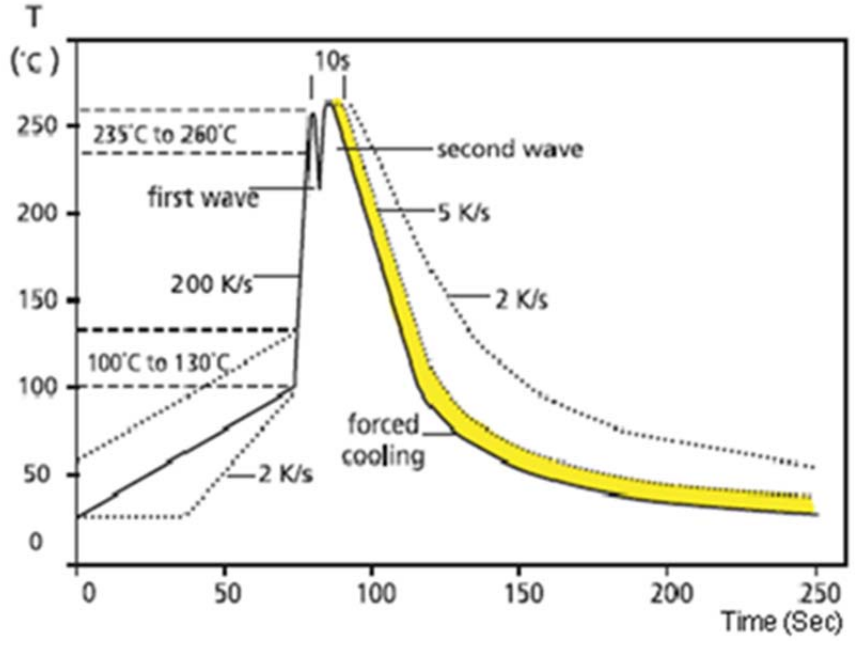
9.1 Recommend Soldering Method:

9.1.1 Lead Free IR Reflow Soldering Profile



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

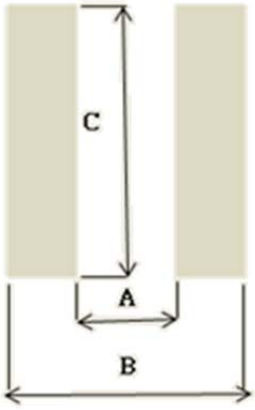
9.1.2 Lead Free Double-Wave Soldering Profile



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

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
RHW06 (0612)	0.7	2.6	3.5

9.3 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, you 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.

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

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 resister will be overloaded. There might be machinery damage due to the climbing temperature.

(d) If the resister 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 Stock period:

10.1 The temperature condition must be controlled at 25±5℃,the R.H. must be controlled at 60±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.

11 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

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