RHG Series Thick Film Chip Resistors
Product Specification

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Page No.	**1**

1 Scope:

1.1 This specification is applicable to lead free and halogen free of RoHS directive for RHG series high power pulse-proof thick film chip resistors.

1.2 The product is for general purpose.

2 Explanation Of Part Numbers:

(EX)

RHG **2512** **T** **100** **J**

Type	Size	Size	Nominal Resistance		Resistance Tolerance
High Power Pulse-Proof Thick Film Chip Resistors	0402 0603 0805 1206 2010 2512	T : Taping	5% 3-Digits	EX. 10Ω=100 4.7Ω=4R7	F=± 1% J=± 5%
			1% 4-Digits	EX. 10.2Ω=10R2 10KΩ=1002	

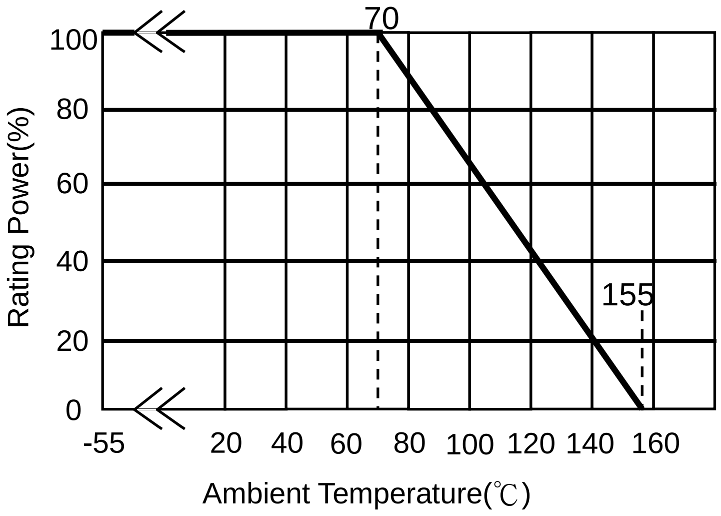
3 General Specifications:

Type	**Rate Power at 70℃**	**Max. Working Current**	**Max. Overload Current**	**T.C.R (ppm/℃)**	**Resistance Range** F(±1%)、J(±5%) E-24、E-96
RHG0402	$\frac{1}{5}$W	50V	100V	±200	1Ω≦R≦10M
RHG0603	$\frac{1}{3}$W	75V	150V	±200	1Ω≦R≦10M
RHG0805	$\frac{1}{2}$W	150V	300V	±200	1Ω≦R≦10M
RHG1206	$\frac{3}{4}$W	200V	400V	±200	1Ω≦R≦10M
RHG2010	1W	200V	400V	±200	1Ω≦R≦10M
RHG2512	2W	200V	400V	±200	1Ω≦R≦10M
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 centigrade, the power can be modified by the curve as below.



3.2 Current Rating:

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

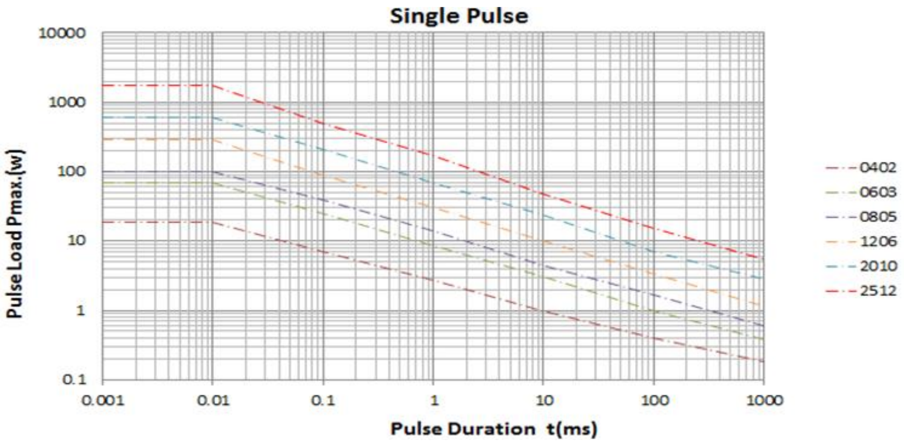
The voltage can be calculated by the following formula. If the calculated value exceeds the Max. voltage specified in the Table 3, the Max. voltage rating is set as the voltage rating.

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

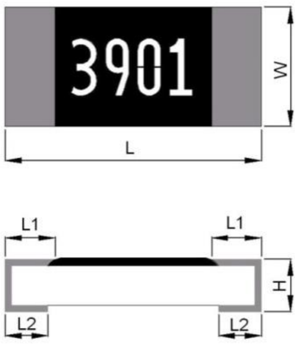
E= Voltage rating (V)
P= Power rating (W)
R= Nominal resistance(Ω)

3.3 Single Pulse Loading Capability

Pulse on a regular basis; maximum permissible peak pulse power (Pmax) as a function of a pulse duration. $V_{peak} \leqq$ 0402(100V)、0603(150V)、0805(300V)、1206(400V)、2010(400V)、2512(400V)



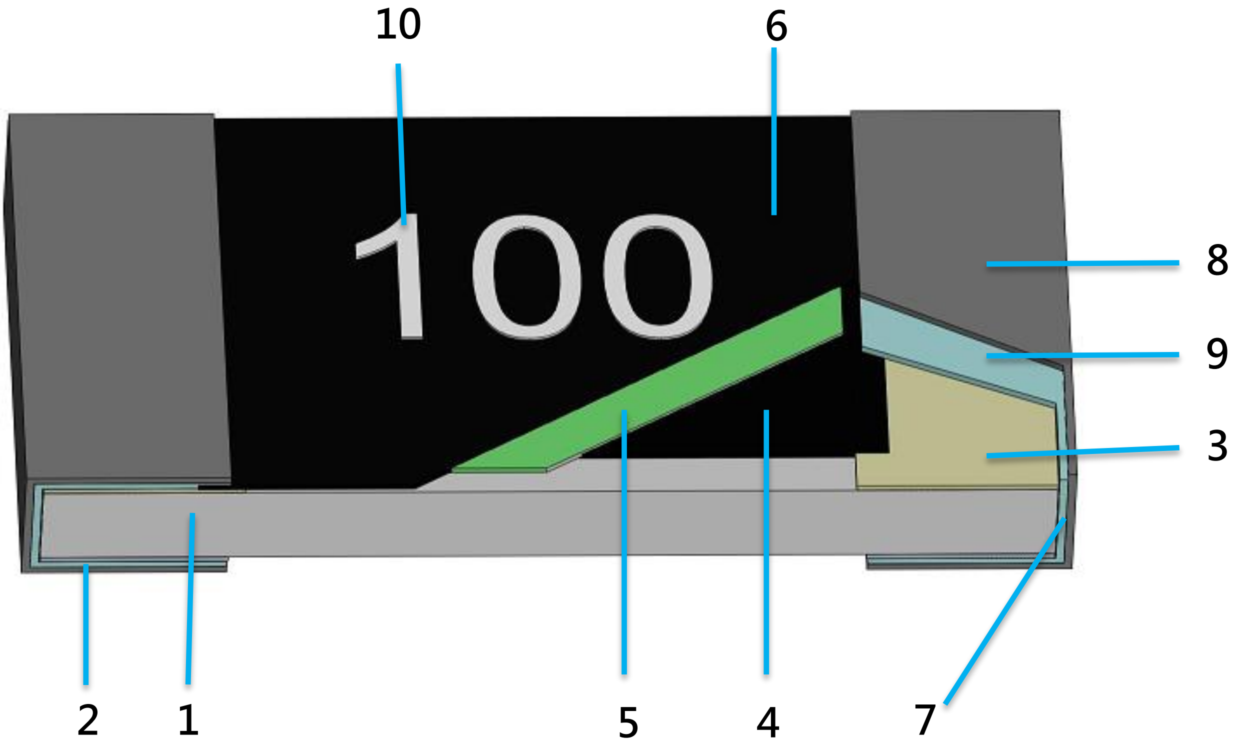
4 Dimensions:



Unit:mm

Type	Dimension Size Code	L	W	H	L1	L2
RHG	0402	1.00±0.10	0.50±0.05	0.30±0.05	0.20±0.10	0.25±0.10
RHG	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.15	0.30±0.15
RHG	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.15
RHG	1206	3.05±0.10	1.55±0.10	0.50+0.10 -0.05	0.45±0.20	0.35±0.15
RHG	2010	5.00±0.20	2.50±0.20	0.55±0.10	0.60±0.20	0.60±0.20
RHG	2512	6.40±0.20	3.20±0.20	0.70±0.10	0.60±0.20	1.25±0.20

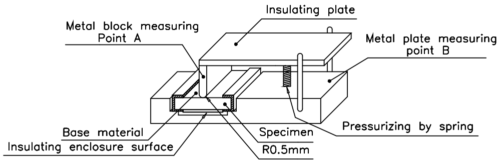
5 Structure Graph:



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

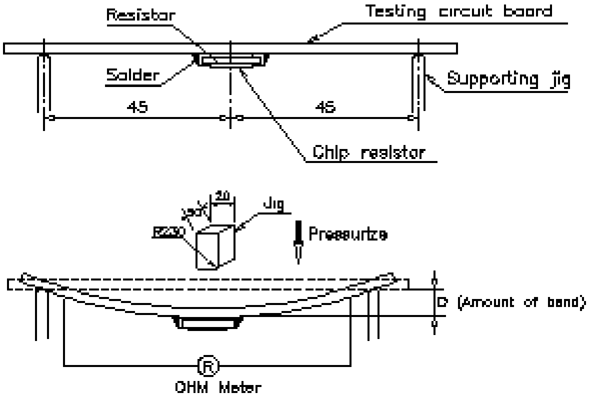
6 Reliability Test:

6.1 Electrical Performance Test

Item	Conditions	Specifications
		Resistors
Temperature Coefficient of Resistance	TCR（ppm/℃）$= \frac{(R2-R1)}{R1(T2-T1)} \times 10^6$ R1: Resistance at room temperature R2: Resistance at -55℃ or +125℃ T1: Room temperature T2: Temperature -55℃ or +125℃ Refer to JIS-C5201-1 4.8	Refer to item 3. general specifications
Short Time Overload	Applied 2.5 times rated current for 5 seconds and 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%: △R=±1.0% ±5%: △R=±2.0%
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 	≧10^9Ω
Dielectric Withstand Voltage	Put the resistor in the fixture, add VAC (see spec. below) in +,- terminal. RTG0402、0603apply 300 VAC 1 minute. RTG0805、1206、2010、2512apply 500 VAC 1 minute. Refer to JIS-C5201-1 4.7	No short or burned on the appearance.
ESD	Put the specimens on the test fixture and apply ±3KVDC on terminals for 1sec .Afterwards, the specimens stabilize for30min or more and measure of its resistance variance rate. Refer to EIAJED-4701-300 304	△R=±5.0%

6.2 Mechanical Performance Test

Item	Conditions	Specifications
		Resistors
Terminal Strength	Test1:The resistor mounted on the board applied 5Npushingforce 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℃for5 minutes, then the resistor is left in the room for 48 hrs, and measured its resistance variance rate. Refer to JIS-C5201-1 4.29	ΔR=±1.0%
Solderability	Preconditioning: Put the tested resistor in the apparatus of PCT, at a temperature of 105℃, 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℃ for 2±0.5 sec, then the resistor is left as placed under microscope to observe 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 of260+5/-0℃ for 10 +1/-0seconds. 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 of260+5/-0℃ for 30+1/-0 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℃ 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 ΔR=±1.0% Test item 2: (1)Solder coverage over 95%. (2)The underlying material (such as ceramic) shall not be visible at thecrest corner area of the electrode. Test item 3: (1)Variance rate on resistance ΔR=±1.0%

<table>
<tr><th rowspan="2">Item</th><th rowspan="2">Conditions</th><th>Specifications</th></tr>
<tr><th>Resistors</th></tr>
<tr><td>Joint Strength of Solder</td><td>Bending Strength:
Solder tested resistor on to PC board. Add force in the middle down, and under load measured its resistance variance rate.
D: RHG0402、0603、0805=5mm
RHG1206=3mm
RHG2010、2512=2mm


Refer to JIS-C5201-1 4.33</td><td>∆R=±1.0%</td></tr>
</table>

6.3 Environmental Test

<table>
<tr><th rowspan="2">Item</th><th rowspan="2">Conditions</th><th>Specifications</th></tr>
<tr><th>Resistors</th></tr>
<tr><td>Resistance to Dry Heat</td><td>Put tested resistor in chamber under temperature 155±5℃ 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</td><td>±1%:
∆R=±1.0%
±5%:
∆R=±2.0%</td></tr>
<tr><td>Thermal Shock</td><td>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>
<tr><th colspan="2">Testing Condition</th></tr>
<tr><td>Lowest Temperature</td><td>-55±5℃</td></tr>
<tr><td>Highest Temperature</td><td>125±5℃</td></tr>
<tr><td>Temperature-retaining time</td><td>15 minutes each</td></tr>
</table>
Refer to MIL-STD 202 Method 107</td><td>∆R=±1.0%</td></tr>
<tr><td>Loading Life in Moisture</td><td>Put the tested resistor in the chamber under temperature 40±2℃, 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</td><td>±1%:
∆R=±1.0%
±5%:
∆R=±2.0%</td></tr>
<tr><td>Load Life</td><td>Put the tested resistor in chamber under temperature 70±2℃ 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</td><td>±1%:
∆R=±1.0%
±5%:
∆R=±2.0%</td></tr>
</table>

7 Plating Thickness:

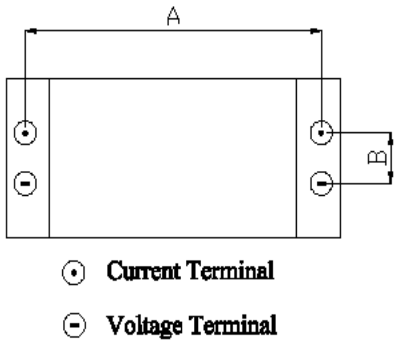
7.1 Ni:≥2μm

7.2 Sn(Tin):≥3μm

7.3 Sn(Tin):Mate Sn

8 Measurement Point:

Bottom electrode



Unit : mm

TYPE \ DIM	A	B
RHG0402	0.80±0.05	0.24±0.05
RHG0603	1.35±0.05	0.35±0.05
RHG0805	1.80±0.05	0.35±0.05
RHG1206	2.90±0.05	0.35±0.05
RHG2010	4.50±0.05	1.15±0.05
RHG2512	5.90±0.05	1.60±0.05

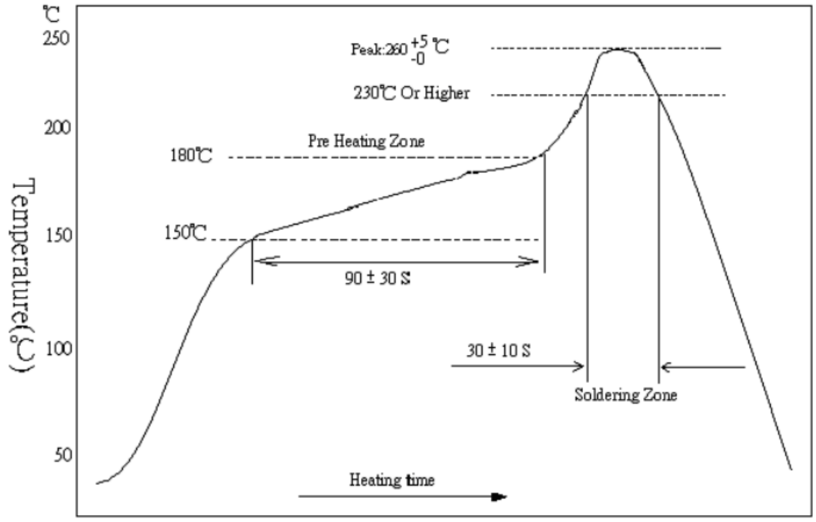
9 Rule of package empty quantity:

9.1 Empty quantity for each reels not allowed to exceed 0.1% of the whole quantity, and continuous 2pcs (included) empty are also allowed.

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

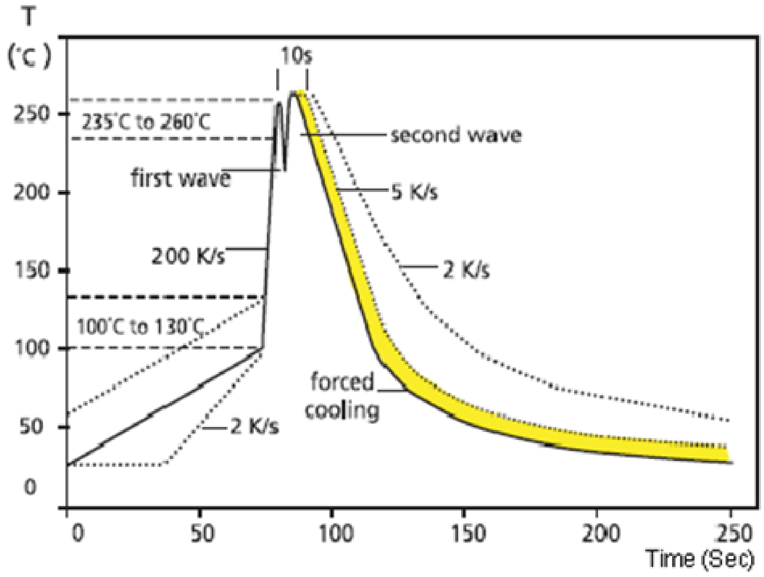
10.1 Recommend Soldering Method:

10.1.1Lead Free IR Reflow Soldering Profile



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

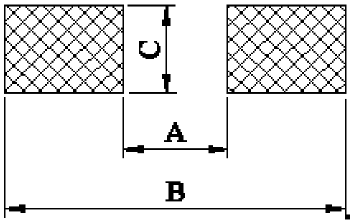
10.1.2Lead Free Double-Wave Soldering Profile. (This applies to 0603 size inclusive above products)



10.1.3Soldering Iron: temperature 350℃±10℃, dwell time shall be less than 3 sec.

10.2 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

DIM TYPE	A	B	C
RHG0402	0.50	1.80	0.50
RHG0603	0.50	2.50	1.27
RHG0805	0.66	3.56	1.78
RHG1206	1.50	4.30	2.18
RHG2010	3.50	6.10	2.80
RHG2512	3.80	8.00	3.50

10.3 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 Cl_2、H_2S、NH_3、SO_2 and NO_2;
(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.

10.4 Momentary Overload Precautions:

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

10.5 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.

11 Stock period:

11.1 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.

11.2 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.

11.3 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.

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