



Lead-Free Current Sensing Resistors

RLS Series

(Halogen-Free)

Document No	TRLS-XX0S001K
Issued date	2017/03/01
page	1/8

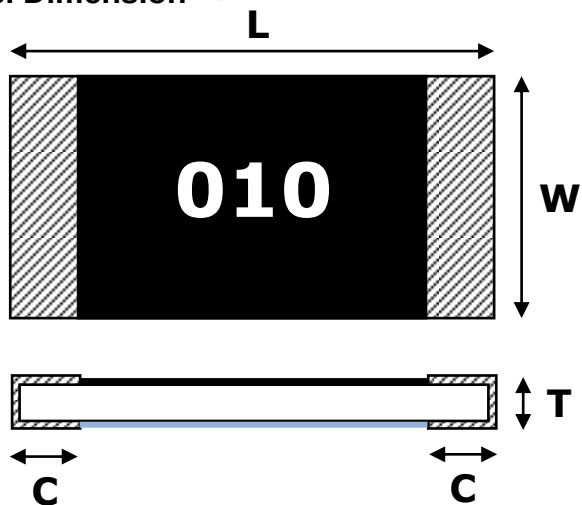
1. Scope :

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 :

RLS12	F	T	C	R010
Series No.	Tolerance	Packaging	Power	Resistance
06→0603 10→0805 12→1206 25→2512	F = $\pm 1\%$ G = $\pm 2\%$ J = $\pm 5\%$	T=Paper E=Embossed	A = 0.25W S = 0.5 W I = 0.75W C = 1 W E = 2W	R005=5 mΩ R0065=6.5 mΩ R010=10mΩ

3. Dimension :



3.1 Marking

For 0805 to 2512:

Resistance value is expressed by 3 digits.

E.G.:

005 = $0.005\Omega = 5\text{ m}\Omega$

010 = $0.010\Omega = 10\text{ m}\Omega$

6.5 = $0.0065\Omega = 6.5\text{ m}\Omega$

For 0603: No Marking.

UNIT: mm

Series	L	W	C	T
RLS06	1.60±0.20	0.80±0.20	0.40±0.20	0.60±0.20
RLS10	2.00±0.20	1.25±0.20	0.40±0.30	0.70±0.20
RLS12	3.20±0.20	1.60±0.20	0.50±0.30	0.70±0.20
RLS25	6.40±0.20	3.20±0.20	0.90±0.20	0.70±0.20



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Document No	TRLS-XX0S001K
Issued date	2017/03/01
page	2/8

4. Features:

Series	Size	Power (W)	Resistance Value	Operation Temperature Range	TCR	Tolerance
RLS06	0603	0.50	5 ~ 20 mΩ	-55°C ~ +155°C	±50ppm/°C	±1% ±2% ±5%
RLS10	0805	0.75	5 ~ 30 mΩ			
RLS12	1206	1.0	5 ~ 40 mΩ			
RLS25	2512	2.0	5 ~ 10 mΩ			

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"	< ±1%
Short Time Overload	IEC60115-1-4.13 JIS-C5201-4.13	5 X rated power for 5s	< ±1%
Moisture no Load	IEC60115-1- 4.24.2.1a) JIS-C5201- 4.24.2.1a)	85°C , 85%RH, 1000hrs	< ±1%
Temperature cycle	IEC60115-1-4.19 JIS-C5201-4.19	-55°C & +155°C , 100cycle, 15min per extreme condition	< ±1%
Resistance to Soldering Heat	IEC60115-1-4.18 JIS-C5201-4.18	260±5°C for 10±1 sec	< ±0.5%
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	155°C , 1000hrs	< ±1%
Low Temperature Storage	IEC60115-1- 4.23.4 JIS-C5201-4.23.4	-55°C , 1000hrs	< ±1%
Substrate Bending	IEC60115-1-4.33 JIS-C5201-4.33	Bending width 2mm	< ±0.5%
Insulation Resistance	IEC60115-1-4.6 JIS-C5201-4.6	100V DC for 1 minute	>100 MΩ



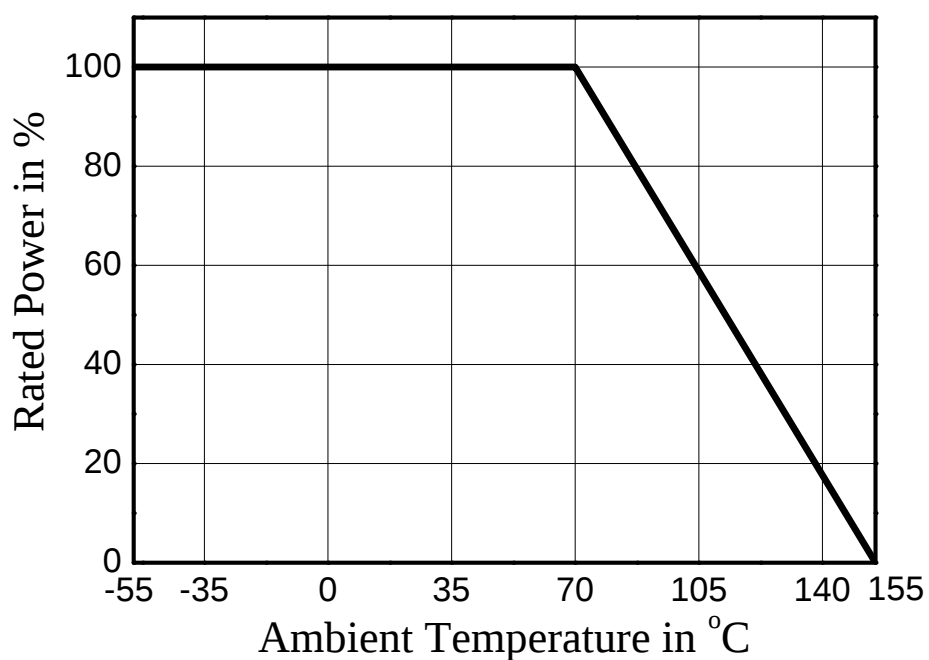
Lead-Free Current Sensing Resistors

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Document No	TRLS-XX0S001K
Issued date	2017/03/01
page	3/8

5.1 Derating Curve



5.2 Rated Current & Voltage

The rated Current and Voltage are calculated by the following formula:

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

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

I: Rated Current (A)

V: Rated Voltage (V)

P: Rated Power (W)

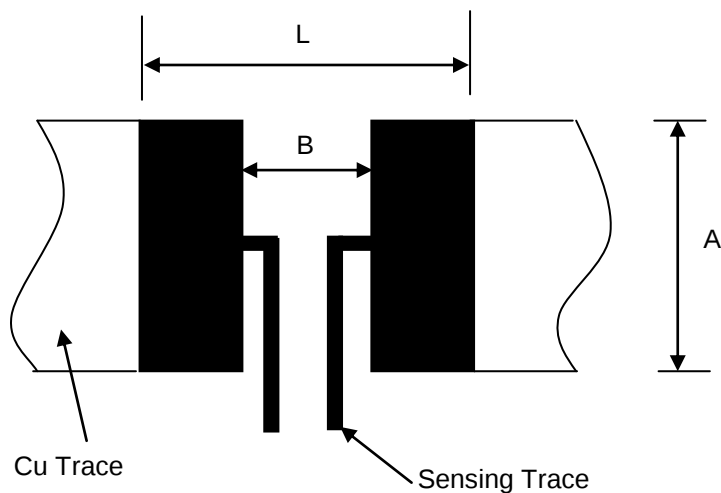
R: Resistance Value (Ω)



Lead-Free Current Sensing Resistors RLS Series (Halogen-Free)

Document No	TRLS-XX0S001K
Issued date	2017/03/01
page	4/8

6. Recommended Solder Pad Dimension



Unit: mm

Series	Resistance (mΩ)	A	L	B
RLS06	R = 5 R = 20	1.0	2.8	0.6
	5 < R < 20			0.85
RLS10	5 ≤ R < 10	1.4	3.2	0.8
	10 ≤ R ≤ 30			1.2
RLS12	5 ≤ R < 10	1.8	4.7	1.2
	10 ≤ R < 20			1.8
	20 ≤ R ≤ 40			2.2
RLS25	5 ≤ R ≤ 10	3.6	7.9	4.6

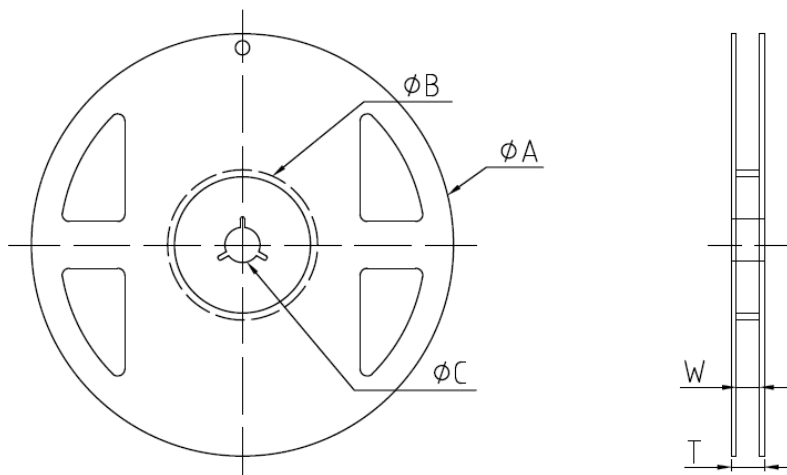
Note: *The copper foil minimum thickness of PCB needs 3 oz



Lead-Free Current Sensing Resistors RLS Series (Halogen-Free)

Document No	TRLS-XX0S001K
Issued date	2017/03/01
page	6/8

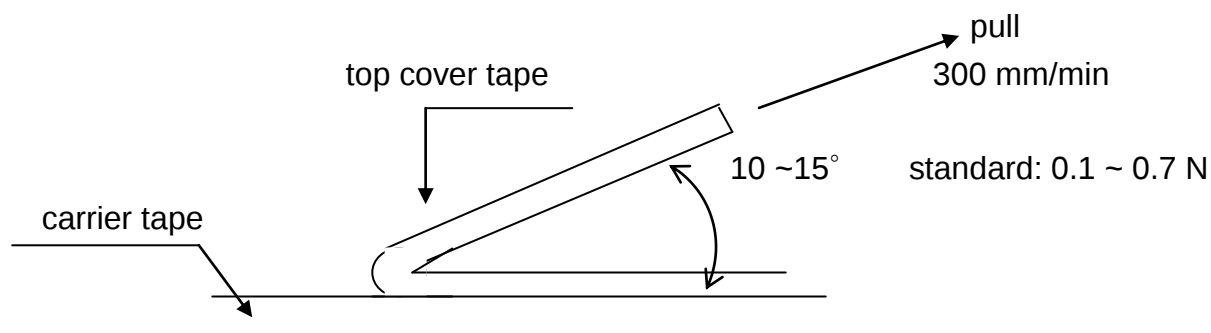
10. Reel Specification



Series	ϕA	ϕB	ϕC	W	T
RLS06 RLS10 RLS12	180 $\pm$ 2.0	60 $\pm$ 1.0	13.0 $\pm$ 1.0	9.0 $\pm$ 1.0	11.4 $\pm$ 1.0
RLS25	180 $\pm$ 2.0	60 $\pm$ 1.0	13.0 $\pm$ 1.0	13.0 $\pm$ 1.0	15.4 $\pm$ 1.0

11. Peeling Strength of Top Cover Tape

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



12. Storage Conditions:

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

13. Shelf Life:

2 years from manufacturing date.



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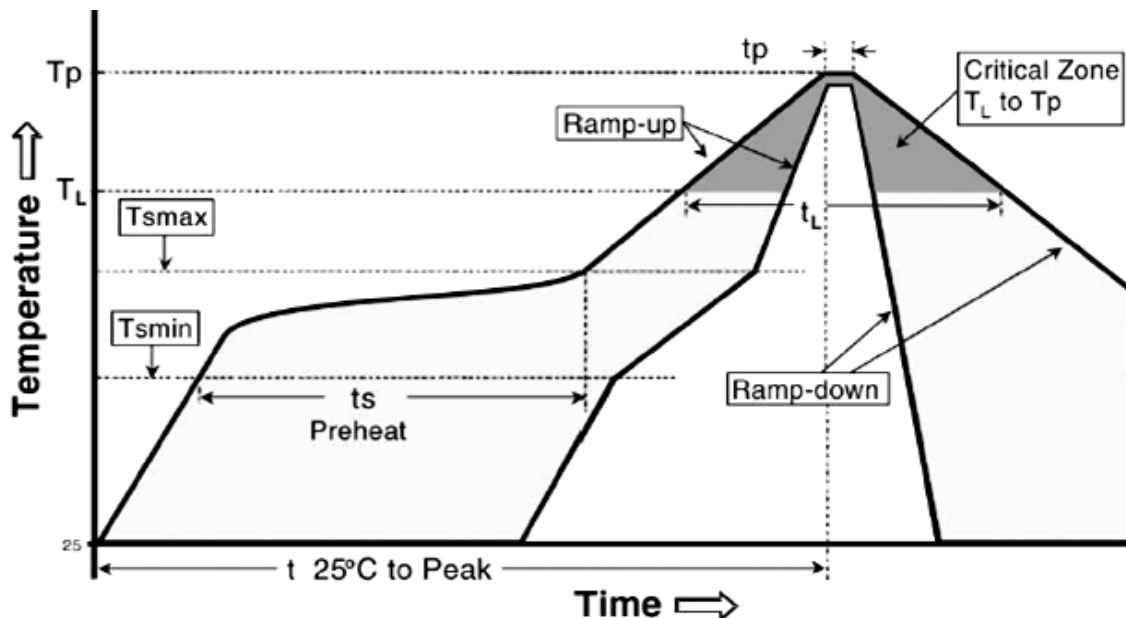
(Halogen-Free)

Document No TRLS-XX0S001K

Issued date 2017/03/01

page 7/8

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



Alloyed 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

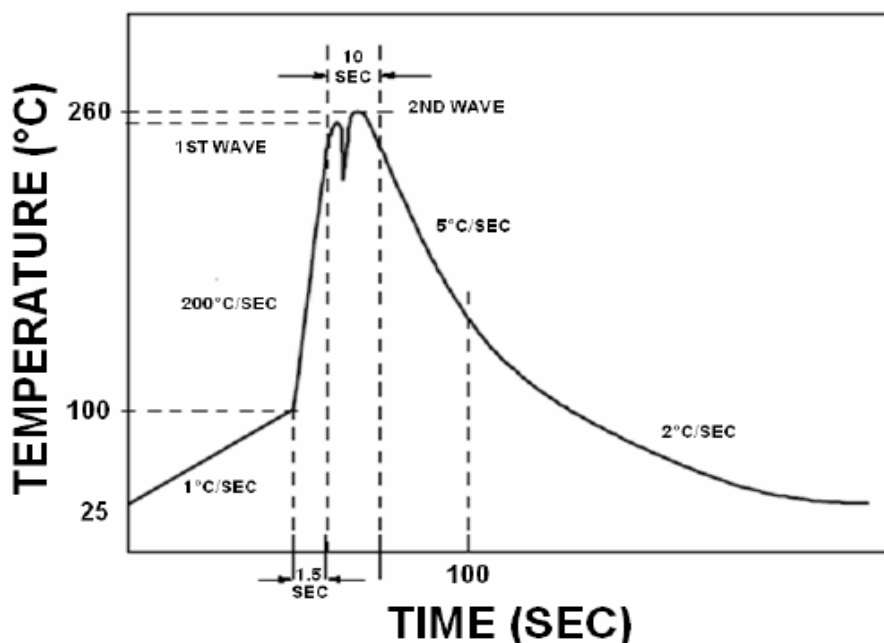
Profile Feature	Lead (Pb)-Free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C / second max.
Preheat - Temperature Min (T _{smin}) - Temperature Max (T _{smax}) - Time (T _{smin} to T _{smax}) (t _s)	150°C 200°C 60 -150 seconds
Time maintained above : - Temperature (T _L) - Time (T _L)	217°C 60-120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



Lead-Free Current Sensing Resistors RLS Series (Halogen-Free)

Document No	TRLS-XX0S001K
Issued date	2017/03/01
page	8/8

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



16. 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.

17. Manufacturing Country & City :

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(4) TAI OHM ELECTRONICS (M) SDN. BHD. (Malaysia – Penang)

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