



# Lead-Free Current Sensing Resistors RLS Series 0mΩ (JUMPER) (Halogen-Free)

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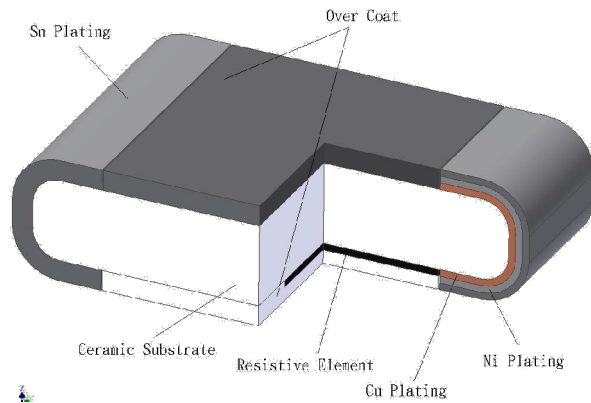
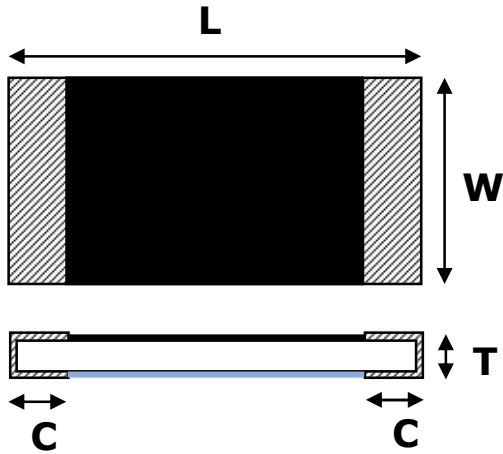
## 1. Scope

This specification applied to the products of Lead-Free current sensing resistor of metal foil for Lead-Free RLS series manufactured by TA-I TECHNOLOGY CO.,LTD

## 2. Type Designation

RLS04	J	T	K	R000
<b>Series No.</b>	<b>Tolerance</b>	<b>Packaging</b>	<b>Power</b>	<b>Resistance</b>
04 : 0402 06 : 0603	J= ±5%	T= Paper	K= 0.2W A= 0.25W	R000 ≤ 0.5mΩ

## 3. Construction and Dimension



Series	L	W	C	T
RLS04	1.10±0.10	0.55±0.10	0.25±0.10	0.45±0.10
RLS06	1.60±0.10	0.80±0.10	0.40±0.20	0.70±0.20

### Marking

For 0402&0603: No Marking

Unit: mm



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#### 4. Features

Series	Size	Power (W)	Resistance Value	Operation Temperature Range	Max Rated Current	TCR
RLS04	0402	0.2	$\leq 0.5 \text{ m}\Omega$	-55°C~+155°C	20 (A)	3800 ppm/°C
RLS06	0603	0.25	$\leq 0.5 \text{ m}\Omega$	-55°C~+155°C	22.36 (A)	3800 ppm/°C

#### 5. Reliability Tests

Test Items	Reference standard	Condition of Test	Test Limits
Temperature Coefficient of Resistance	IEC60115-1-4.8 JIS-C5201-4.8	+25°C ~ +125°C	Refer 4.0
Load Life	IEC60115-1-4.25.1 JIS-C5201-4.25.1	1000hours at rated power, 70°C, 1.5hours "ON", 0.5hour "OFF"	$\leq 0.5 \text{ m}\Omega$
Short Time Overload	IEC60115-1-4.13 JIS-C5201-4.13	5 X rated power for 5s	$\leq 0.5 \text{ m}\Omega$
Moisture no Load	IEC60115-1- 4.24.2.1a) JIS-C5201- 4.24.2.1a)	85°C, 85%RH, 1000hrs	$\leq 0.5 \text{ m}\Omega$
Temperature cycle	IEC60115-1-4.19 JIS-C5201-4.19	RLS04 : -55°C & +125°C, 100 cycle, 15min per extreme condition RLS06 : -55°C & +155°C, 100 cycle, 15min per extreme condition	$\leq 0.5 \text{ m}\Omega$
Resistance to Soldering Heat	IEC60115-1-4.18 JIS-C5201-4.18	260±5°C for 10±1 sec	$\leq 0.5 \text{ m}\Omega$
Solderability	IEC60115-1-4.17 JIS-C5201-4.17	245±5°C, 2±0.5sec	At least 95% of surface area of electrode shall be covered with new solder
High Temperature Exposure	IEC60115-1- 4.23.2 JIS-C5201-4.23.2	RLS04 : 125°C, 1000hrs RLS06 : 155°C, 1000hrs	$\leq 0.5 \text{ m}\Omega$
Low Temperature Storage	IEC60115-1- 4.23.4 JIS-C5201-4.23.4	-55°C, 1000hrs	$\leq 0.5 \text{ m}\Omega$
Substrate Bending	IEC60115-1-4.33 JIS-C5201-4.33	Bending width 2mm	$\leq 0.5 \text{ m}\Omega$
Insulation Resistance	IEC60115-1-4.6 JIS-C5201-4.6	100V DC for 1 minute	>100 MΩ

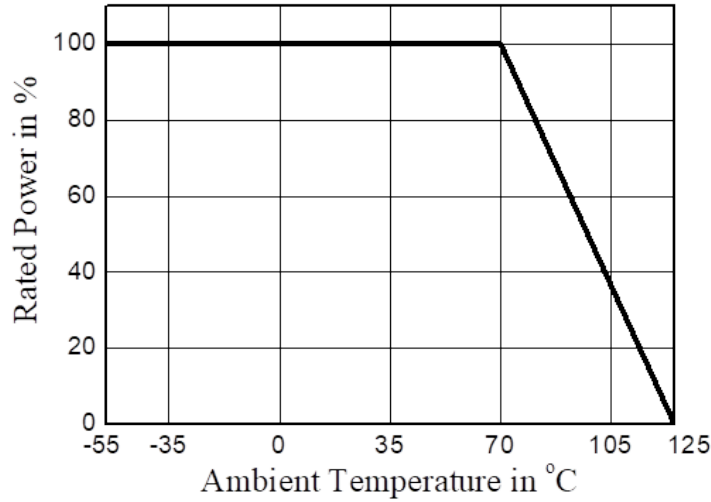


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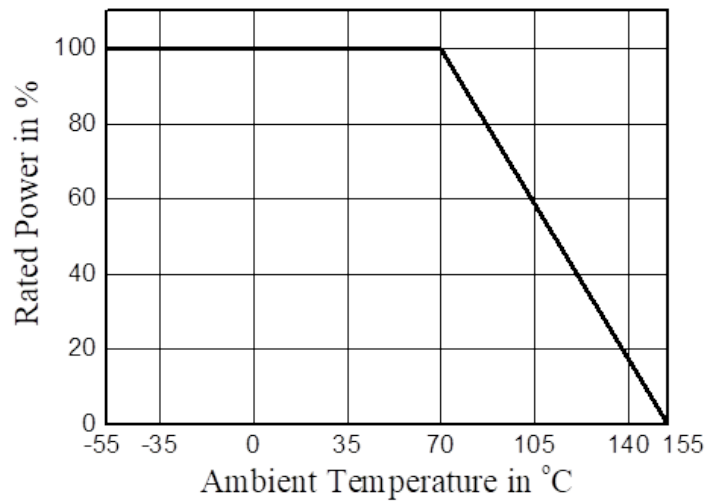
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## 5.1 Derating Curve

### 5.1.1 RLS04



### 5.1.2 RLS06



## 5.2 Rated Current & Voltage

The rated current is calculated by the following formula:

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

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

I: Rated Current(A)

V: Rated Voltage

P: Rated Power(W)

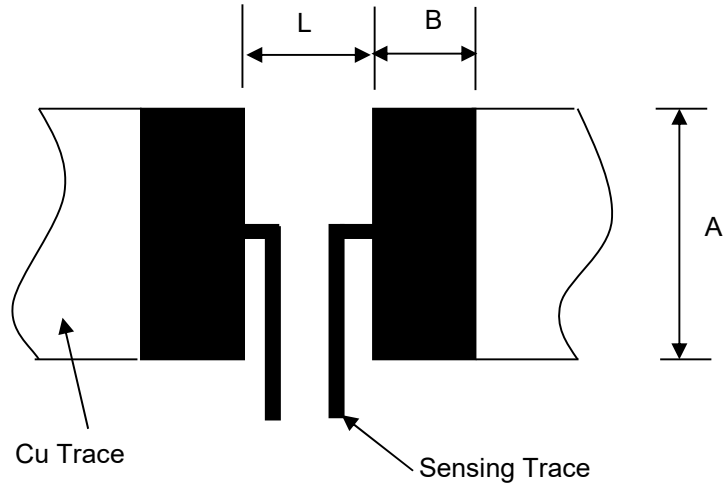
R: Resistance Value(Ω)



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**6. Recommended Solder Pad Dimension**



Series	Resistance Range (Ω)	A	L	B
RLS04	Jumper	0.7	0.45	0.375
RLS06		1.0	0.6	1.1

Unit: mm

- \*1 The copper foil minimum thickness of PCB needs 3 oz
- \*2. PCB Dimension Tolerance is +/-0.1mm.
- \*3. The Resistance will change slightly after soldered, it is depended on PCB PAD size design and it's necessary to consider the effect of the resistance increase or decrease.

**7. Number of Package**

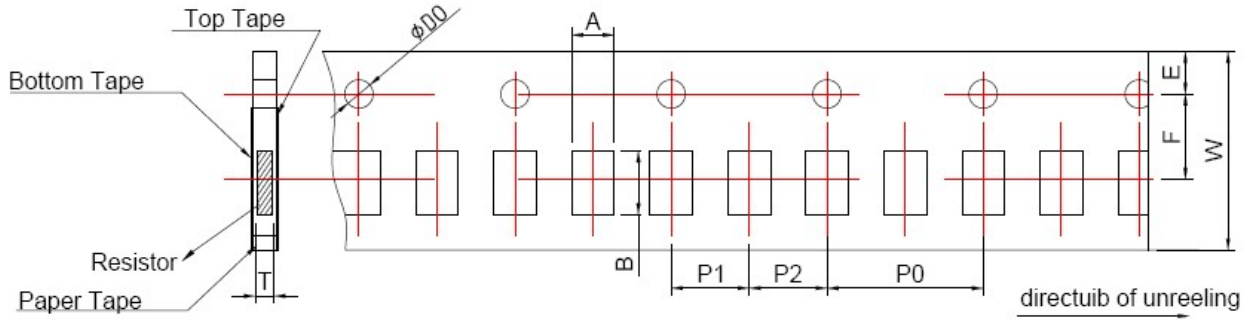
	RLS04	RLS06
Pieces	10000	5000



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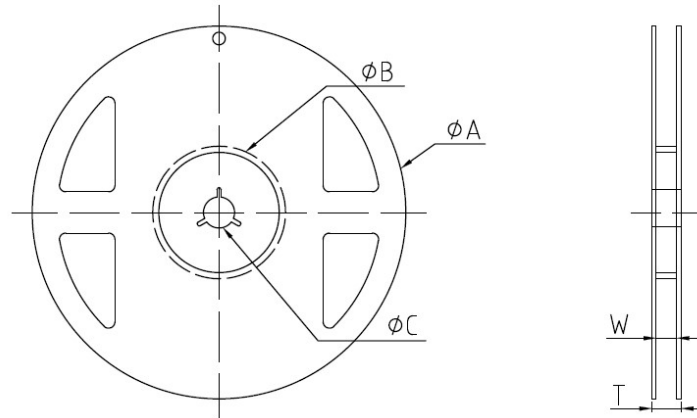
**8. Packaging**



Packing	Type	A	B	W	F	E	P1	P2	P0	ϕD0	T
Paper Tape	RLS04	0.75 ±0.05	1.30 ±0.05	8.00 ±0.20	3.50 ±0.05	1.75 ±0.10	2.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.55 ±0.10	0.65 ±0.10
	RLS06	1.10 ±0.15	1.90 ±0.20	8.00 ±0.20	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.55 ±0.10	0.85 ±0.10

Unit: mm

**9. Reel Specification**



Series	ϕ A	ϕ B	ϕ C	W	T
RLS04	178 ±2.0	60 ±1.0	13.0±1.0	9.0±1.0	11.4±1.0
RLS06	178 ±2.0	60 ±1.0	13.0±1.0	9.0±1.0	11.4±1.0

Unit: mm

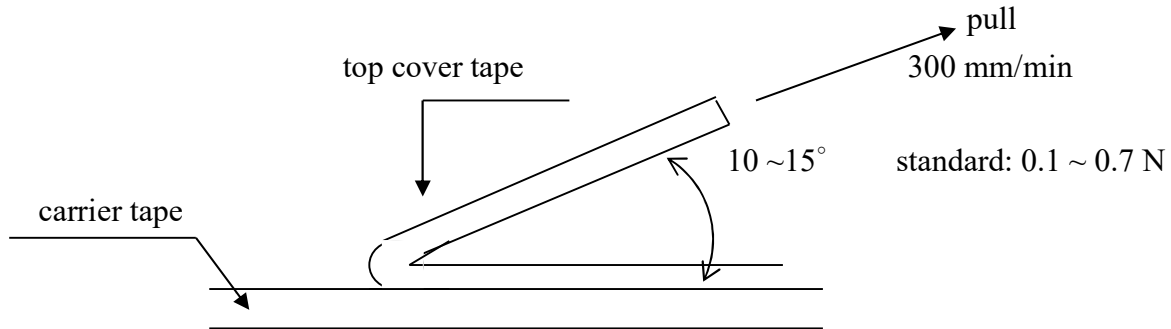


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**10. Peeling Strength of Top Cover Tape**

Test Condition : 0.1 to 0.7 N at a peel-off speed of 300 mm / min.



**11. Storage Conditions**

Temperature: 5°C~35°C, Humidity:40%~75%

Moisture Sensitivity Level: Level 1

**12. Shelf Life**

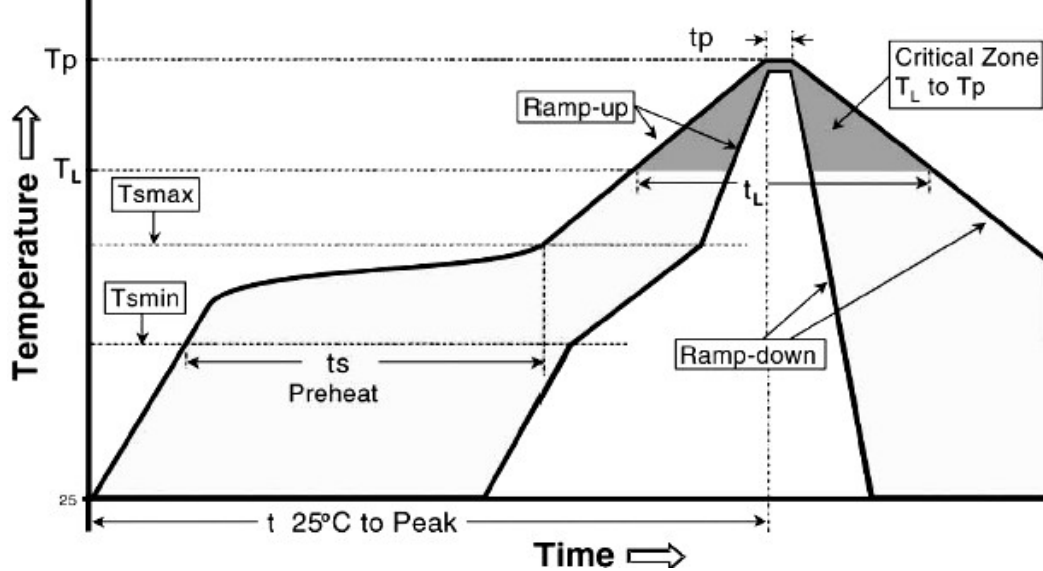
2 years from manufacturing date.



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**13. Recommend IR – Reflow profile (solder: Sn96.5 / Ag3 / Cu0.5)**



**Allowed Re-flow times: 3 times**

**Remark: To avoid discoloration phenomena of chip on terminal electrodes, please use N2 Re-flow furnace.**

**Iron Solder: 350±10°C, 3+1/-0 sec, 1 time**

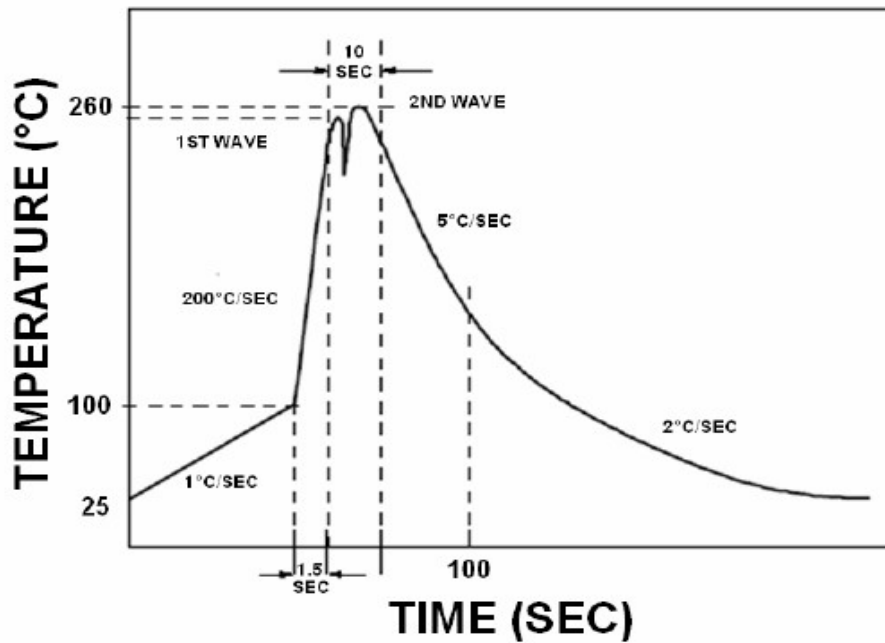
Profile Feature	Lead (Pb)-Free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C / second max.
Preheat - Temperature Min (T <sub>smin</sub> ) - Temperature Max (T <sub>smax</sub> ) - Time (T <sub>smin</sub> to T <sub>smax</sub> ) (ts)	150°C 200°C 60 -120 seconds
Time maintained above: - Temperature (T <sub>L</sub> ) - Time (T <sub>L</sub> )	217°C 60-150 seconds
Peak Temperature (T <sub>p</sub> )	260°C
Time within $\begin{matrix} +0 \\ -5 \end{matrix}$ °C of actual Peak Temperature (t <sub>p</sub> ) <sup>2</sup>	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8minutes max.



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**14. Recommend Wave-Solder profile (solder: Sn96.5 / Ag3 / Cu0.5)**



**15. ECN**

Engineering Change Notice: The customer will be informed with ECN if there is significant modification on the characteristics and materials described in Approval Sheet.