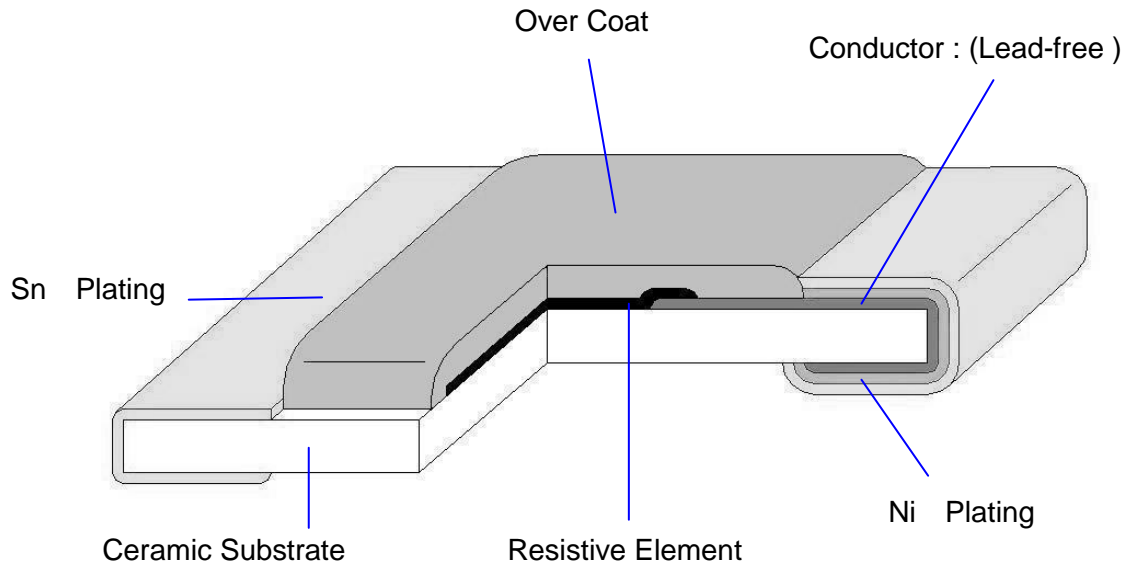


1. Scope :

This specification applies for the RL series of alloy film chip resistors made by TA-I.

2. Construction :



3. Type Designation :

RL

Product Code
RL : Chip Resistor

10

Size
Power Rating

F

Tolerance

TN

Packaging

R100

Nominal
Resistance

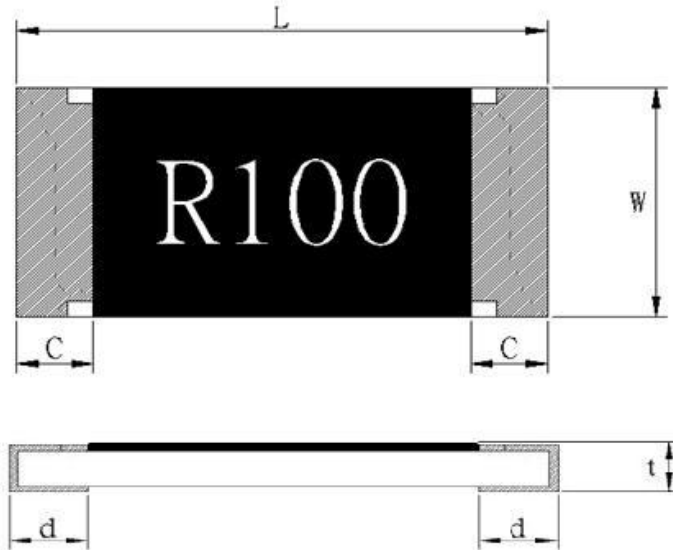
| |
|---------------------|
| 04-0402(1005) 1/16W |
| 06-0603(1608) 1/8W |
| 10-0805(2012) 1/4W |
| 12-1206(3216) 1/2W |
| 13-1210(3226) 1/2W |
| 20-2010(5025) 3/4W |
| 25-2512(6432) 1W |

| |
|--------|
| J- ±5% |
| G- ±2% |
| F- ±1% |

| |
|-----------------|
| T-Paper Tape |
| E-Embossed Tape |
| N-Lead Free |

| |
|-------------------------------------|
| 3 Digits e.g.,5% (E24) R10=0.1Ω |
| 4 Digits e.g.,1% (E96) R100=0.1Ω |

4. Dimensions :



UNIT: mm

| Type | L | W | C | d | t |
|------|--|------------|------------|------------|------------|
| RL04 | 1.00 ^{+0.10} / _{-0.05} | 0.50 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 | 0.35 ±0.05 |
| RL06 | 1.60 ±0.10 | 0.80 ±0.10 | 0.30 ±0.20 | 0.35 ±0.20 | 0.45 ±0.10 |
| RL10 | 2.00 ±0.10 | 1.25 ±0.10 | 0.40 ±0.20 | 0.35 ±0.20 | 0.50 ±0.10 |
| RL12 | 3.10 ±0.20 | 1.55 ±0.10 | 0.50 ±0.30 | 0.40 ±0.20 | 0.55 ±0.10 |
| RL13 | 3.10 ±0.20 | 2.55 ±0.20 | 0.50 ±0.30 | 0.50 ±0.20 | 0.55 ±0.15 |
| RL20 | 5.00 ±0.20 | 2.50 ±0.20 | 0.60 ±0.30 | 0.50 ±0.25 | 0.55 ±0.10 |
| RL25 | 6.30 ±0.20 | 3.20 ±0.20 | 0.60 ±0.30 | 0.50 ±0.25 | 0.55 ±0.10 |

5. Electrical characteristics :

| Characteristics | Feature | | | | | | | Measurement Method |
|---------------------------------|------------------------------------|------|------|------|------|------|------|---------------------------|
| | RL04 | RL06 | RL10 | RL12 | RL13 | RL20 | RL25 | |
| Power Ratings (W) | 1/16W | 1/8W | 1/4W | 1/2W | 1/2W | 3/4W | 1W | JIS Code 3A / JIS Code 3D |
| Resistance Value (mΩ) | 100 ~ 910 | | | | | | | Refer to JIS C 5201-1-4.5 |
| T.C.R (ppm / °C) | 100~500mΩ: ±300 501~910mΩ: ±200 | | ±200 | | | | | Refer to JIS C 5201-1-4.8 |
| Operation Temperature Range(°C) | -55 ~ +155 | | | | | | | |
| Resistance Tolerance (%) | ± 1%, ± 2%, ± 5% | | | | | | | JIS C 5201-1-4.2.5 |
| Insulation Resistance (MΩ) | Over 100 | | | | | | | Refer to JIS C 5201-1-4.6 |
| Maximum Working Voltage (V) | (P * R) ^{1/2} | | | | | | | |

Note : Except for the above standardized products, we also provide the customized products.

5.1 Derating Curve :

For resistors operated at ambient temperature over 70°C , power rating shall be derated in accordance with figure 1.

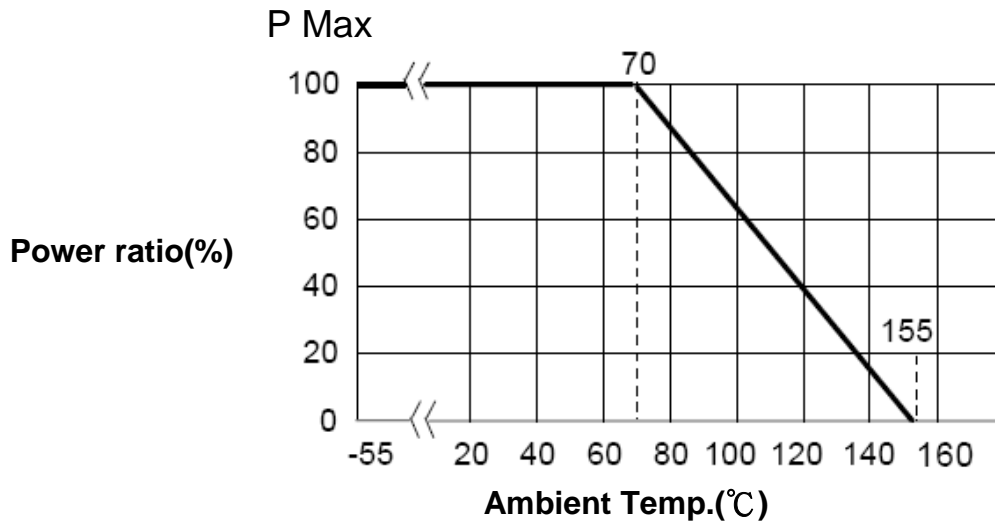


Figure 1

6. Reliability Test :

| NTest Item | Reference standard | Condition of Test | Test Limits |
|--|---|---|---|
| Temperature Coefficient of Resistance | IEC60115-1-4.8 JIS-C5201-1-4.8 | -55 ~ +125°C | Refer to paragraph 5 |
| Short Time Overload | IEC60115-1-4.13 JIS-C5201-1-4.13 | 2.5 X rated voltage, 5s | 1%:± (1%+0.005 Ω) 2%,5%:± (3%+0.005 Ω) Remark: 0402±(2%+0.005 Ω) |
| Load Life | IEC60115-1-4.25.1 JIS-C5201-1-4.25.1 | 1000 hours at rated power , 70°C , 1.5hours "ON " , 0.5hour "OFF" | 1%:± (1%+0.001 Ω) 2%,5%:± (3%+0.001 Ω) Remark: 0402±(3%+0.005 Ω) |
| Load Life with Humidity | IEC60115-1-4.24 JIS-C5201-1-4.24 | 1000 hours at rated power , 40 ± 2°C , 90~95% RH 1.5hours "ON " , 0.5hour "OFF" | 1%:± (1%+0.001 Ω) 2%,5%:± (3%+0.001 Ω) Remark: 0402±(3%+0.005 Ω) |
| Rapid Change of Temperature | IEC60115-1-4.19 JIS-C5201-1-4.19 | -55°C (30 min.) / +155 °C(30 min.) 5 cycles | ± 1%+0.005 Ω |
| Resistance to Soldering Heat | IEC60115-1-4.18 JIS-C5201-1-4.18 | 270 ± 5°C solder , 10 ± 1 sec dwell . | ± 1%+0.005 Ω |
| Solderability | IEC60115-1-4.17 JIS-C5201-1-4.17 | 245±5°C solder, 2±0.5 sec dwell. Solder : Sn96.5 / Ag3.0 / Cu0.5 | At least 95% of surface area of electrode shall be covered with new solder. |
| Robustness of Termination (Bending Strength) | IEC60115-1-4.33 JIS-C5201-1-4.33 | 3mm deflection 2mm deflection (RL20,25) | ± 1%+0.005Ω |
| Resistance to Dry Heat | IEC60115-1-4.23.2 JIS-C5201-1-4.23.2 | 155 ± 5°C for 96 ± 4hrs | 1%: ± (1%+0.005 Ω) 2%,5%:± (2%+0.005 Ω) |

MSL Level: 1

Note* :RCWV : Rated continuous working voltage .

7. Marking :

7.1 Type : 0805, 1206, 1210, 2010, 2512

7.1.1 E96: 1%

Resistance value is expressed by 4 digits, the first "R" means decimal point and the other digits represent for the normal resistance in Ω .

e.g., R100 =100 m Ω

7.1.2 E24: 2%,5%

Resistance value is expressed by 3 digits, the first "R" means decimal point and the other digits represent for the normal resistance in Ω .

e.g., R10 =100 m Ω

7.2 Type : 0603

7.2.1 E96: 1%

When the marking space is too small in such small-sized resistors as RL06, the marking can not made by 4 digits and may be made by two digits combined with one English capital.

Significant figures of nominal resistance

| Symbol | E96 | Symbol | E96 | Symbol | E96 | Symbol | E96 |
|--------|-----|--------|-----|--------|-----|--------|-----|
| 01 | 100 | 25 | 178 | 49 | 316 | 73 | 562 |
| 02 | 102 | 26 | 182 | 50 | 324 | 74 | 576 |
| 03 | 105 | 27 | 187 | 51 | 332 | 75 | 590 |
| 04 | 107 | 28 | 191 | 52 | 340 | 76 | 604 |
| 05 | 110 | 29 | 196 | 53 | 348 | 77 | 619 |
| 06 | 113 | 30 | 200 | 54 | 357 | 78 | 634 |
| 07 | 115 | 31 | 205 | 55 | 365 | 79 | 649 |
| 08 | 118 | 32 | 210 | 56 | 374 | 80 | 665 |
| 09 | 121 | 33 | 215 | 57 | 383 | 81 | 681 |
| 10 | 124 | 34 | 221 | 58 | 392 | 82 | 698 |
| 11 | 127 | 35 | 226 | 59 | 402 | 83 | 715 |
| 12 | 130 | 36 | 232 | 60 | 412 | 84 | 732 |
| 13 | 133 | 37 | 237 | 61 | 422 | 85 | 750 |
| 14 | 137 | 38 | 243 | 62 | 432 | 86 | 768 |
| 15 | 140 | 39 | 249 | 63 | 442 | 87 | 787 |
| 16 | 143 | 40 | 255 | 64 | 453 | 88 | 806 |
| 17 | 147 | 41 | 261 | 65 | 464 | 89 | 825 |
| 18 | 150 | 42 | 267 | 66 | 475 | 90 | 845 |
| 19 | 154 | 43 | 274 | 67 | 487 | 91 | 866 |
| 20 | 158 | 44 | 280 | 68 | 499 | 92 | 887 |
| 21 | 162 | 45 | 287 | 69 | 511 | 93 | 909 |
| 22 | 165 | 46 | 294 | 70 | 523 | 94 | 931 |
| 23 | 169 | 47 | 301 | 71 | 536 | 95 | 953 |
| 24 | 174 | 48 | 309 | 72 | 549 | 96 | 976 |

Symbol for multipliers

| Symbol | A | B | C | D | E | F | G | H | X | Y | Z |
|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| multipliers | 10 ⁰ | 10 ¹ | 10 ² | 10 ³ | 10 ⁴ | 10 ⁵ | 10 ⁶ | 10 ⁷ | 10 ⁻¹ | 10 ⁻² | 10 ⁻³ |

e.g., 01Z =100 x10⁻³=100 m Ω

Notes :

When the resistance value is not in the list of E96 , 3 digitals with underline in E-24 series is used as mark .

e.g., 0603 : 120m Ω , 1% Marking is 012

7.2.2 E24: 2%,5%

Resistance value is expressed by 3 digits, the first "0" means decimal point and the other digits represent for the normal resistance in Ω .
e.g., 010 = 100 m Ω

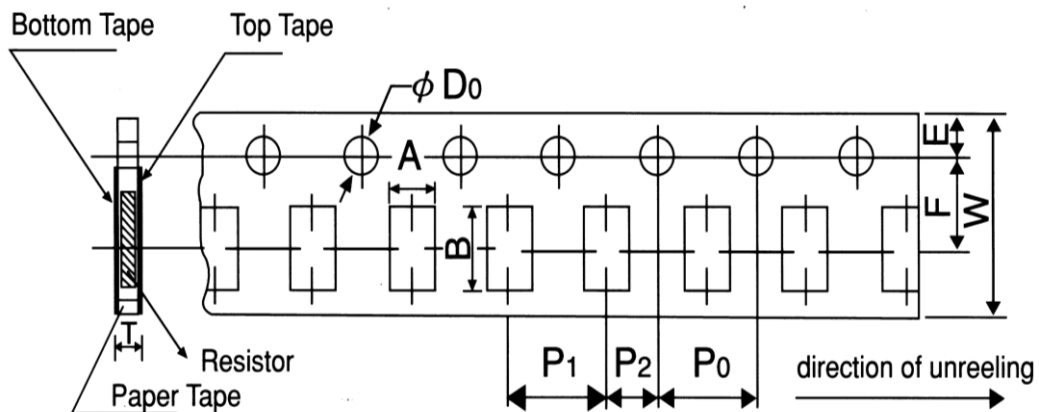
7.2 Type: 0402

RL04 : No Marking

8. Taping & Reel :

8.1 Taping Dimensions :

8.1.1 4 mm pitch paper



UNIT: mm

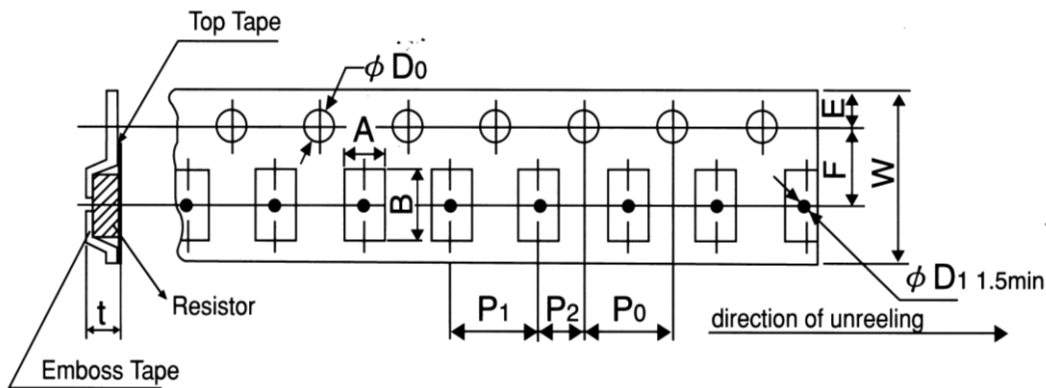
| Packing | Type | A | B | W | F | E | P ₁ | P ₂ | P ₀ | D ₀ | T |
|------------|------|-----------|----------|---------|----------|----------|----------------|----------------|----------------|----------------|-----------|
| Paper Tape | RL06 | 1.1 ±0.1 | 1.9 ±0.1 | 8.0±0.2 | 3.5±0.05 | 1.75±0.1 | 4.0±0.1 | 2.0±0.05 | 4.0±0.1 | φ 1.5 | 0.64 ±0.1 |
| | RL10 | 1.6 ±0.15 | 2.4 ±0.2 | | | | | | | | +0.1 |
| | RL12 | 2.0 ±0.15 | 3.6 ±0.2 | | | | | | | | -0 |
| | RL13 | 2.8 ±0.20 | 3.6 ±0.2 | | | | | | | | 0.84 ±0.1 |

8.1.2 2 mm pitch paper :



| Packing | Type | A | B | W | F | E | P ₁ | P ₂ | P ₀ | D ₀ | T |
|------------|------|----------|----------|----------|----------|----------|----------------|----------------|----------------|---------------------|-----------|
| Paper Tape | RL04 | 0.7±0.05 | 1.2±0.05 | 8.0 ±0.2 | 3.5±0.05 | 1.75±0.1 | 2.0 ±0.1 | 2.0 ±0.1 | 4.0 ±0.1 | φ 1.5 +0.1 -0 | 0.45 ±0.1 |
| | RL06 | 1.1 ±0.1 | 1.9 ±0.1 | 8.0 ±0.2 | 3.5±0.05 | 1.75±0.1 | 4.0 ±0.1 | 2.0 ±0.1 | 4.0 ±0.1 | φ 1.5 +0.1 -0 | 0.64 ±0.1 |

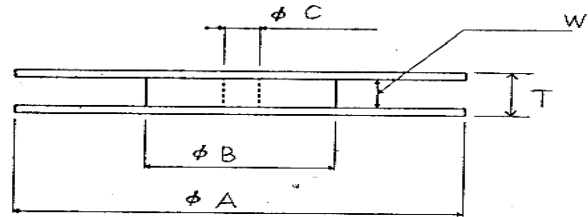
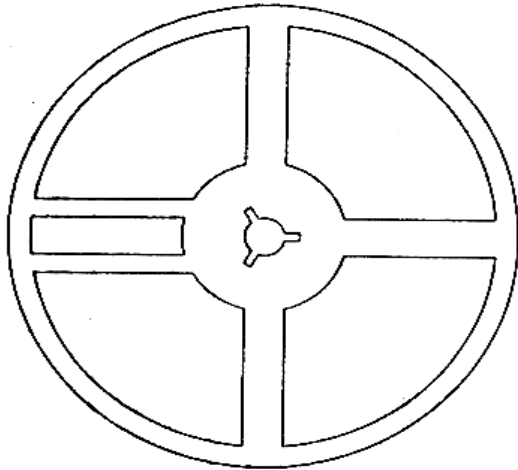
8.1.3 4 mm pitch Emboss :



| Packing | Type | A | B | W | F | E | P ₁ | P ₂ | P ₀ | D ₀ | T |
|---------|------|----------|----------|----------|----------|----------|----------------|----------------|----------------|---------------------|------------|
| Emboss | RL20 | 2.8 ±0.2 | 5.3 ±0.2 | 12.0±0.2 | 5.5±0.05 | 1.75±0.1 | 4.0±0.1 | 2.0±0.05 | 4.0±0.05 | φ 1.5 +0.1 -0 | 0.85 ±0.15 |
| | RL25 | 3.6 ±0.2 | 6.9 ±0.2 | | | | | | | | |

| Type Size | | Paper Tape | | Emboss Plastic Tape 4 mm pitch |
|-----------|----|------------|------------|-----------------------------------|
| | | 4 mm pitch | 2 mm pitch | |
| | | 178mm/R | 178mm/R | |
| RL | 04 | | 10000 | |
| RL | 06 | 5000 | 10000 | |
| RL | 10 | 5000 | | |
| RL | 12 | 5000 | | |
| RL | 13 | 5000 | | |
| RL | 20 | | | 4000 |
| RL | 25 | | | 4000 |

8.2 Reel Specifications :

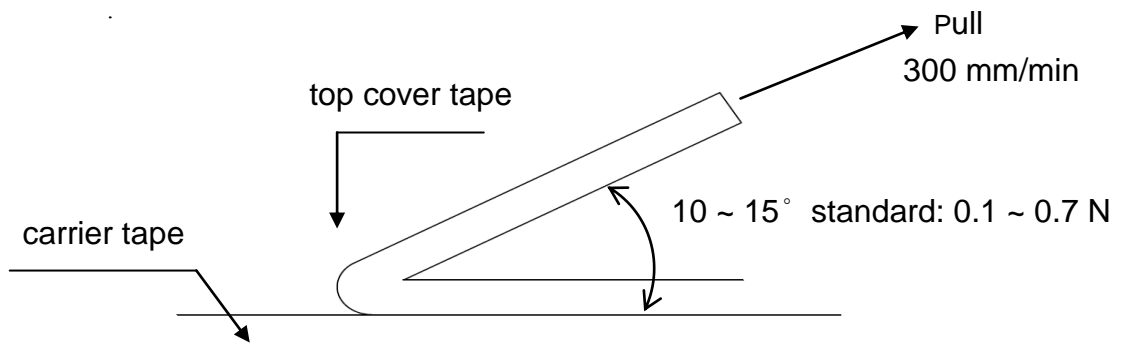


UNIT: mm

| Series | ϕA | ϕB | ϕC | W | T |
|-----------------------|---------------|----------------|----------------|----------------|----------------|
| RL 04/ 06/ 10/ 12/ 13 | 178 ± 2.0 | 60.0 ± 1.0 | 13.0 ± 1.0 | 9.0 ± 1.0 | 11.5 ± 1.0 |
| RL 20 / 25 | | | | 13.0 ± 1.0 | 15.5 ± 1.0 |

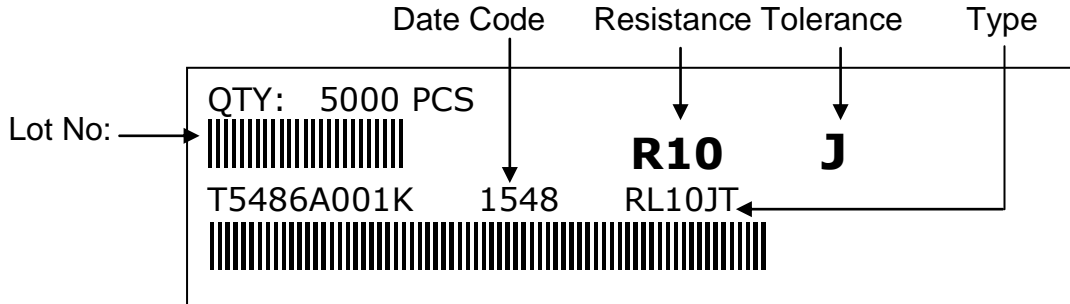
8.3 Peel – off force :

Peel – off force of paper and blister tape is in accordance with “JIS-C5202 ” that is , 0.1 to 0.7 N at a peel-off speed of 300 mm / minute.



9. Label :

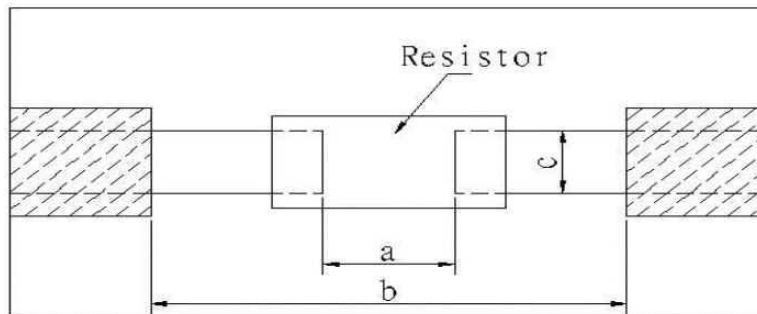
9.1 Manufacture Label :



9.2 Customer Label: (By customer request) :

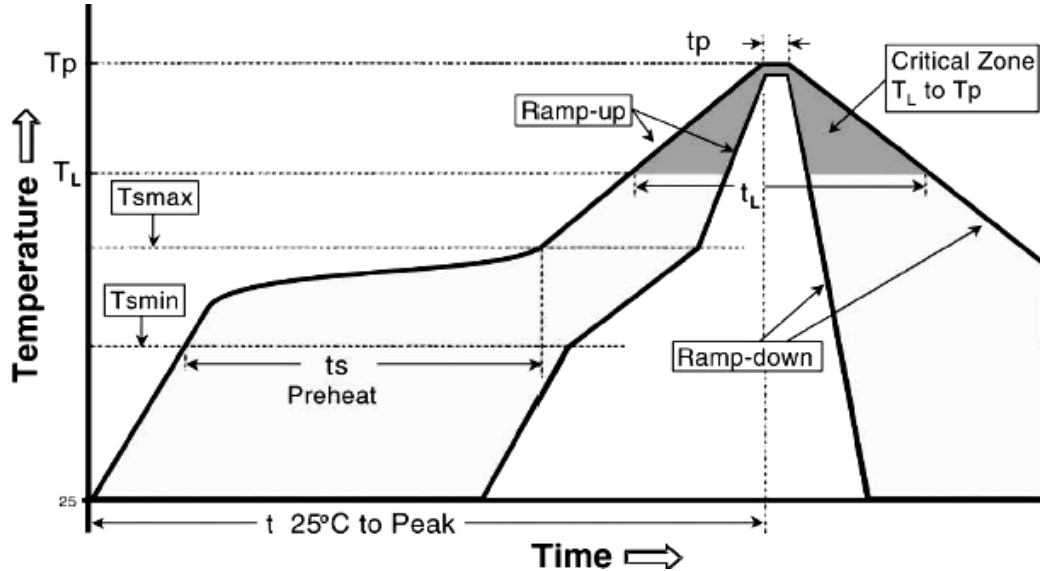


10. Recommended land patterns :



| Type | Land pattern Size | Dimension (mm) | | |
|------|----------------------|------------------|---------|---------|
| | | a | b | c |
| RL | 04(1005) | 0.5~0.6 | 1.4~1.6 | 0.4~0.6 |
| RL | 06 (0603) | 0.7~0.9 | 2.0~2.2 | 0.8~1.0 |
| RL | 10 (0805) | 1.0~1.4 | 3.2~3.8 | 0.9~1.4 |
| RL | 12 (1206) | 2.0~2.4 | 4.4~5.0 | 1.2~1.8 |
| RL | 13 (1210) | 2.0~2.4 | 4.4~5.0 | 2.3~3.5 |
| RL | 20 (2010) | 3.3~3.7 | 5.7~6.5 | 2.3~3.5 |
| RL | 25 (2512) | 3.6~4.0 | 7.6~8.6 | 2.3~3.5 |

11. Recommend IR – Reflow profile : (Lead-Free solder : Sn96.5 / Ag3 / Cu0.5)



| 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 -120 seconds |
| Time maintained above : - Temperature (T _L) - Time (t _L) | 217°C 60-150 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. |

Allowed Re-flow times : 3 times

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

12. Storage Conditions :

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

13. Shelf Life :

2 years from manufacturing date

| | | | |
|-------------|---|-------------|--------------|
| TA-I | Alloy Film Chip Resistors Low Resistance (Standard) Halogen-Free | Document No | TRL-XX0S002C |
| | | Issued date | 2022/02/23 |
| | | Page. | 10 / 10 |

14. 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.

15. Manufacturing Country & City :

TA-I TECHNOLOGY CO., LTD. (Taiwan– Tao Yuan)
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Associated companies :

(1) FORTUNE TASK RESISTOR FACTORY (China – Dongguan)
Tel : 86-769-8339-4790~3 Fax : 86-769-8339-4794

(2) TA-I TECHNOLOGY (DONGGUAN) CO., LTD. (China –Dongguan)
Tel : 86-769-8339-4790~3 Fax : 86-769-8339-4794

(3) TA-I TECHNOLOGY (SU ZHOU) CO., LTD. (China – Su Zhou)
Tel :86- 512-63457879 Fax : 86-512-63457869

(4) TAI OHM ELECTRONICS (M) SDN. BHD. (Malaysia – Penang)
Tel :604- 3900480 Fax : 604-3901481

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[PR2512FKF7W0R004L](#) [RC1005F124CS](#) [RL73K3AR56JTDF](#) [RL7520WT-R001-F](#) [RL7520WT-R009-G](#) [RL7520WT-R020-F](#) [LRC-](#)
[LR2512LF-01-R820J](#) [WR06X104JGLJ](#) [TL2BR01F](#) [65709-330](#) [SP1R12J](#) [RL7520WT-R039-G](#) [RL7520WT-R002-F](#) [LRF2010-R003JW](#)
[KRL1632E-C-R200-F-T5](#) [KRL1632E-C-R200-F-T1](#) [Y14880R02000B9R](#) [RLP73M1ER051FTDF](#) [RLP73M2AR075FTDF](#)
[SR731ERTTP5R10F](#) [SR731ERTTP100J](#) [SR731ERTTP6R80F](#) [SR731ERTTP4R70F](#) [SR731ERTTP2R20F](#) [SR731ERTTP3R90F](#)
[SR731ERTTP1R00F](#) [SR731ERTTP10R0F](#) [SR731ERTTP2R00F](#) [SR731ERTTP8R20F](#) [SR731ERTTP3R9J](#) [SR731ERTTP8R2J](#)
[SR731ERTTP2R0J](#) [SR731ERTTP4R7J](#) [SR731ERTTP9R1J](#) [SR731ERTTP1R0J](#) [SR731ERTTP2R2J](#) [SR731ERTTP5R1J](#) [SR731ERTTP6R8J](#)
[SR731ERTTP9R10F](#) [RCWE2512R180FKEA](#) [FCSL64R007JER](#) [LRF1206-R018FW](#) [TLR2B10DR022FTDG](#)