



Lead-Free Current Sensing Resistors

RLS Series

(Halogen-Free)

| | |
|-------------|---------------|
| Document No | TRLS-XX0S001L |
| Issued date | 2020/06/11 |
| page | 1/8 |

1. Scope :

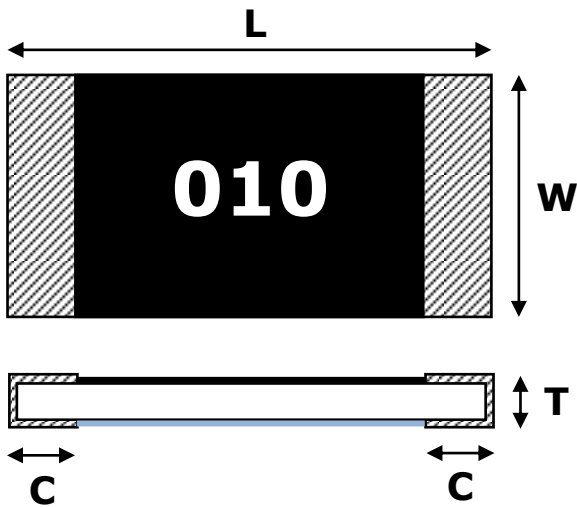
This specification applied to the products of Lead-Free current sensing resistor of metal foil for Lead-Free RLS series manufactured by TA-I TECHNOLOGY CO.,LTD.

2. Type Designation :



| Series No. | Tolerance | Packaging | Power | Resistance |
|--|---|-------------------------------------|--|---|
| 06→0603 10→0805 12→1206 25→2512 | F = ± 1% G = ± 2% J = ± 5% | T=Paper E=Embossed | B = 0.125W 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 = 0.005Ω = 5 mΩ

010 = 0.010Ω = 10mΩ

6.5 = 0.0065Ω = 6.5 mΩ

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 |



Lead-Free Current Sensing Resistors

RLS Series (Halogen-Free)

| | |
|-------------|---------------|
| Document No | TRLS-XX0S001L |
| Issued date | 2020/06/11 |
| 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:

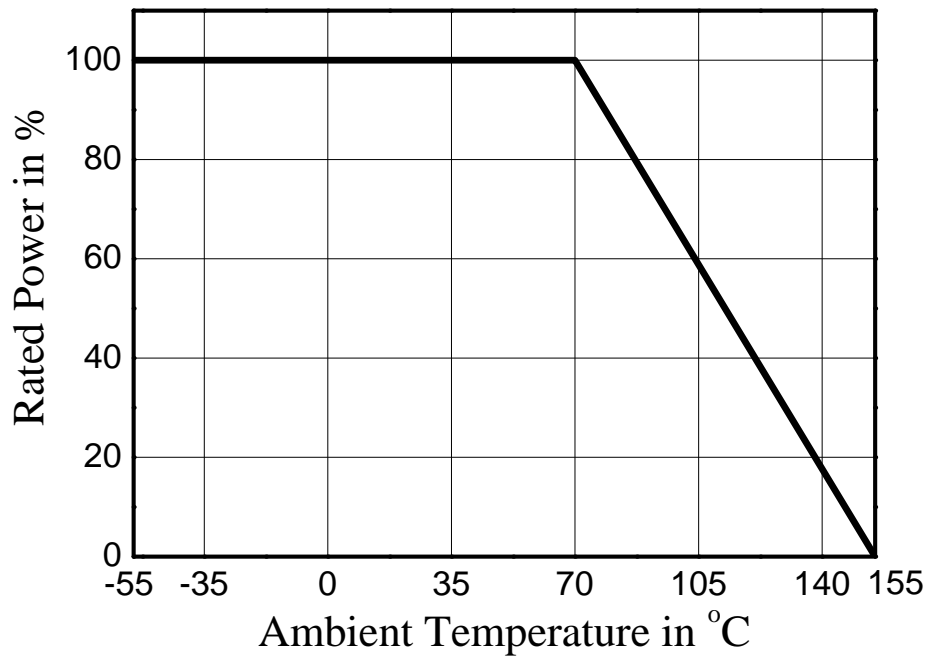
| Test Items | Reference standard | Condition of Test | Test Limits |
|---------------------------------------|---|---|--|
| Temperature Coefficient of Resistance | IEC60115-1-4.8 JIS-C5201-4.8 | +25°C ~ +125°C | Refer 4.0 |
| Load Life | IEC60115-1-4.25.1 JIS-C5201-4.25.1 | 1000hours at rated power, 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 RLS Series (Halogen-Free)

| | |
|-------------|---------------|
| Document No | TRLS-XX0S001L |
| Issued date | 2020/06/11 |
| 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)

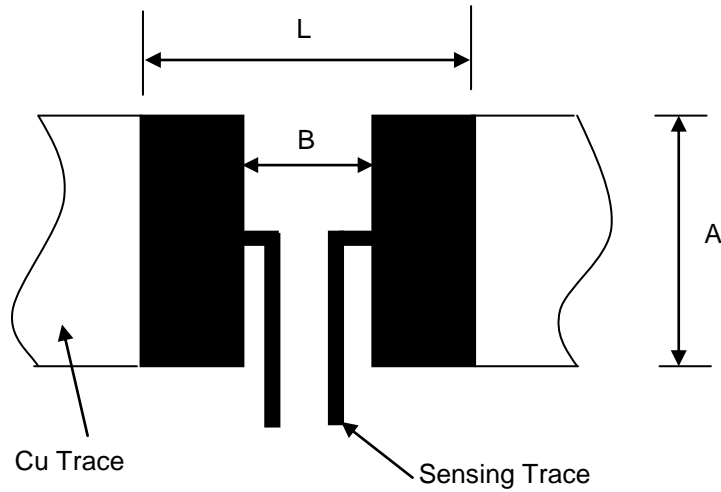
R: Resistance Value (Ω)



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

| | |
|-------------|---------------|
| Document No | TRLS-XX0S001L |
| Issued date | 2020/06/11 |
| 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

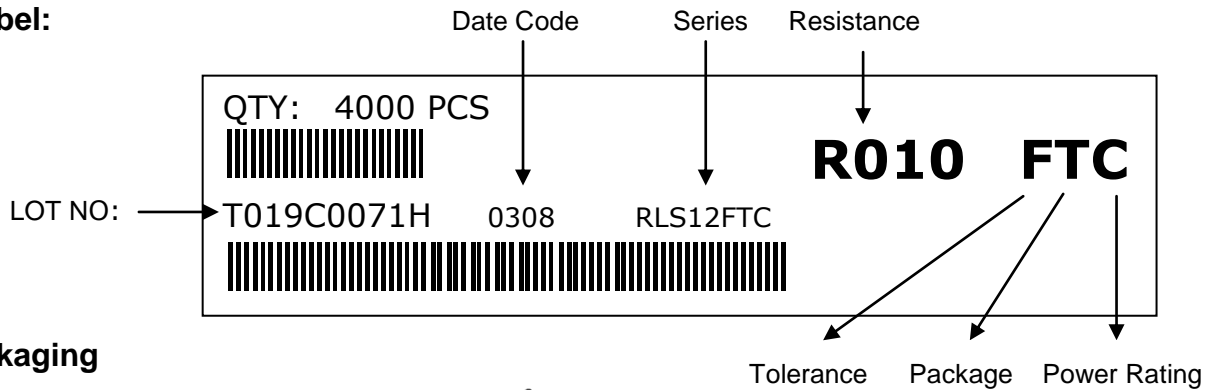
RLS Series (Halogen-Free)

| | |
|-------------|---------------|
| Document No | TRLS-XX0S001L |
| Issued date | 2020/06/11 |
| page | 5/8 |

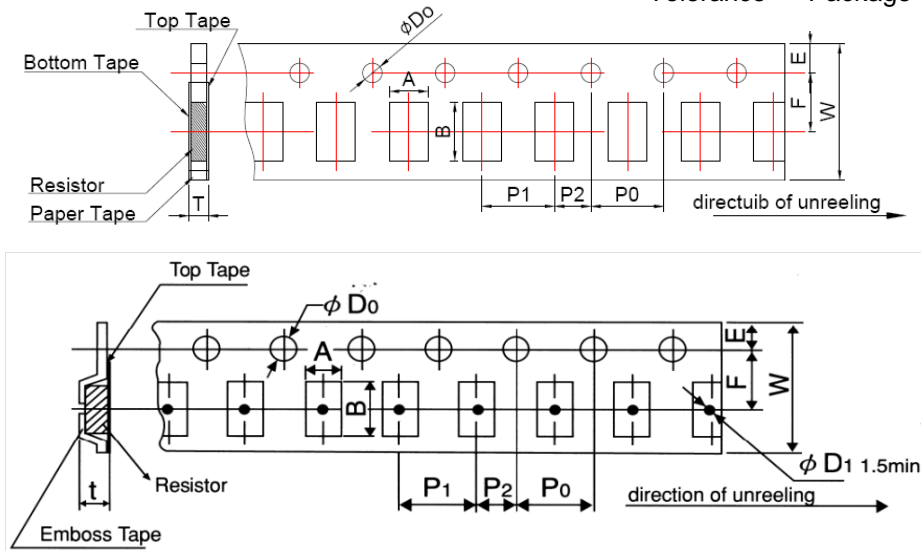
7. Number of Package:

| | | | | |
|----------------|-------|-------|-------|-------|
| Series | RLS06 | RLS10 | RLS12 | RLS25 |
| Pieces/Package | 5000 | 4000 | 4000 | 4000 |

8. Label:



9. Packaging



Tape packaging dimension

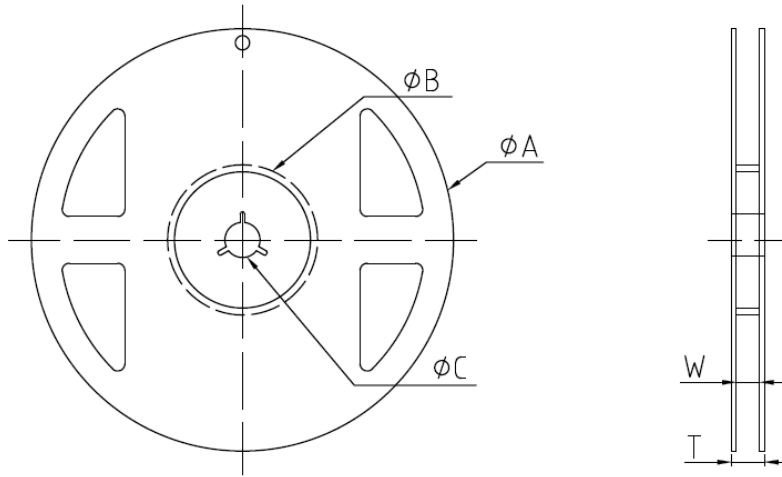
| Packing | Type | A | B | W | F | E | P1 | P2 | P0 | D0 | T |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Paper | RLS06 | 1.10 | 1.90 | 8.00 | 3.50 | 1.75 | 4.00 | 2.00 | 4.00 | 1.55 | 0.85 |
| | RLS10 | 1.60 | 2.40 | 8.00 | 3.50 | 1.75 | 4.00 | 2.00 | 4.00 | 1.55 | 1.05 |
| | RLS12 | 2.00 | 3.60 | 8.00 | 3.50 | 1.75 | 4.00 | 2.00 | 4.00 | 1.55 | 1.05 |
| Embossed | RLS25 | 3.60 | 6.90 | 12.0 | 5.50 | 1.75 | 4.00 | 2.00 | 4.00 | 1.55 | 0.85 |
| Tolerance | | ±0.15 | ±0.20 | ±0.20 | ±0.05 | ±0.10 | ±0.10 | ±0.10 | ±0.10 | ±0.10 | ±0.10 |



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

| | |
|-------------|---------------|
| Document No | TRLS-XX0S001L |
| Issued date | 2020/06/11 |
| page | 6/8 |

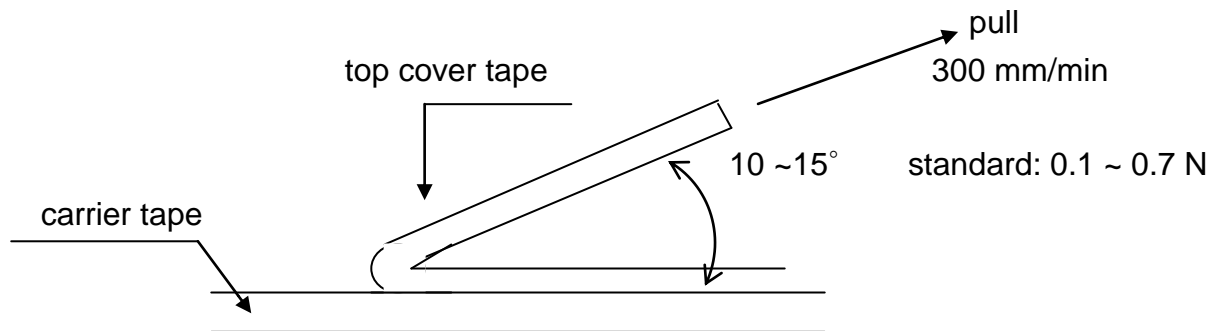
10. Reel Specification



| 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:

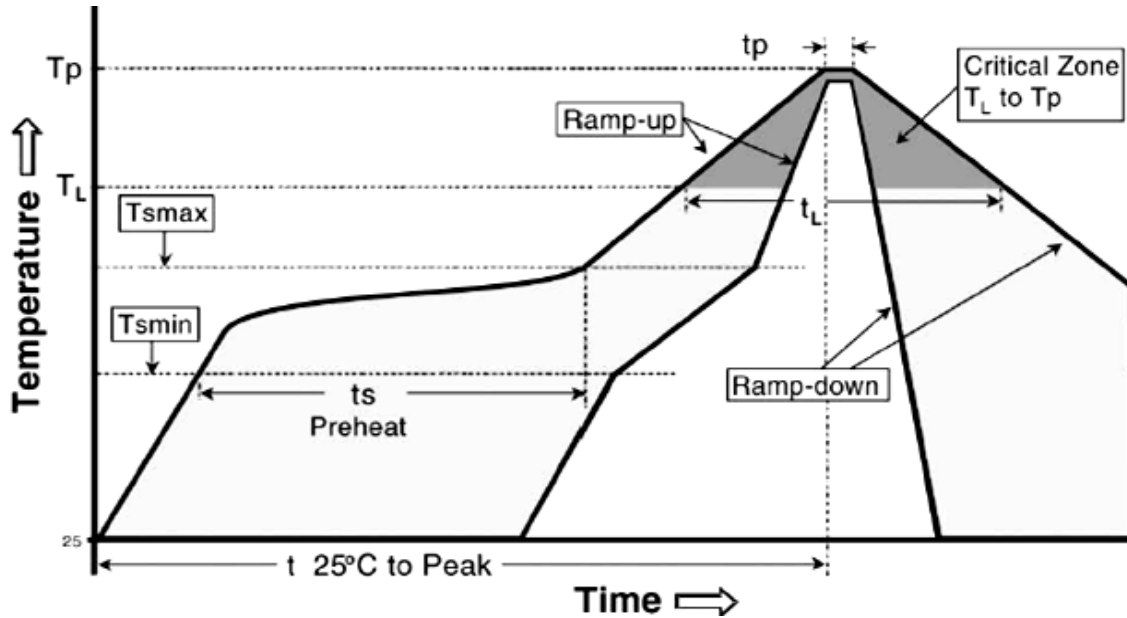
2 years from manufacturing date.



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

| | |
|-------------|---------------|
| Document No | TRLS-XX0S001L |
| Issued date | 2020/06/11 |
| 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

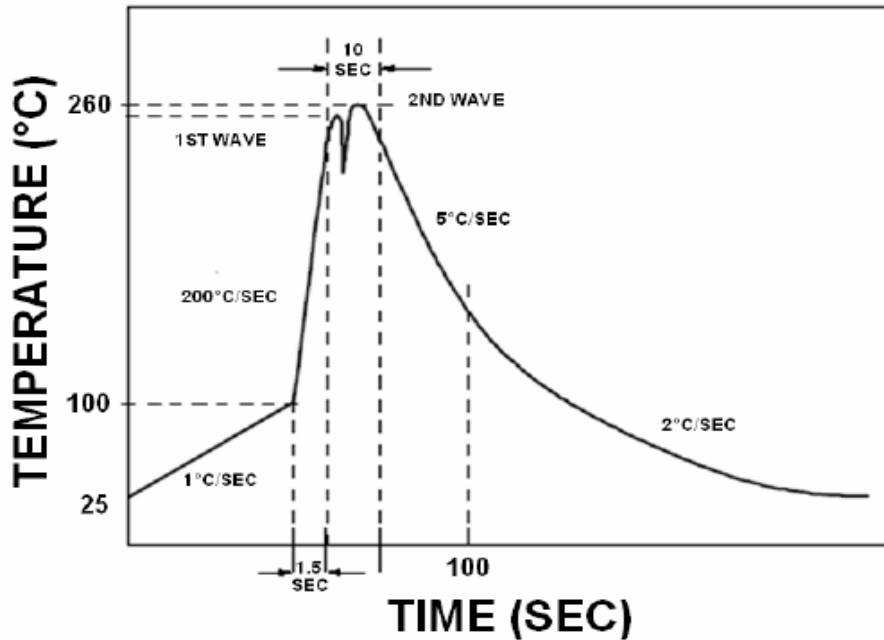
| Profile Feature | Lead (Pb)-Free Assembly |
|---|-----------------------------------|
| Average ramp-up rate (T _{smax} to T _p) | 3°C / second max. |
| Preheat - Temperature Min (T _{smin}) - Temperature Max (T _{smax}) - Time (T _{smin} to T _{smax}) (t _s) | 150°C 200°C 60 -150 seconds |
| Time 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 | 8mimutes max. |



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

| | |
|-------------|---------------|
| Document No | TRLS-XX0S001L |
| Issued date | 2020/06/11 |
| 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.