



UNI-ROYAL
厚聲集團

DATA SHEET

Product Name Metal Strip Chip Resistors

Part Name LR Series

Uniroyal Electronics Global Co., Ltd.

88#, Longteng Road, Economic & Technical Development Zone, Kunshan, Jiangsu, China

Tel +86 512 5763 1411 / 22 /33

Email marketing@uni-royal.cn

Manufacture Plant Uniroyal Electronics Industry Co., Ltd.

Aeon Technology Corporation

Royal Electronic Factory (Thailand) Co., Ltd.

Royal Technology (Thailand) Co., Ltd.

1. Scope

- 1.1 This specification for approve relates to the Metal Strip Chip Resistors manufactured by UNI-ROYAL.
- 1.2 Low Resistance / Low TCR
- 1.3 Excellent long term stability
- 1.4 RoHs compliant and halogen free.
- 1.5 Lead free.
- 1.6 High precision current sensing and voltage division.

2. Part No. System

Part No. includes 14 codes shown as below:

2.1 1st~4th codes: Part name. E.g.: LR05, LR06, LR12, LR25, LR28, LR27

2.2 5th~6th codes: Power rating.

E.g.: W=Normal Size "1~G" = "1~16"

| | | | | | | | | | | |
|-------------|------|-----|-----|-----|-----|-----|------|------|------|----|
| Wattage | 1/32 | 3/4 | 1/2 | 1/3 | 1/4 | 1/8 | 1/10 | 1/16 | 1/20 | 1 |
| Normal Size | WH | 07 | W2 | W3 | W4 | W8 | WA | WG | WM | 1W |

If power rating is lower or equal than 1 watt, 5th code would be "W" and 6th code would be a number or letter.

E.g.: 1W=1W 4W=4W

2.3 7th code: Tolerance. E.g.: D=±0.5% F=±1% G=±2% J=±5% K=±10%

2.4 8th~11th codes: Resistance Value.

2.4.1 If value belongs to standard value of ≥5% 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 ≤2% 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=10⁰ 1=10¹ 2=10² 3=10³ 4=10⁴ 5=10⁵ 6=10⁶ J=10⁻¹ K=10⁻² L=10⁻³ M=10⁻⁴
 N=10⁻⁵ P=10⁻⁶

2.5 12th~14th codes.

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

2.5.2 13th code: Standard Packing Quantity.

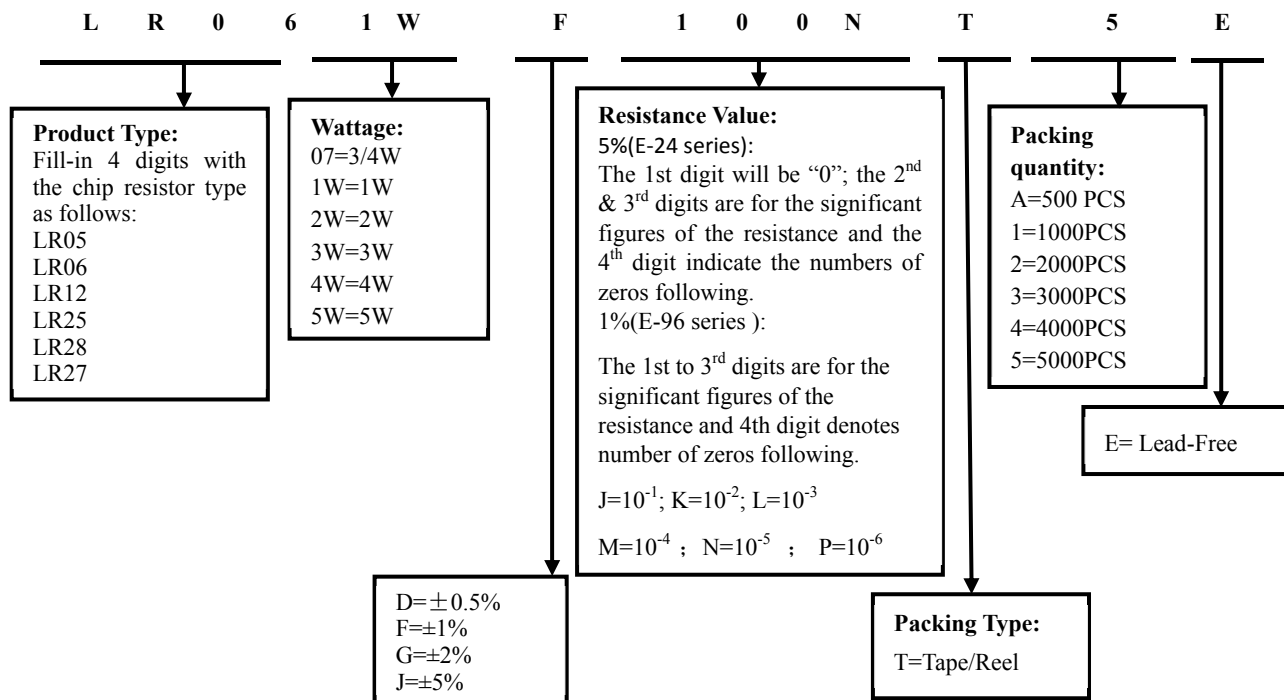
4=4000pcs 5=5000pcs C=10000pcs D=20000pcs E=15000pcs
 Chip Product: BD=B/B-20000pcs TC=T/R-10000pcs

2.5.3 14th code: Special features.

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

3. Ordering Procedure

(Example: LR06 1W ±1% 1mΩ T/R-5000)



4. Marking

4.1 LR05 products no marking.

4.2 All the other products marking are 4 digits.

(1) "R" designates the decimal location in ohms

e.g. 1mΩ the product marking is R001.

25mΩ the product marking is R025.

100mΩ the product marking is R100.

(2) 0Ω product marking is 0R

4.3 The criteria to distinguishing the mark on the surface of products are that characters can be identified.

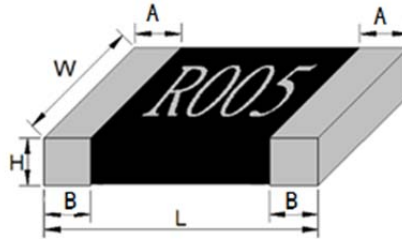
5. Standard Electrical Specifications

| Type | Rating Power at 70°C | T.C.R. (ppm/°C) | Max. Rating Current (A) | Max. Overload Current (A) | Resistance Range (mΩ) | | | Operating Temperature Range (°C) |
|------|----------------------|-----------------|-------------------------|---------------------------|-----------------------|----------------------------------|------------|----------------------------------|
| | | | | | 0.5% (D) | 1.0% (F) 2.0% (G) 5.0% (J) | | |
| LR05 | 1W | ≅±100 | 31.62 | 63.24 | --- | 1 | -55~+170°C | |
| | | ≅±75 | 25.81 | 44.72 | --- | 1.5~2 | | |
| | | ≅±50 | 15.81 | 31.62 | --- | 2.5~15 | | |
| LR06 | 1W | ≅±50 | 31.62 | 63.24 | 7~50 | 1~50 | | |
| | 1.5W | ≅±50 | 38.72 | 77.49 | 7~10 | 1~10 | | |
| LR12 | 2W | ≅±75 | 63.24 | 141.42 | --- | 0.5~0.75 | | |
| | 2W | ≅±50 | 44.72 | 100.00 | 16~450 | 1~450 | | |
| | 3W | ≅±75 | 77.45 | 154.91 | --- | 0.5~0.75 | | |
| | 3W | ≅±50 | 54.77 | 109.54 | 7~100 | 1~100 | | |
| LR25 | 4W | ≅±75 | 126.49 | 252.98 | --- | 0.25~0.3 | | |
| | | ≅±50 | 89.44 | 178.88 | | 0.5~3 | | |
| LR28 | 4W | ≅±50 | 31.62 | 63.24 | 7~450 | 4~450 | | |
| LR27 | 3W | ≅±75 | 77.45 | 173.20 | --- | 0.5 | | |
| | 3W | ≅±50 | 54.77 | 122.47 | 7~60 | 1~60 | | |
| | 5W | ≅±75 | 100.00 | 173.20 | --- | 0.5 | | |
| | 5W | ≅±50 | 70.71 | 122.47 | 7~500 | 1~500 | | |

Jumper Specifications

| Type | Rating Power at 70°C | Max. Rating Current | Resistance (mΩ) | Operating Temperature Range (°C) |
|------|----------------------|---------------------|-----------------|----------------------------------|
| LR05 | 1W | 70.7A | ≅0.2 | -55~+170°C |
| LR06 | 1W | 70.7A | | |
| LR12 | 2W | 100A | | |

6. Dimension



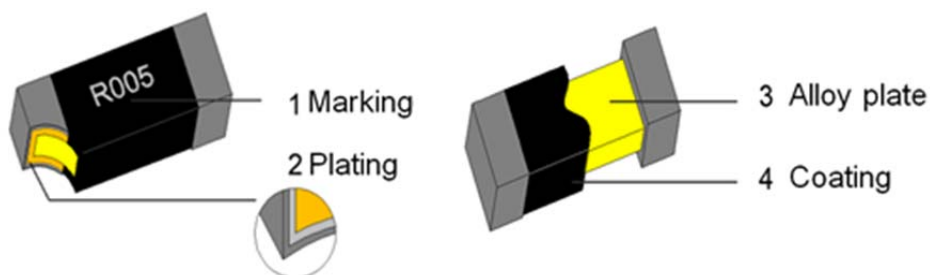
Unit:mm

| Type | Power Rating | Resistance Range | L | W | H | A | B |
|----------|--------------|------------------|--------------|-------------|-------------|-------------|-------------|
| LR05 | 1W | 1mΩ | 2.100±0.200 | 1.500±0.200 | 0.500±0.200 | / | 0.400±0.200 |
| | | 1.5mΩ | | | 0.350±0.200 | | |
| | | 2mΩ | | | | | |
| | | 2.5~3mΩ | | | | | |
| | | 4~8mΩ | | | | | |
| | 9~15mΩ | | | | | | |
| LR06 | 1W | 1mΩ | 3.200±0.254 | 1.650±0.254 | 0.770±0.254 | 0.508±0.254 | 0.508±0.254 |
| | | 2mΩ | | | 0.650±0.254 | | |
| | | 3~20mΩ | | | 0.550±0.254 | | |
| | 21~50mΩ | 0.470±0.254 | | | | | |
| | 1.5W | 1mΩ | | | 0.770±0.254 | | |
| | | 2mΩ | | | 0.650±0.254 | | |
| 3~10mΩ | | 0.550±0.254 | | | | | |
| LR12 | 2W | 0.5mΩ | 6.35±0.254 | 3.18±0.254 | 0.770±0.254 | 1.150±0.254 | 2.200±0.254 |
| | | 1 mΩ | | | 0.700±0.200 | 1.800±0.200 | 1.800±0.200 |
| | | 2~15mΩ | | | | 0.900±0.200 | 0.900±0.200 |
| | | 16~75mΩ | | | 0.600±0.254 | 1.05±0.254 | 1.100±0.254 |
| | | 76~100mΩ | | | 0.550±0.254 | 0.75±0.254 | |
| | | 101~135mΩ | | | 0.470±0.254 | | |
| | | 136~200mΩ | | | 0.400±0.254 | 0.850±0.254 | |
| | 201~450mΩ | | | | | | |
| | 3W | 0.5mΩ | | | 0.770±0.254 | 1.150±0.254 | 2.200±0.254 |
| | | 1mΩ | | | 0.670±0.254 | 1.150±0.254 | 1.400±0.254 |
| | | 1.5mΩ | | | | | 1.150±0.254 |
| | | 2mΩ | | | | | |
| | | 2.5~6mΩ | | | 0.550±0.254 | 0.75±0.254 | 1.100±0.254 |
| 7~75mΩ | | 0.600±0.254 | | | | | |
| 76~100mΩ | 0.550±0.254 | | | | | | |
| LR25 | 4W | 0.25mΩ | 6.800±0.254 | 6.350±0.254 | 0.770±0.254 | 1.15±0.254 | 2.300±0.254 |
| | | 0.3mΩ | | | 1.800±0.254 | | |
| | | 0.5mΩ | | | 2.300±0.254 | | |
| | | 1mΩ | | | 1.800±0.254 | | |
| | | 1.5mΩ | | | 1.500±0.254 | | |
| 2~3mΩ | 0.550±0.254 | | | | | | |
| LR28 | 4W | 4~450mΩ | 6.600±0.254 | 6.700±0.254 | 0.580±0.254 | 0.40±0.254 | 1.050±0.254 |
| LR27 | 3W | 0.5mΩ | 11.300±0.500 | 6.600±0.500 | 0.770±0.254 | 0.90±0.254 | 3.000±0.254 |
| | | 1mΩ | | | 0.650±0.254 | | 2.000±0.254 |
| | | 1.5~5mΩ | | | 0.550±0.254 | | |
| | 5W | 6~60mΩ | | | 0.800±0.254 | 0.65±0.254 | 3.000±0.254 |
| | | 0.5mΩ | | | 0.680±0.254 | | 2.000±0.254 |
| | | 1mΩ | | | | | |
| | | 1.5~5mΩ | | | | | |
| | | 6~500mΩ | | | 0.580±0.254 | | |

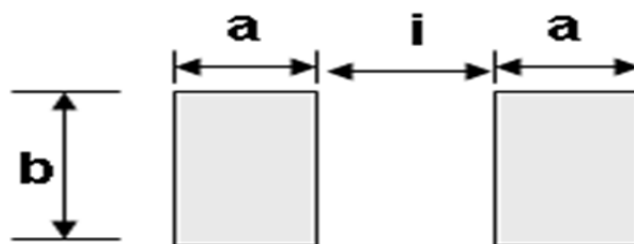
JumperDimension

| Unit:mm | | | | | | | |
|---------|--------------|------------------|-------------|-------------|-------------|-------------|-------------|
| Type | Power Rating | Resistance Range | L | W | H | A | B |
| LR05 | 1W | < 0.2mΩ | 2.10±0.20 | 1.500±0.20 | 0.35±0.20 | / | 0.40±0.20 |
| LR06 | 1W | < 0.2mΩ | 3.200±0.250 | 1.650±0.250 | 0.650±0.254 | 0.508±0.254 | 0.508±0.254 |
| LR12 | 2W | < 0.2mΩ | 6.350±0.250 | 3.180±0.250 | 0.650±0.254 | 1.15±0.254 | 1.100±0.254 |

7. Structure



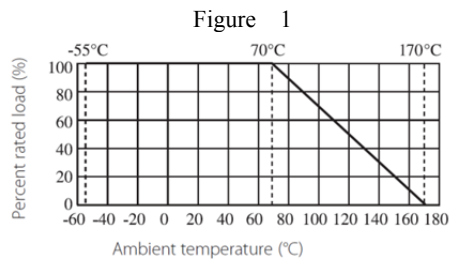
8. Recommend land pattern



| Unit: mm | | | | |
|---------------|------------------|------|------|------|
| Type | Resistance Range | a | b | i |
| LR05-1W | 1~15mΩ | 1.00 | 1.80 | 1.00 |
| LR06 -1W,1.5W | Jumper : ≅0.2mΩ | 1.46 | 2.15 | 1.68 |
| | 1mΩ~100mΩ | 1.46 | 2.15 | 1.68 |
| LR12 -2W | Jumper : ≅0.2mΩ | 2.30 | 3.68 | 3.15 |
| | 0.5mΩ | 3.40 | 3.68 | 0.95 |
| | 1mΩ~15mΩ | 1.90 | 3.68 | 3.50 |
| | 16mΩ~200mΩ | 2.30 | 3.68 | 3.15 |
| LR12 3W | 201mΩ~500mΩ | 2.05 | 3.68 | 3.65 |
| | 0.5mΩ~1mΩ | 3.40 | 3.68 | 0.95 |
| | 1.5mΩ | 2.35 | 3.68 | 1.35 |
| | 2mΩ | 2.10 | 3.68 | 2.55 |
| LR25 - 4W | 2.5mΩ~100mΩ | 2.30 | 3.68 | 3.15 |
| | 0.25mΩ ; 0.5mΩ | 3.25 | 6.85 | 1.70 |
| LR28 - 4W | 0.3mΩ ; 1mΩ~3mΩ | 2.75 | 6.85 | 2.70 |
| | 4mΩ~450mΩ | 2.05 | 7.20 | 3.90 |
| LR27-,3W,5W | 0.5mΩ~1.5mΩ | 4.50 | 8.74 | 4.50 |
| | 2.0mΩ~100mΩ | 3.50 | 8.74 | 6.50 |
| | 101mΩ~500mΩ | 3.50 | 8.74 | 6.50 |

9. 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

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

I = Rating current (A)

P= Rating Power (W)

R= Resistance(Ω)

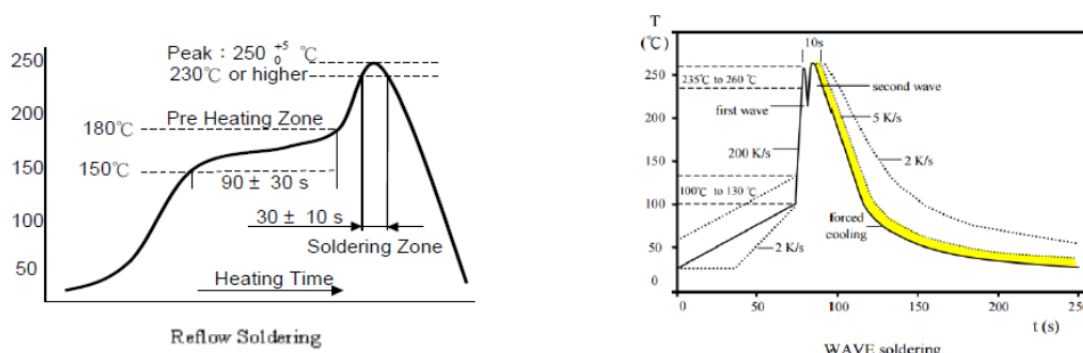
10. Performance Specification

| Test Item | Test Method | Procedure | Requirements |
|---------------------------------|---------------------------|---|--------------------------------------|
| Temperature Coefficient | JIS C 5201-1 4.8 | Natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/°C)}$ R1: resistance value at room temp. (t ₁) R2: resistance value at room temp. +100°C (t ₂) Test pattern: room temp. (T ₁), room temp. +100°C(t ₂) | List by specification |
| Short-time overload | JIS-C-5201 4.13 | Permanent resistance change after the application of a potential of 5 times power rate for 5 seconds | $\Delta R \leq \pm 0.5\%$ |
| Operational Life | JIS-C-5201 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. | $\Delta R \leq \pm 1.0\%$ |
| High Temp. Exposure | MIL-STD-202 108A | Exposed to a temperature of 170±2°C for 1000H. | $\Delta R \leq \pm 1.0\%$ |
| 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. | $\Delta R \leq \pm 0.5\%$ |
| Rapid change of temperature | JIS-C-5201 4.19 | 30 min at -55 °C and 30 min at 170°C; 100 cycles | $\Delta R \leq \pm 0.5\%$ |
| Terminal bending | JIS-C-5201 4.33 | 2mm , 60Sec | $\Delta R \leq \pm 0.50\%$ |
| Resistance to Solder Heat | JIS-C-5201 4.18 | Dip the resistor into a temperature of 260±5°C and hold it for a 10±1 seconds. | $\Delta R \leq \pm 0.5\%$ |
| Solderability | JIS-C-5201 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: 2~3 seconds. | >95% Coverage |
| Dielectric Withstanding Voltage | JIS-C-5201 4.7 | Applied 500 VAC for 1 minute , and Limit surge current 50 mA (max.) | No short or burned on the appearance |
| Terminal Strength | JIS-C-5201 4.16 | 5N , 10 seconds | No broken |

For Jumper

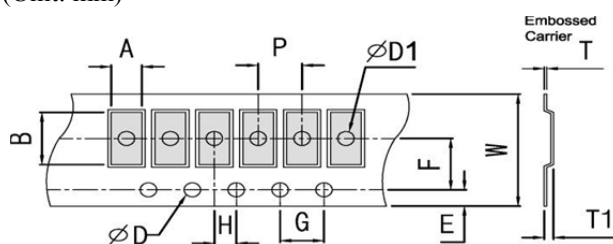
| Test Item | Test Method | Procedure | Requirements |
|---------------------------|---------------------------|---|--------------------|
| Short Time Overload | JIS C 5201-1 4.13 | Permanent resistance change after the application of a potential of 4 times power rate for 5 seconds | $\cong 0.2m\Omega$ |
| Temperature Cycling | JIS-C-5201 4.19 | 30 min at -55 °C and 30 min at 170°C; 100 cycles | $\cong 0.2m\Omega$ |
| High Temperature Exposure | MIL-STD-202 108A | Exposed to a temperature of 170±2°C for 1000H. | $\cong 0.2m\Omega$ |
| Bias 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. | $\cong 0.2m\Omega$ |
| Operational Life | JIS C 5201-1 4.25 | 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. | $\cong 0.2m\Omega$ |
| Solderability | JIS-C-5201 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: 2~3 seconds. | >95% coverage |

11. Soldering Profile



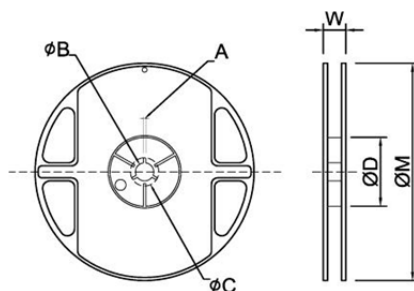
12. Packing of Surface Mount Resistors

12.1 Embossed Dimensions:(Unit: mm)



| Type | Resistance Range | W | P | E | F | ϕD | $\phi D1$ | G | H | A | B | T1 | T |
|------|-------------------|-----------|-----------|-----------|-----------|-----------------------------|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| LR05 | 1~15m Ω | 8.0±0.30 | 4.0±0.10 | 1.75±0.10 | 3.5±0.10 | 1.50 $^{+0.1}$ ₀ | 1.0±0.10 | 4.0±0.10 | 2.0±0.10 | 2.03±0.10 | 3.55±0.10 | 0.80±0.20 | 0.20±0.05 |
| LR06 | 1m Ω | 8.0±0.30 | 4.0±0.10 | 1.75±0.10 | 3.5±0.10 | | 1.0±0.10 | 4.0±0.10 | 2.0±0.10 | 2.03±0.10 | 3.55±0.10 | 1.10±0.10 | 0.20±0.05 |
| | 2~100m Ω | | | | | | | | | | | 0.85±0.10 | |
| LR12 | 0.5m Ω | 12.0±0.30 | 4.0±0.10 | 1.75±0.10 | 5.5±0.10 | | 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 |
| | 1~500m Ω | | | | | | | | | | | 0.90±0.10 | |
| LR25 | 0.25~3m Ω | 12.0±0.30 | 8.0±0.10 | 1.75±0.10 | 5.5±0.10 | | 1.55±0.10 | 4.0±0.10 | 2.0±0.10 | 6.81±0.10 | 7.16±0.10 | 1.05±0.10 | 0.25±0.05 |
| LR28 | 4~450m Ω | 12.0±0.30 | 8.0±0.10 | 1.75±0.10 | 5.5±0.10 | | 1.55±0.10 | 4.0±0.10 | 2.0±0.10 | 7.10±0.10 | 7.05±0.10 | 0.95±0.10 | 0.20±0.05 |
| LR27 | 0.5~500m Ω | 24.0±0.30 | 12.0±0.10 | 1.75±0.10 | 11.5±0.10 | 1.50±0.10 | 4.0±0.10 | 2.0±0.10 | 7.38±0.10 | 12.0±0.10 | 1.05±0.10 | 0.30±0.10 | |

12.2 Dimension of Reel : (Unit: mm)



| Type | Taping | Qty/Reel | A | ΦB | ΦC | ΦD | W | ΦM |
|------|----------|----------------------|---------|----------|----------|----------|----------|---------|
| LR05 | Embossed | 5,000pcs | 2.0±0.5 | 13.0±0.5 | 21.0±0.5 | 60.0±1.0 | 10.0±1.0 | 178±2.0 |
| LR06 | Embossed | 5,000pcs | 2.0±0.5 | 13.0±0.5 | 21.0±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 | 21.0±0.5 | 60.0±1.0 | 13.8±1.0 | 178±2.0 |
| LR25 | Embossed | 2,000pcs 1,000pcs | 2.5±0.5 | 13.5±0.5 | 17.7±0.5 | 60.0±1.0 | 16.2±1.0 | 178±2.0 |
| LR28 | Embossed | 2,000pcs 1,000pcs | 2.5±0.5 | 13.5±0.5 | 17.7±0.5 | 60.0±1.0 | 16.2±1.0 | 178±2.0 |
| LR27 | Embossed | 1,000pcs 500pcs | 2.0±0.5 | 13.2±0.5 | 17.7±0.5 | 60.0±1.0 | 24.4±2.0 | 178±2.0 |

13. Note

13.1 UNI-ROYAL recommend the storage condition temperature: $25 \pm 5^{\circ}\text{C}$, humidity : $60 \pm 20\%$.

(Put condition for individual product).

Even under UNI-ROYAL recommended storage condition, solderability of products over 1 year old. (Put condition for each product) may be degraded.

13.2 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.

13.3 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 Cl_2 , H_2S , NH_3 , SO_2 , NO_2 .

14. Record

| Version | Description | Page | Date | Amended by | Checked by |
|---------|---------------|------|--------------|-------------|------------|
| 1 | First version | 1~8 | Apr.02, 2020 | Haiyan Chen | Yuhua Xu |
| | | | | | |
| | | | | | |

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[SR731ERTTP5R10F](#) [SR731ERTTP100J](#) [SR731ERTTP6R80F](#) [SR731ERTTP4R70F](#) [SR731ERTTP2R20F](#) [SR731ERTTP3R90F](#)
[SR731ERTTP1R00F](#) [SR731ERTTP10R0F](#) [SR731ERTTP2R00F](#) [SR731ERTTP8R20F](#) [SR731ERTTP3R9J](#) [SR731ERTTP8R2J](#)
[SR731ERTTP2R0J](#) [SR731ERTTP4R7J](#) [SR731ERTTP9R1J](#) [SR731ERTTP1R0J](#) [SR731ERTTP2R2J](#) [SR731ERTTP5R1J](#) [SR731ERTTP6R8J](#)
[SR731ERTTP9R10F](#) [FCSL64R007JER](#) [LRF1206-R018FW](#) [TLR2B10DR022FTDG](#) [TLR2H10DR01FTDG](#)