



**Suzhou LiShengDa Electronic Technology Co., Ltd**

**APPROVAL SHEET NO.: NQ-APS-042**

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**LRLN Series**

**Metal Alloy Long Terminal**

**Low-Resistance Resistor**

**Product Specifications**

**Rev. A0**

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## Features

- Metal Alloy Long Terminal Low-Resistance Resistor
- Low thermal EMF
- Low TCR
- Low inductance

## Applications

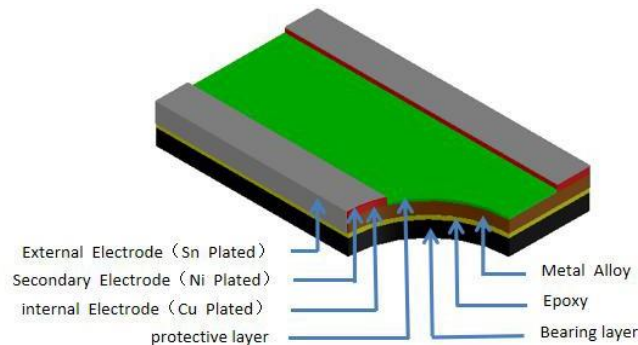
- Battery pack
- Inverter/Converter
- Consumer electronics
- Notebook

## Part number

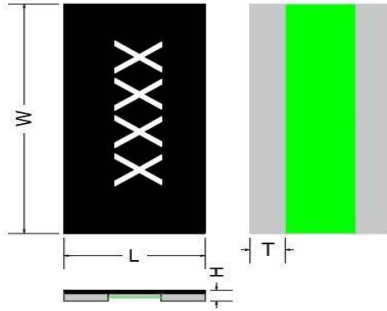
**Explanation Of Part Numbers:** LRLN06CFTR010A = LRLN series 0612 Size 1W 1% 5mΩ

<u>LRLN</u>	<u>06</u>	<u>C</u>	<u>F</u>	<u>T</u>	<u>R005</u>	<u>A</u>
Series	Dimension	Rated Power	Tolerance	Packaging	Resistance	Terminals
LRNN: Metal alloy long terminal Resistor	06: 0612 05: 0508	C: 1W	D:0.5% ;F:1% ;J:5%	T:Paper	R005=5mΩ	A: 2 terminal B: 4 terminal

## Construction



### Physical Dimensions (mm)



Unit : mm

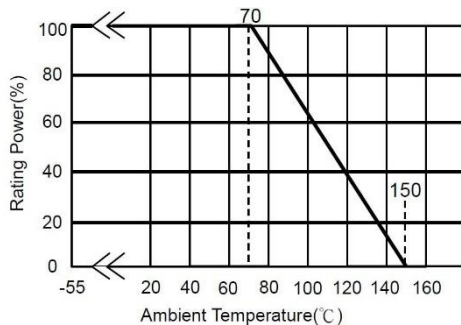
Size	R Value	L	W	H	T
0612	1mΩ	1.60±0.20	3.20±0.20	Max 0.40	0.40±0.15
0612	1.5mΩ~25 mΩ	1.60±0.20	3.20±0.20	Max 0.35	0.40±0.15
0508	1mΩ	1.26±0.20	2.06±0.20	Max 0.40	0.35±0.15
0508	1.5mΩ~10 mΩ	1.26±0.20	2.06±0.20	Max 0.35	0.35±0.15

### Standard Electrical Specifications

Size	Power Rating at 70°C(W)	Resistance Range (mΩ)	TCR (ppm/°C)	Resistance Tolerance (%)	Rating Current	Operation Temperature Range
0612	1	1~2	±70	D:0.5% ;F:1% ;J:5%	(P/R) <sup>1/2</sup>	-55°C~+150°C
0612	1	3~25	±50			
0508	1	1~2	±100			
0508	1	3~10	±70			

\* Note: P=Rating Power ; R=Resistance Value

### Power Derating Curve



For resistors operated in ambient over 70°C, rated load (rated power) shall be derated in accordance with the above figure.

### Rated Current

The rated Current is calculated by the following formula:

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

I = Rating current (A)

P= Rating Power (W)

R= Resistance(Ω )

### ■ Marking Format :

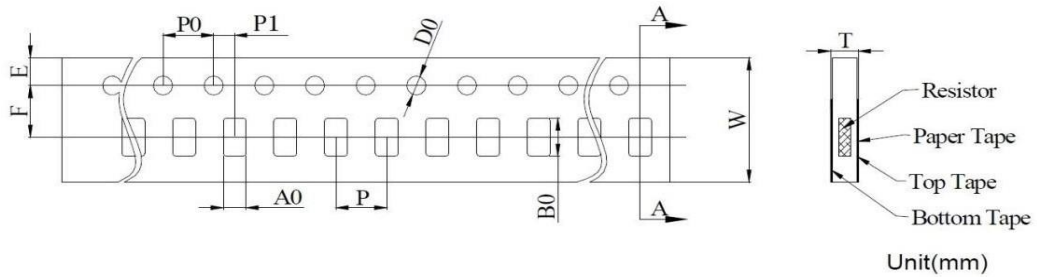
For 0612 Size is marked with four digit. We have two different ways of marking:

- a. "R" designates the decimal location in ohms, e.g. 1mΩ : R001; 10mΩ : R010;
- b. "m" designates the decimal location in milliohms, e.g. 0.5mΩ : 0m50; 5.5mΩ : 5m50;

For 0508 Size is marked with three digit. We have two different ways of marking:

- a. "R" designates the decimal location in ohms, e.g. 1mΩ : 001; 10mΩ : 010
- b. "m" designates the decimal location in milliohms, e.g. 0.5mΩ : 0m5; 1.5mΩ : 1m5

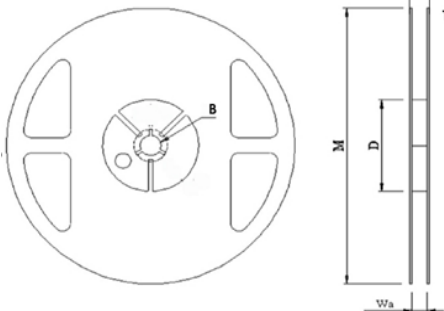
### ■ Taping specification



Size	0612	0508
A0	2.00±0.20	1.66±0.20
B0	3.60±0.20	2.46±0.20
E	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05
W	8.00±0.20	8.00±0.20
P0	4.00±0.10	4.00±0.10
P	4.00±0.10	4.00±0.10
P1	2.00±0.05	2.00±0.05
D0	1.50±0.10	1.50±0.10
T	0.55±0.20	0.55±0.20

### ▲ Reel Dimensions

unit: mm



Series	M	W	A	B	C	D
LRNN	178.0±2.0	8.4+0.5/-0	2.0±0.5	13.2±0.5	17.70±0.5	60.0±1.0

### ▲ Quantity of Package

Size	Quantity (pcs)
0612/0508	5,000

**Reliability test item < Electrical Performance >**

Item	Test condition/ Methods	Limited	Standard													
<b>Temperature coefficient of resistance</b>	TCR = $(R-R_0)/R_0(T_2-T_1) \times 10^6$ R <sub>0</sub> : resistance of room temperature R: resistance of 125°C ; T1: Room temperature T2: Temperature at 125°C	Refer to Spec	MIL-STD-202 Method 304													
<b>Short time Overload</b>	Applied Overload for 5 seconds , then measure its resistance variance rate. (Test condition refer to below): 0603 for 3 times															
	<table border="1"> <thead> <tr> <th>Type</th> <th>Resistance(mΩ)</th> <th>Power rating</th> </tr> </thead> <tbody> <tr> <td rowspan="2">0612</td> <td>1 ≤ R ≤ 10</td> <td>4 times</td> </tr> <tr> <td>10 &lt; R ≤ 25</td> <td>3 times</td> </tr> <tr> <td rowspan="2">0508</td> <td>1 ≤ R ≤ 10</td> <td>3 times</td> </tr> <tr> <td>9 ≤ R ≤ 10</td> <td>3 times</td> </tr> </tbody> </table>			Type	Resistance(mΩ)	Power rating	0612	1 ≤ R ≤ 10	4 times	10 < R ≤ 25	3 times	0508	1 ≤ R ≤ 10	3 times	9 ≤ R ≤ 10	3 times
	Type	Resistance(mΩ)	Power rating													
	0612	1 ≤ R ≤ 10	4 times													
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0508	1 ≤ R ≤ 10	3 times														
	9 ≤ R ≤ 10	3 times														
≤±1.0%																
IEC60115-1 4.13																
<b>Resistance to Soldering Heat</b>	260°C±5°C time: 12sec±0.5sec	≤±0.5%	MIL-STD-202 Method 210													
<b>Solderability</b>	Temperature of Solder: 245±5°C Dipping time:3±0.5s	Solder coverage over 95%	IEC60115-1 4.17													
<b>Temperature Cycling</b>	-55°C (15min)/+150°C(15min), 300 cycles	≤±1.0%	MIL-STD-202													
<b>Low temperature Storage</b>	-55°C for 1000hours, No power	≤±1.0%	IEC60115-1 4.23.4													
<b>High Temperature Storage</b>	150°C for 1000hours, No power	≤±1.0%	IEC60115-1 4.25													
<b>Bias Humidity</b>	+85°C, 85% RH, 10%bias, 1000hours	0612: 1.5~10mR, ΔR ≤ ±1% 11~20MR, ΔR ≤ ±2% 0508: 1~8mR, ΔR ≤ ±1% 9~10MR, ΔR ≤ ±2%	MIL-STD-202													
<b>Vibration</b>	The frequency varies from 10HZ to 55HZ and return to 10HZ, shall be transferred in 1 min. Amplitude : 1.5mm, 3 directions, and 12 hours	≤±0.5%	MIL-STD-202													
<b>Operational life</b>	70°C±2°C, 1000 hours, at rated power 1.5 hours "ON", 0.5 hours "OFF"	0612: 1.5~9MR, ΔR ≤ ±1% 10~14MR, ΔR ≤ ±3% 15~20MR, ΔR ≤ ±5% 0508: 1~8mR, ΔR ≤ ±1% 9~10mR, ΔR ≤ ±3%	Method 201													
<b>Moisture resistance</b>	MIL-STD-202,method106, No power, 7b not required	≤±0.5%	MIL-STD-202													

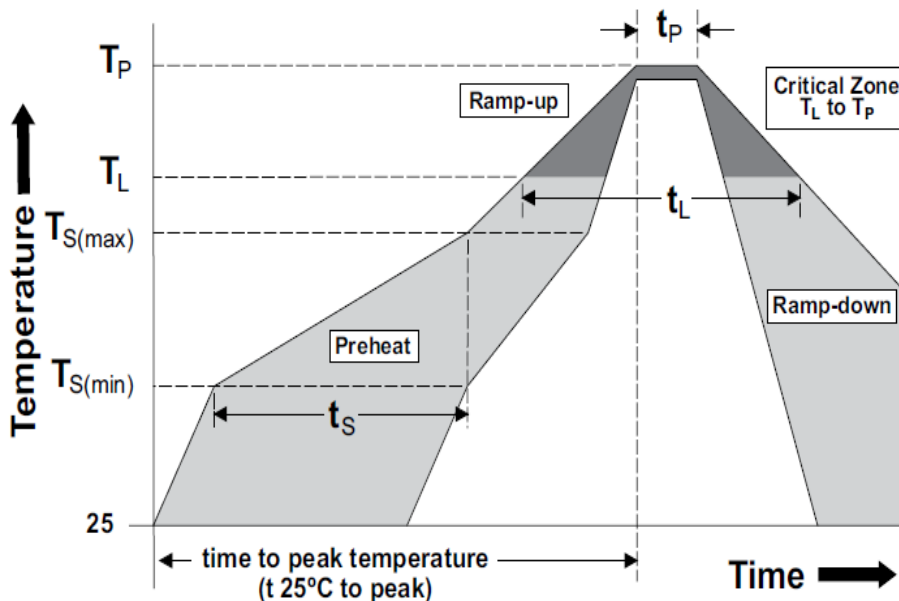
Note : Measurement at 24±4 hours after test conclusion for all reliability tests-parts.

**Recommend Soldering Method:**

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

\*Recommend solder paste: 96.5Sn/3.0Ag/0.5Cu

**IR Reflow-Soldering Profile**



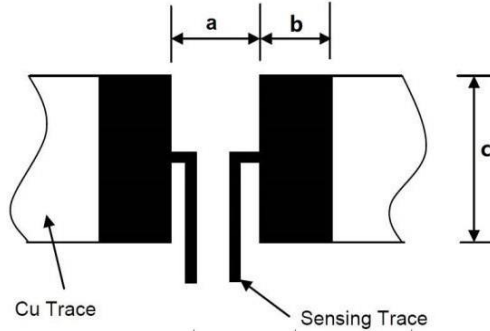
Reflow Condition		Pb – Free assembly
Pre heat	- Temperature Min ( $T_s(\min)$ )	150°C
	- Temperature Max ( $T_s(\max)$ )	200°C
	- Time (Min to Max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		5°C/second max
$T_s(\max)$ to $T_L$ - Ramp-up Rate		5°C/second max
Reflow	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Time ( $t_L$ )	60 – 150 seconds
Peak Temperature ( $T_P$ )		260°C
Time within 5°C of actual peak Temperature ( $t_p$ )		10 – 30 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature ( $T_P$ )		8 minutes Max.
Wave Soldering		260°C, 10 seconds max.
Hand Soldering		350°C, 5 seconds max.

Recommended IR Reflow Soldering Profile MEET J-STD-020D

**Soldering Iron:**

Temperature  $350^{\circ}\text{C} \pm 10^{\circ}\text{C}$ , dwell time shall be less than 3 sec.

## Recommended Solder Pad Layout



Unit: mm

Size	a	b	c
0612	0.80	1.00	3.50
0508	0.50	0.90	2.30

## Label



## Storage requirement

\*The temperature condition must be controlled at  $5\sim 35^{\circ}\text{C}$ , the R.H. must be controlled at  $40\sim 75\%$ . The stock can maintain quality level in two years.

\*\*Please avoid the mentioned harsh environment below when storing to ensure product performance and its' weld ability. Places exposed to sea breeze or other corrosive gas, such as  $\text{Cl}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ ,  $\text{SO}_2$  and  $\text{NO}_2$ .

\*\*\*When the product is moved and stored, please ensure the correct orientation of the box. Do not drop or squeeze the box. Otherwise, the electrode or the body of the product may be damaged.

## Operation and Processing Precautions:

- ① Handle with care when printing circuit board (PCB) is divided or fixed on support body, because bending of printing circuit board (PCB) mounting will make mechanical stress for resistors.
- ② Make sure the power rating is under the limit when using the resistor. When power rating is over the limit, the resistor will be overloaded. There might be machinery damage due to the climbing temperature.
- ③ Avoid damage to the edge of resistor and protective layer caused by mechanical stress.

## Notice

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