

DATA SHEET

Product Name Metal Strip Chip Resistors

Part Name LR06/LR12 Series

File No. SMD-SP-016

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1. Scope

- 1.1 This specification for approve relates to the Metal Strip Chip Resistors manufactured by UNI-ROYAL.
- 1.2 High power rating up to 3 watts
- 1.3 Low TCR
- 1.4 Low inductance
- 1.4 Compliant with RoHS directive.
- 1.5 Halogen free requirement.

2. Part No. System

Part No. includes 14 codes shown as below:

2.1 1st~4th codes: Part name. E.g.: LR06,LR12

2.2 5th~6th codes: Power rating.

| | | | | |
|-------------|----|-----|----|----|
| Wattage | 1 | 1.5 | 2 | 3 |
| Normal Size | 1W | 1A | 2W | 3W |

2.3 7th code: Tolerance. E.g.: F=±1% J=±5%

2.4 8th~11th codes: Resistance Value.

2.4.1 If value belongs to standard value of ≥2% series, 8th code would be zero, 9th~10th codes are significant figures of the resistance and 11th code is the power of ten.

2.4.2 If value belongs to standard value of ≤1% series, 8th~10th codes are significant figures of the resistance, and 11th code is the power of ten.

2.4.3 11th codes listed as following:

$$0=10^0 \quad 1=10^1 \quad 2=10^2 \quad 3=10^3 \quad 4=10^4 \quad 5=10^5 \quad 6=10^6 \quad J=10^{-1} \quad K=10^{-2} \quad L=10^{-3} \quad M=10^{-4}$$

$$N=10^{-5} \quad P=10^{-6}$$

2.5 12th~14th codes.

2.5.1 12th code: Packaging Type. E.g.: T=Tape/Reel

2.5.2 13th code: Standard Packing Quantity.

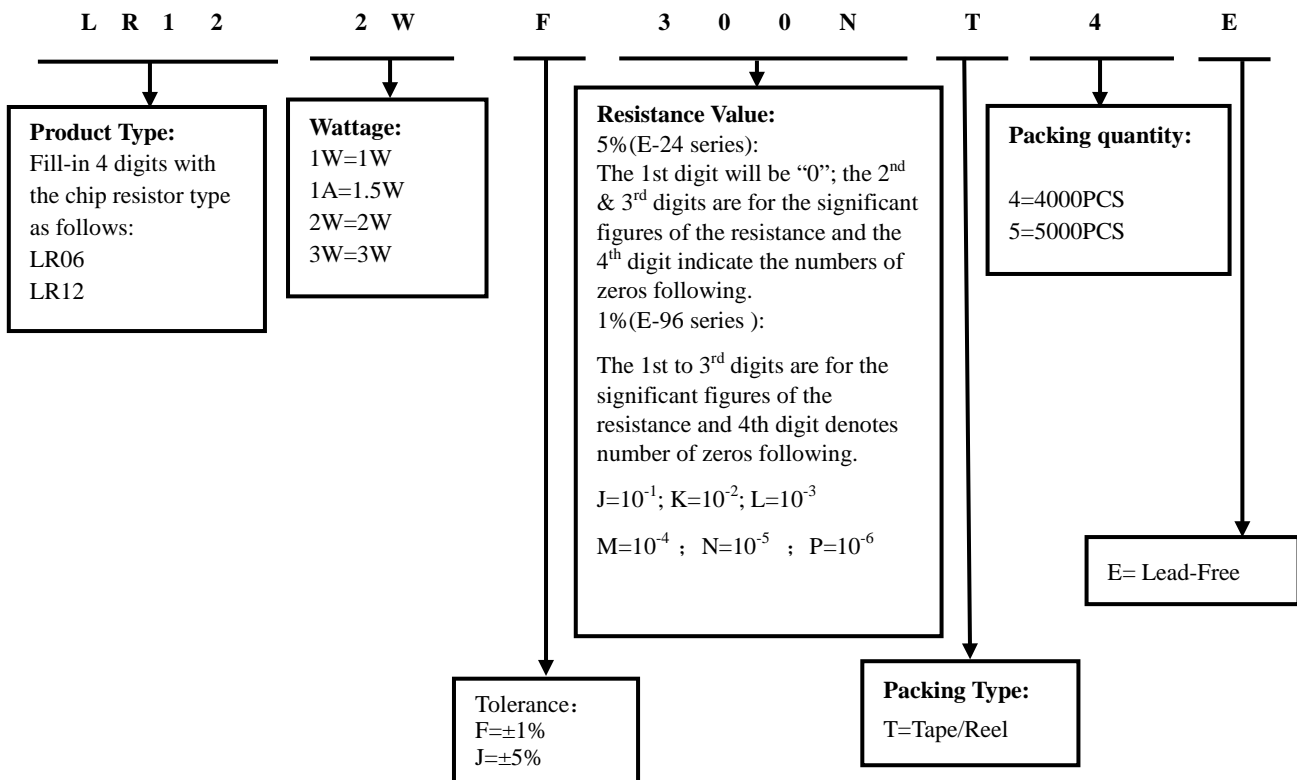
$$4=4000\text{pcs} \quad 5=5000\text{pcs}$$

2.5.3 14th code: Special features.

E = Environmental Protection, Lead Free, or Standard type.

3. Ordering Procedure

(Example: LR12 2W ±1% 3mΩ T/R-4000)



4. Marking

4.1 Normally, the products marking are 4 digits.

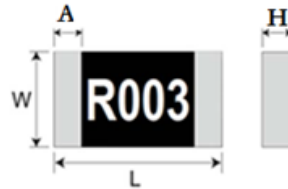
“R” designates the decimal location in ohms

e.g. 3mΩ the product marking is R003.

25mΩ the product marking is R025.

100mΩ the product marking is R100.

5. Dimension

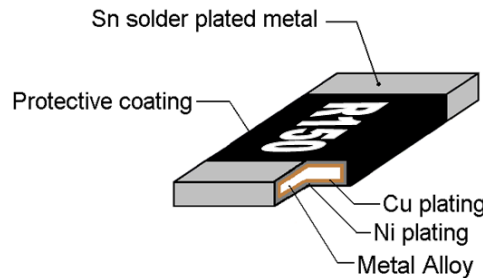


3~350mΩ

Unit:mm

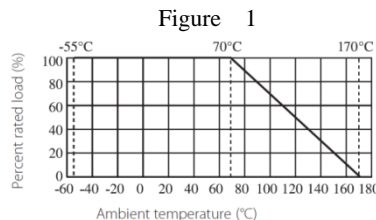
| Type | Power Rating | Resistance Range | L | W | H | A |
|----------------|--------------|------------------|-----------|-----------|-----------|-----------|
| LR06 (1206) | 1W | 3~30mΩ | 3.20±0.25 | 1.60±0.25 | 0.65±0.25 | 0.70±0.30 |
| | 1.5W | 3~5mΩ | | | | |
| LR12 (2512) | 2W | 3~25mΩ | 6.35±0.25 | 3.18±0.25 | 0.70±0.25 | 0.90±0.25 |
| | | 26~350mΩ | | | 0.90±0.25 | 0.65±0.25 |
| | 3W | 3~9mΩ | | | 0.90±0.25 | 0.90±0.25 |
| | | 10~350mΩ | | | 0.90±0.25 | 0.65±0.25 |

6. Structure



7. Derating Curve

Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70°C. For temperature in excess of 70°C , The load shall be derate as shown in figure 1.



The following equation may be used to determine the DC (Direct Current) or AC (Alternating Current) (RMS, root mean square value) of normal rated power. However, if the result value exceeds the highest current of regulated standards, the highest normal rated power is to be used

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

I = Rating current (A)

P= Rating Power (W)

R= Resistance(Ω)

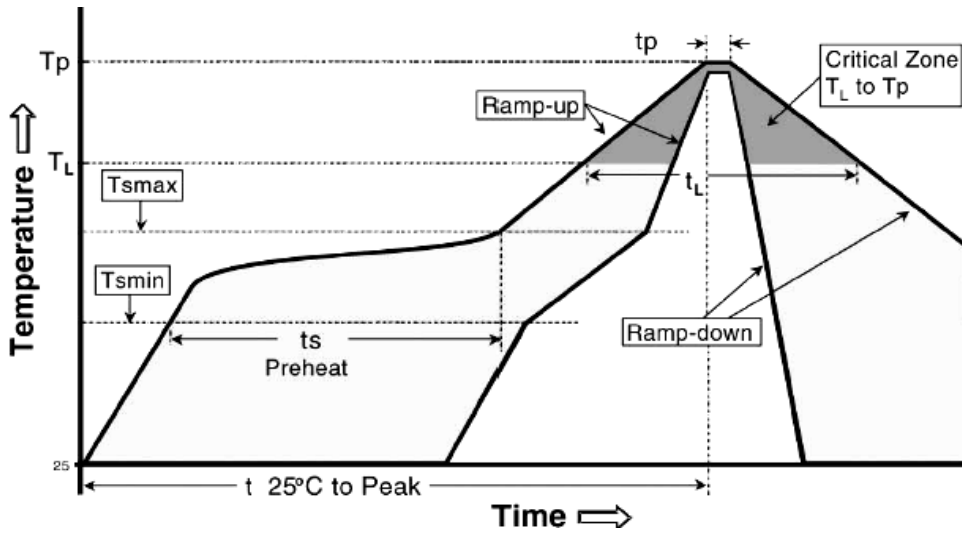
8. Performance Specification

| Test Item | Test Methods (GB/T 5729, JIS-C-5201, IEC 60115-1) | Requirements |
|---------------------------------|---|--------------------------------------|
| Temperature Coefficient | 4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/}^\circ\text{C)}$ R ₁ : Resistance Value at room temperature (t ₁) ; R ₂ : Resistance at test temperature(t ₂) t ₁ : +25 °C or specified room temperature t ₂ : Test temperature(125 °C) | ±50PPM/°C |
| Short-time overload | 4.13 The number of rated power are as follows : LR06: 5 times of rated power; LR12-2W: 5 times of rated power; LR12-3W: 4times of rated power; for 5 seconds | ΔR≤±(0.5%+0.0005Ω) |
| Load Life | 4.25.1 Permanent Resistance change after 1000 hours operating at rated working current or Max .Working Current whichever less with duty cycle of 1.5hours “ON” , 0.5 hour “OFF” at 70±2 °C ambient. | ΔR≤±(1.0%+0.0005Ω) |
| High Temperature Exposure | MIL-STD-202 108A Exposed to a temperature of 155±2 °C for 1000H. | ΔR≤±(1.0%+0.0005Ω) |
| Biased Humidity | MIL-STD-202 Method 103 1000 hours 85 °C/85%RH. Note: Specified conditions:10% of operating power. Measurement at 24±4 hours after test conclusion. | ΔR≤±(0.5%+0.0005Ω) |
| Rapid change of temperature | 4.19. 30 min at -55 °C and 30 min at 155 °C; 100 cycles | ΔR≤±(0.5%+0.0005Ω) |
| Terminal bending | 4.33. 2mm , 10Sec | ΔR≤±(0.5%+0.0005Ω) |
| Resistance to Solder Heat | 4.18 Dip the resistor into a temperature of 260±5 °C and hold it for a 10±1 seconds. | ΔR≤±(0.5%+0.0005Ω) |
| Solderability | 4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Temperature of solder: 245±3 °C; Dwell time in solder: 2~3seconds. | >95% Coverage |
| Dielectric Withstanding Voltage | 4.7 Applied 500 VAC for 1 minute , and Limit surge current 50 mA (max.) | No short or burned on the appearance |
| Terminal Strength | 4.16 5N , 10 seconds | No broken |

9. Soldering Condition

(This is for recommendation, please customer perform adjustment according to actual application)

9.1 Recommend Reflow Soldering Profile: (solder : Sn96.5 / Ag3 / Cu0.5)

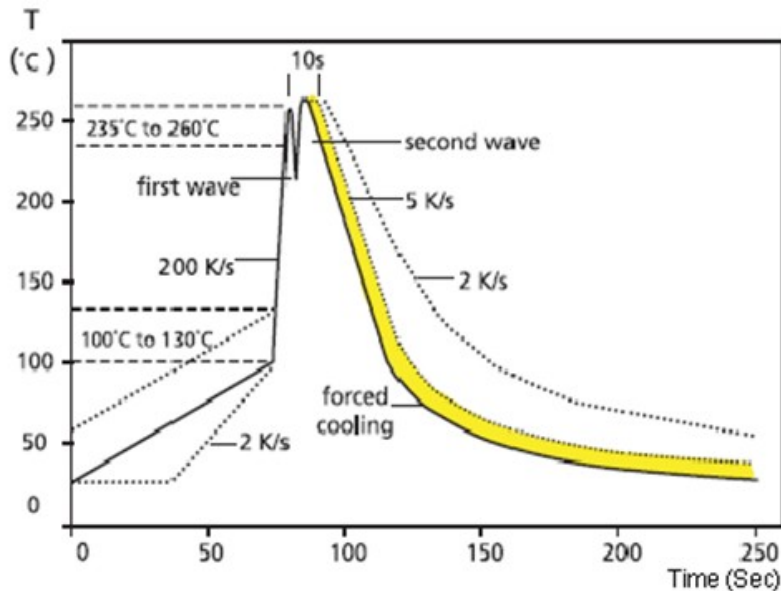


| Profile Feature | Lead (Pb)-Free solder |
|---|----------------------------------|
| Preheat: Temperature Min (T _{s min}) Temperature Max (T _{s max}) Time (T _{s min} to T _{s max}) (ts) | 150°C 200°C 60 -120seconds |
| Average ramp-up rate: (T _{s max} to T _p) | 3°C/ second max. |
| Time maintained 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 (tp) ² | 10 seconds |
| Ramp-down Rate | 6°C/second max. |
| Time 25°C to Peak Temperature | 8 minutes max. |

Allowed Re-flow times : 2 times

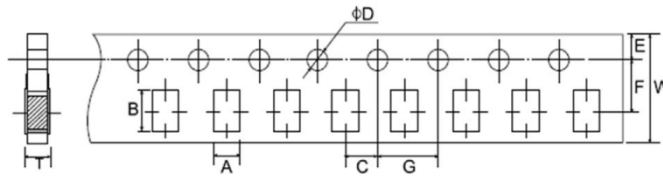
Remark : To avoid discoloration phenomena of chip on terminal electrodes, we suggest use N₂ Re-flow furnace .

9.2 Recommend Wave Soldering Profile :

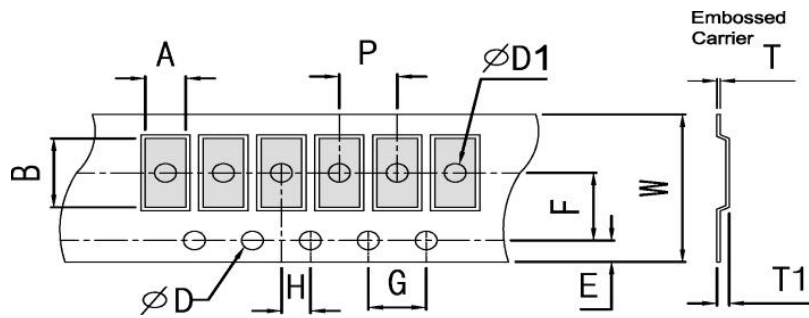


10. Packing

10.1 Embossed Dimensions:(Unit: mm)

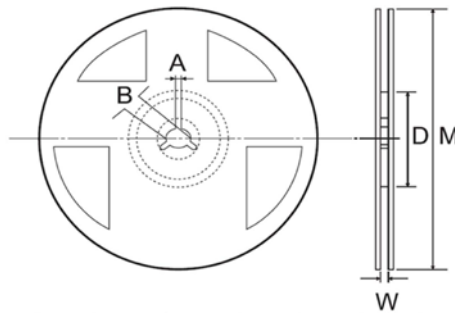


| Type | A | B | C | ΦD | E | F | G | W | T |
|------|----------|----------|----------|------------------------------------|-----------|----------|----------|----------|-----------|
| LR06 | 2.0±0.20 | 3.6±0.20 | 2.0±0.05 | 1.50 ^{+0.1} ₋₀ | 1.75±0.10 | 3.5±0.05 | 4.0±0.10 | 8.0±0.20 | 0.81±0.10 |



| Type | W | P | E | F | ΦD | ΦD1 | G | H | A | B | T1 | T |
|------|-----------|----------|-----------|----------|------------------------------------|-----------|----------|----------|-----------|-----------|-----------|-----------|
| LR12 | 12.0±0.30 | 4.0±0.10 | 1.75±0.10 | 5.5±0.10 | 1.50 ^{+0.1} ₋₀ | 1.55±0.10 | 4.0±0.10 | 2.0±0.10 | 3.50±0.10 | 6.80±0.10 | 1.10±0.10 | 0.20±0.05 |

10.2 Dimension of Reel : (Unit: mm)



| Type | Taping | Qty/Reel | A | B | D | W | ΦM |
|------|----------|----------|---------|----------|----------|----------|---------|
| LR06 | Paper | 5,000pcs | 2.0±0.5 | 13.0±0.5 | 60.0±1.0 | 10.0±1.0 | 178±2.0 |
| LR12 | Embossed | 4,000pcs | 2.0±0.5 | 13.0±0.5 | 60.0±1.0 | 13.8±1.0 | 178±2.0 |

11. Note

- 11.1 UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35°C under humidity between 25 to 75%RH.
 Even under UNI-ROYAL recommended storage condition, solderability of products over 1 year old. (Put condition for each product) may be degraded.
- 11.2 Store / transport cartons in the correct direction, which is indicated on a carton as a symbol.
 Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
- 11.3 Product performance and soldered connections may deteriorate if the products are stored in the following places:
- Storage in high Electrostatic.
 - Storage in direct sunshine、rain and snow or condensation.
 - Where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, NO₂, Br etc.

12. Record

| Version | Description | Page | Date | Amended by | Checked by |
|---------|---|------|--------------|-------------|-------------|
| 1 | First version | 1~6 | Apr.23, 2021 | Haiyan Chen | Yuhua Xu |
| 2 | Extend the resistance range | 3 | Jan.18, 2022 | Haiyan Chen | Yuhua Xu |
| 3 | Extend the resistance range | 3 | Mar.09, 2022 | Haiyan Chen | Yuhua Xu |
| 4 | Extend the resistance range | 3 | May.10, 2022 | Haiyan Chen | Yuhua Xu |
| 5 | Modify the temperature coefficient test conditions | 4 | Oct.26, 2022 | Haiyan Chen | Yuhua Xu |
| 6 | Add specification for “LR06” | 1~7 | Mar.07, 2024 | Junying Ye | Haiyan Chen |
| 7 | 1. Modify the dimension 2. Cancel the recommend land pattern | 3 | May.15, 2024 | Haiyan Chen | Yuhua Xu |

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