

**UNI-ROYAL**  
厚聲集團

# DATA SHEET

**Product Name** Metal Strip Chip Resistors

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**Part Name** LR12 Series

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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 High power rating up to 3 watts
- 1.3 Low TCR
- 1.4 Low inductance
- 1.4 RoHS complaint

## 2. Part No. System

Part No. includes 14 codes shown as below:

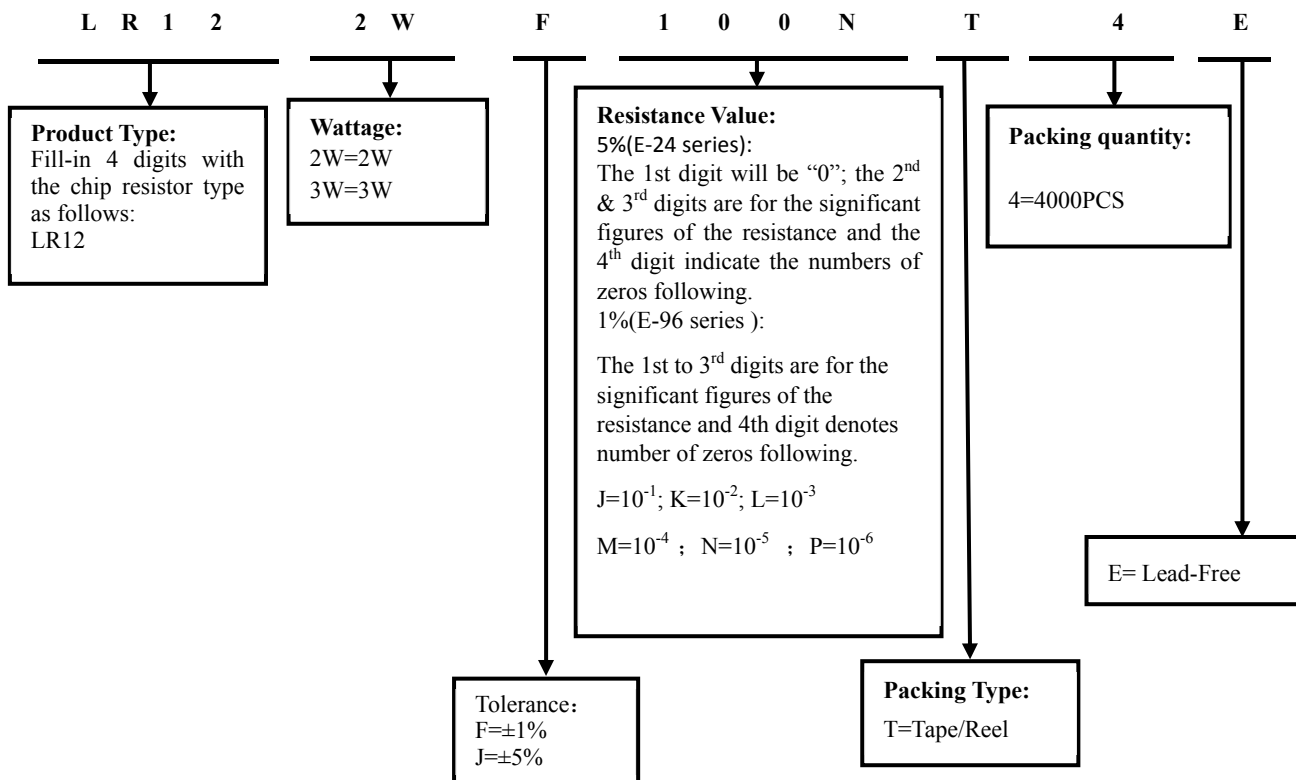
- 2.1 1<sup>st</sup>~4<sup>th</sup> codes: Part name. E.g.: LR12
- 2.2 5<sup>th</sup>~6<sup>th</sup> codes: Power rating.

Wattage	2	3
Normal Size	2W	3W

- 2.3 7<sup>th</sup> code: Tolerance. E.g.: F=±1% J=±5%
- 2.4 8<sup>th</sup>~11<sup>th</sup> codes: Resistance Value.
  - 2.4.1 If value belongs to standard value of ≥5% series, 8<sup>th</sup> code would be zero, 9<sup>th</sup>~10<sup>th</sup> codes are significant figures of the resistance and 11<sup>th</sup> code is the power of ten.
  - 2.4.2 If value belongs to standard value of ≤2% series, 8<sup>th</sup>~10<sup>th</sup> codes are significant figures of the resistance, and 11<sup>th</sup> code is the power of ten.
  - 2.4.3 11<sup>th</sup> codes listed as following:  
 0=10<sup>0</sup> 1=10<sup>1</sup> 2=10<sup>2</sup> 3=10<sup>3</sup> 4=10<sup>4</sup> 5=10<sup>5</sup> 6=10<sup>6</sup> J=10<sup>-1</sup> K=10<sup>-2</sup> L=10<sup>-3</sup> M=10<sup>-4</sup>  
 N=10<sup>-5</sup> P=10<sup>-6</sup>
- 2.5 12<sup>th</sup>~14<sup>th</sup> codes.
  - 2.5.1 12<sup>th</sup> code: Packaging Type. E.g.: C=Bulk T=Tape/Reel
  - 2.5.2 13<sup>th</sup> 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 14<sup>th</sup> code: Special features.  
 E = Environmental Protection, Lead Free, or Standard type.

## 3. Ordering Procedure

(Example: LR12 2W ±1% 1mΩ T/R-4000)



**4. Marking**

4.1 Normally, the products marking are 4 digits.

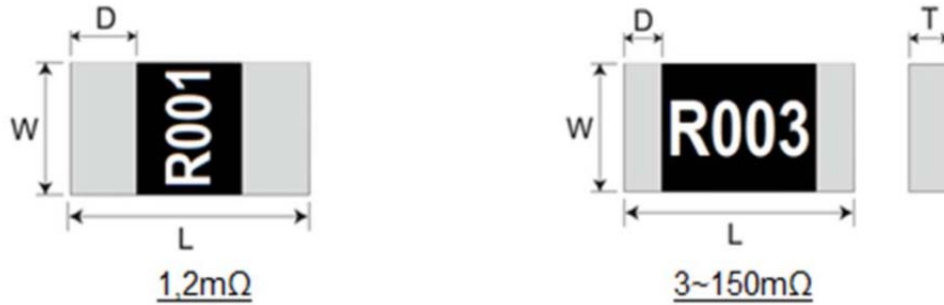
“R” designates the decimal location in ohms

e.g. 1mΩ the product marking is R001.

25mΩ the product marking is R025.

100mΩ the product marking is R100.

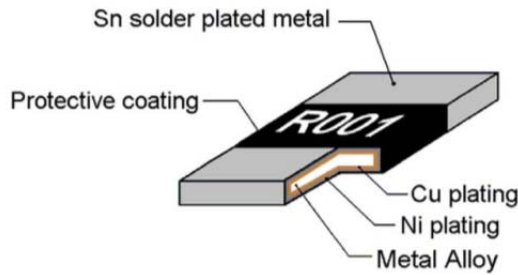
**5. Dimension**



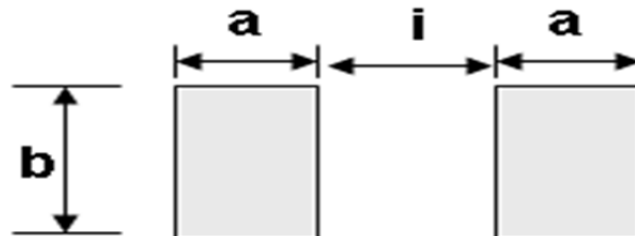
Unit:mm

Type	Power Rating	Resistance Range	L	W	H	T
LR12 (2512)	2W	1~2mΩ	6.35±0.25	3.18±0.25	0.70±0.20	1.80±0.20
		3~25mΩ				0.90±0.30
		26~150mΩ			0.70±0.30	
	3W	2mΩ			0.70±0.20	1.80±0.20
		10~150mΩ			0.70±0.30	0.90±0.30

**6. Structure**



**7. Recommend land pattern**

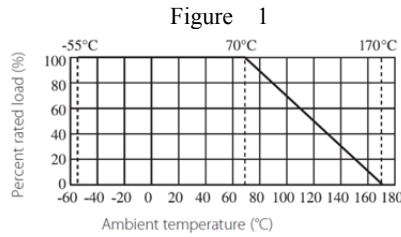


Unit: mm

Type	Resistance Range	a	b	i
LR12	1mΩ,2mΩ	3.20	3.68	1.35
	3mΩ~150mΩ	2.30	3.68	3.15

## 8. 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( $\Omega$ )

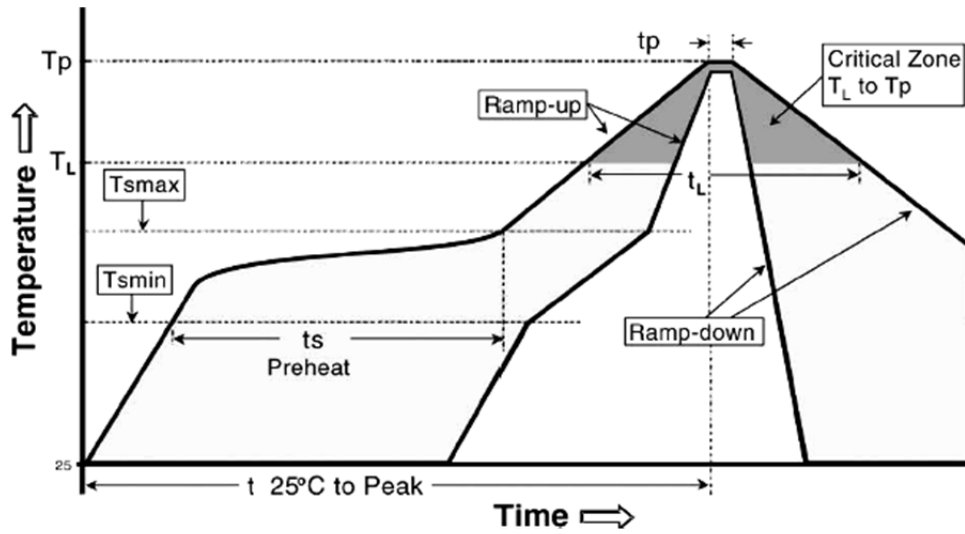
## 9. Performance Specification

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 (Upper limit temperature or Lower limit temperature) $t_1$ : +25°C or specified room temperature $t_2$ : Upper limit temperature or Lower limit temperature test temperature	$\pm 50\text{PPM/}^\circ\text{C}$
Short-time overload	4.13 The number of rated power are as follows : LR12-2W: 5 times of rated power; LR12-3W: 4times of rated power; for 5 seconds	$\Delta R \leq \pm 0.5\%$
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.	$\Delta R \leq \pm 1.0\%$
High Temperature Exposure	<b>MIL-STD-202 108A</b> Exposed to a temperature of 155±2°C for 1000H.	$\Delta R \leq \pm 1.0\%$
Biased Humidity	<b>MIL-STD-202 Method 103</b> 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	4.19. 30 min at -55 °C and 30 min at 155°C; 100 cycles	$\Delta R \leq \pm 0.5\%$
Terminal bending	4.33. 2mm , 10Sec	$\Delta R \leq \pm 0.5\%$
Resistance to Solder Heat	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	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

10. Soldering Condition

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

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

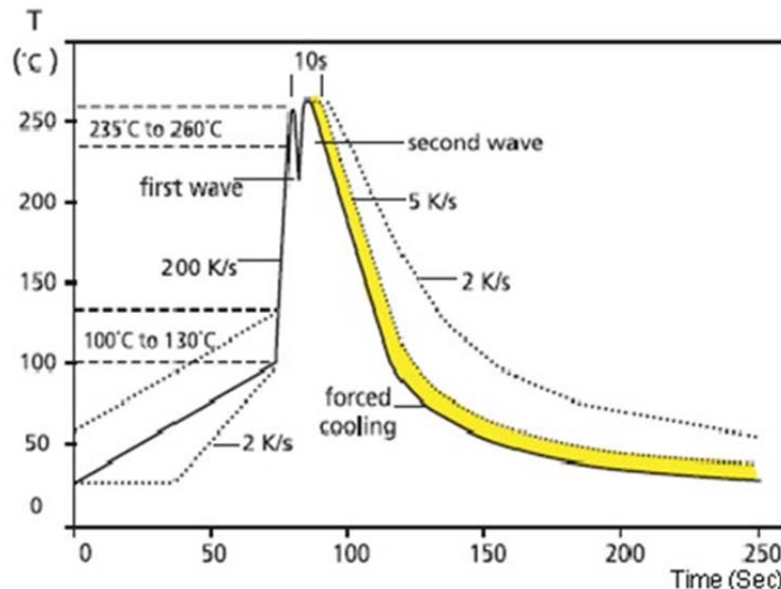


Profile Feature	Lead (Pb)-Free solder
Preheat: Temperature Min ( $T_{smin}$ ) Temperature Max ( $T_{smax}$ ) Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	150°C 200°C 60 -120seconds
Average ramp-up rate: ( $T_{smax}$ to $T_p$ )	3°C/ second max.
Time maintained above : Temperature ( $T_L$ ) Time ( $t_L$ )	217°C 60-150 seconds
Peak Temperature ( $T_p$ )	260°C
Time within $+0$ to $-5$ °C of actual peak Temperature ( $t_p$ ) <sup>2</sup>	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8minutes max.

Allowed Re-flow times : 2 times

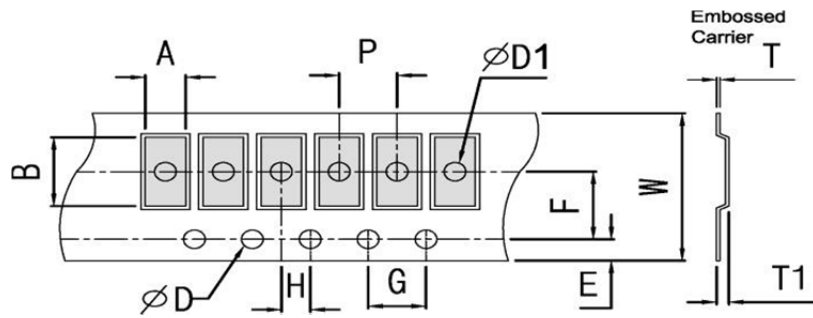
Remark : To avoid discoloration phenomena of chip on terminal electrodes, please use N<sub>2</sub> Re-flow furnace .

10.2 Recommend Wave Soldering Profile :



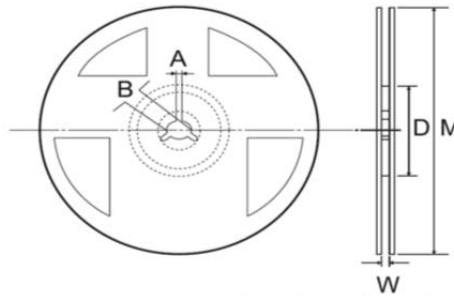
**11. Packing**

11.1 Embossed Dimensions:(Unit: mm)



Type	W	P	E	F	$\phi D$	$\phi D1$	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 $^{+0.1}$	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

11.2 Dimension of Reel : (Unit: mm)



Type	Taping	Qty/Reel	A	B	D	W	$\Phi M$
LR12	Embossed	4,000pcs	2.0±0.5	13.0±0.5	60.0±1.0	13.8±1.0	178±2.0

**12. Note**

- 12.1 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.
- 12.2 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.
- 12.3 Product performance and soldered connections may deteriorate if the products are stored in the following places:
  - a. Storage in high Electrostatic.
  - b. Storage in direct sunshine、rain and snow or condensation.
  - c. Where the products are exposed to sea winds or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>.

**13. 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