Suzhou LiShengDa Electronic Technology Co., Ltd

APPROVAL SHEET NO.: NQ-APS-206

LRNN Series

Metal Alloy Normal Terminal Low-Resistance Resistor Product Specifications

Rev. A0

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Features

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

Applications

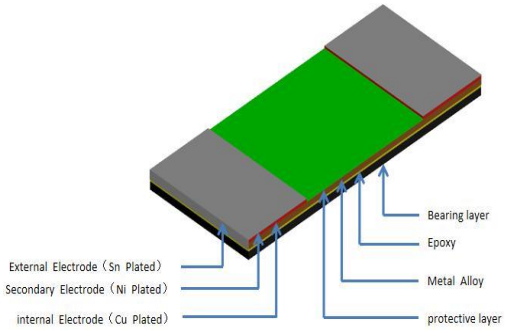
- Battery pack
- Inverter/Converter
- Consumer electronics
- Notebook

Part number

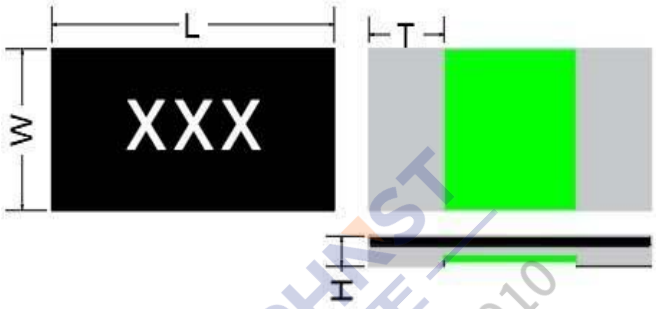
Explanation Of Part Numbers: **LRNN12CFTR010** = LRNN series 1206 Size 1W 1% 10mΩ

LRNN	12	C	F	T	R010
Series	**Dimension**	**Rated Power**	**Tolerance**	**Packaging**	**Resistance**
LRNN: Metal alloy normal terminal Resistor	06: 0603 08:0805 12:1206	C: 1W A: 3/4W S: 1/2W	D:0.5% ;F:1% ;J:5%	T:Paper	R010=10mΩ

Construction



Physical Dimensions (mm)



Unit : mm

Size	R Value	L	W	H	T
1206	1mΩ	3.20±0.25	1.60±0.25	0.45±0.10	1.15±0.20
	2mΩ	3.20±0.25	1.60±0.25	0.45±0.10	0.95±0.20
	3mΩ	3.20±0.20	1.60±0.20	Max 0.45	0.85±0.15
	4mΩ~5mΩ	3.20±0.20	1.60±0.20	Max 0.40	0.85±0.15
	6mΩ~20mΩ	3.20±0.20	1.60±0.20	Max 0.40	0.58±0.15

Size	R Value	L	W	H	T
0805	1mΩ	2.06±0.25	1.26±0.25	0.40±0.10	0.63±0.20
	2mΩ	2.06±0.25	1.26±0.25	0.40±0.10	0.48±0.20
	3mΩ~4mΩ	2.06±0.20	1.26±0.20	Max 0.45	0.43±0.15
	5mΩ~20mΩ	2.06±0.20	1.26±0.20	Max 0.40	0.43±0.15

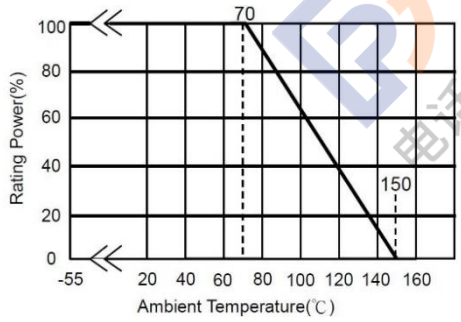
Size	R Value	L	W	H	T
0603	2mΩ	1.6±0.20	0.80±0.20	Max 0.40	0.50±0.15
	3mΩ~4mΩ	1.6±0.20	0.80±0.20	Max 0.40	0.35±0.15
	5mΩ~20mΩ	1.6±0.20	0.80±0.20	Max 0.35	0.35±0.15

Standard Electrical Specifications

Size	Power Rating at 70℃(W)	Resistance Range (mΩ)	TCR (ppm/℃)	Resistance Tolerance (%)	Rating Current	Operation Temperature Range
1206	1	1	±100	D: 0.5% F: 1% J: 5%	$(P/R)^{1/2}$	-55℃~+150℃
		1.5~4	±75			
		5~20	±50			
0805	0.75	1	±200			
		1.5~2	±100			
		3~5	±75			
		6~20	±50			
0603	0.5	2~3	±150			
		4~5	±100			
		6~20	±75			

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

Power Derating Curve



For resistors operated in ambient over 70℃, 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 0603 size is No Marking

For 1206 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;

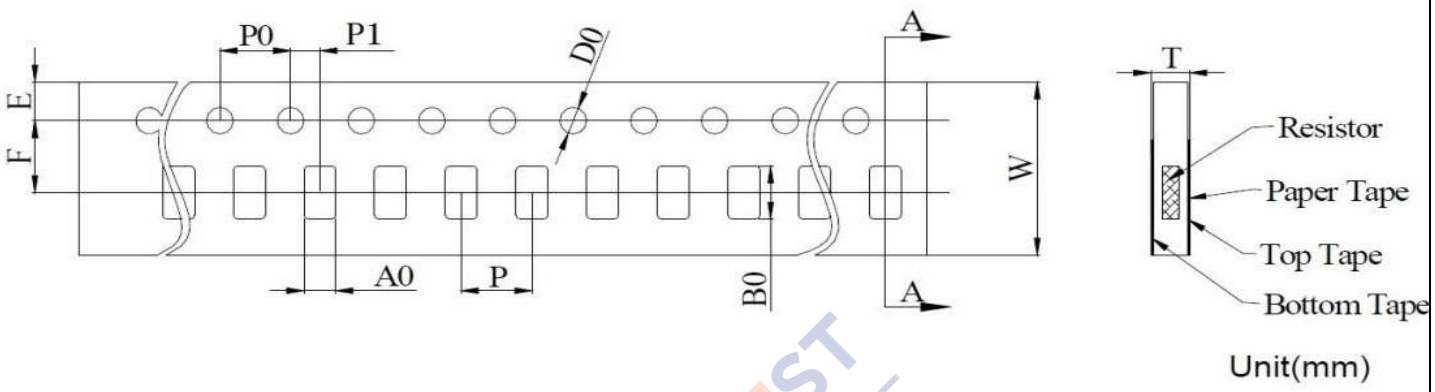
b. “m” designates the decimal location in milliohms, e.g. 0.5mΩ : 0m50; 5.5mΩ : 5m50;

For 0805 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

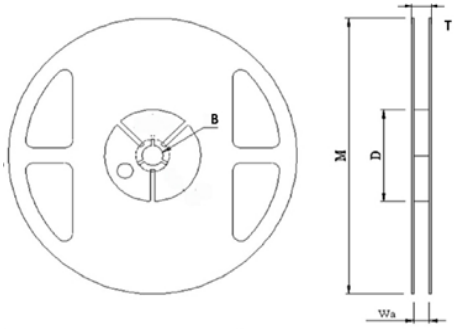
Taping specification



Unit(mm)

Body Size	1206	0805	0603
A0	2.00±0.20	1.66±0.20	1.00±0.20
B0	3.60±0.20	2.46±0.20	1.80±0.20
E	1.75±0.10	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05	3.50±0.05
W	8.00±0.20	8.00±0.20	8.00±0.20
P0	4.00±0.10	4.00±0.10	4.00±0.10
P	4.00±0.10	4.00±0.10	4.00±0.10
P1	2.00±0.05	2.00±0.05	2.00±0.05
D0	1.50±0.10	1.50±0.10	1.55±0.10
T	0.55±0.20	0.55±0.20	0.60±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)
0603/0805/1206	5,000

Reliability test item < Electrical Performance>

<table>
<tr><th>Item</th><th>Test condition/ Methods</th><th>Limited</th><th>Standard</th></tr>
<tr><td>Temperature coefficient of resistance</td><td>TCR =(R-R0)/R0(T2-T1)X 10^6
R0: resistance of room temperature R: resistance of 125℃;
T1: Room temperature T2: Temperature at 125℃</td><td>Refer to Spec</td><td>MIL-STD-202 Method 304</td></tr>
<tr><td>Short time Overload</td><td>Applied Overload for 5 seconds , then measure its resistance variance rate. (Test condition refer to below): 0603 for 3 times
<table>
<tr><th>Type</th><th>Resistance(mΩ)</th><th>Power rating</th></tr>
<tr><td rowspan="2">1206</td><td>1≤R≤10</td><td>4 times</td></tr>
<tr><td>10 < R≤200</td><td>3 times</td></tr>
<tr><td rowspan="2">0805</td><td>1≤R≤10</td><td>4 times</td></tr>
<tr><td>10 < R≤25</td><td>3 times</td></tr>
<tr><td>0603</td><td>2≤R≤10</td><td>4 times</td></tr>
</table></td><td>⩽±1.0%</td><td>IEC60115-1 4.13</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>260℃± 5℃ time：12sec± 0.5sec</td><td>≤±0.5%</td><td>MIL-STD-202 Method 210</td></tr>
<tr><td>Solderability</td><td>Temperature of Solder： 245±5℃ Dipping time:3±0.5s</td><td>Solder coverage over 95%</td><td>IEC60115-1 4.17</td></tr>
<tr><td>Temperature Cycling</td><td>-55℃ (15min)/+150℃(15min), 300 cycles</td><td>≤±1.0%</td><td>MIL-STD-202 Method107G</td></tr>
<tr><td>Low temperature Storage</td><td>-55℃ for 1000hours, No power</td><td>≤±1.0%</td><td>IEC60115-1 4.23.4</td></tr>
<tr><td>High Temperature Storage</td><td>150℃ for 1000hours, No power</td><td>≤±1.0%</td><td>IEC60115-1 4.25</td></tr>
<tr><td>Bias Humidity</td><td>+85℃， 85% RH， 10%bias, 1000hours</td><td>1~10mR,△R⩽±1%
11~20mR,△R⩽±2%</td><td>MIL-STD-202 Method103</td></tr>
<tr><td>Vibration</td><td>Vibration 5g's for 20 minutes 12 cycles each of 3 orientations. Test from 10 Hz - 2000 Hz ⩽±0.5% MIL-STD-202 Method</td><td>≤±0.5%</td><td>MIL-STD-202 Method 204</td></tr>
<tr><td>Operational life</td><td>70℃± 2℃, 1000 hours, at rated power 1.5 hours “ON”, 0.5 hours “OFF”</td><td>1206:
1~9mR ， △R⩽±1%
10~14mR ,△R⩽±3%
15~20mR ,△R⩽±4%
0805:
1~10mR, △R⩽±1%
11~20mR, △R⩽±3%
0603:
2~10mR,△R⩽±1%</td><td>MIL-STD-202 Method 108</td></tr>
<tr><td>Moisture resistance</td><td>MIL-STD-202,method106， No power, 7b not required</td><td>≤±0.5%</td><td>MIL-STD-202 Method 106</td></tr>
</table>

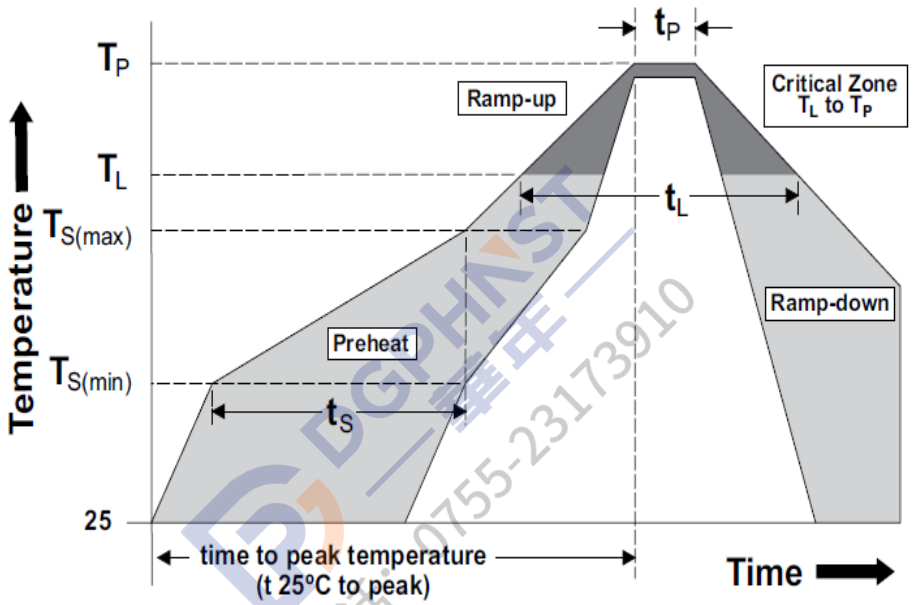
Note : Measurement at 24±4 hours after test conclusion for all reliability tests-parts.

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



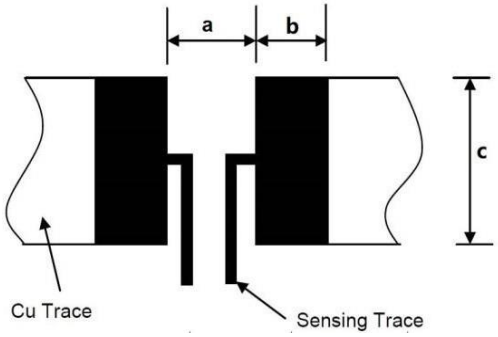
Reflow Condition		Pb – Free assembly
Pre heat	- Temperature Min (T_s(min))	150°C
	- Temperature Max (T_s(max))	200°C
	- Time (Min to Max) (t_s)	60 – 120 secs
Average ramp up rate (Liquidus Temp (T_L) to peak		5°C/second max
T_S(max) to T_L - Ramp-up Rate		5°C/second max
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Time (t_L)	20 – 40 seconds
Peak Temperature (T_P)		260°C
Time within 5°C of actual peak Temperature (t_p)		10 – 30 seconds
Ramp-down Rate		5°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Wave Soldering		Not applicable
Hand Soldering		350°C, 5 seconds max.

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

◆ Soldering Iron:

Temperature 350℃±10℃, dwell time shall be less than 3 sec.

Recommended Solder Pad Layout



Unit: mm

Size	R Value(mΩ)	a	b	c
1206	1~2	0.90	1.95	1.74
	3~5	1.00	1.85	1.74
	6~20	1.20	1.75	1.74
0805	1~20	0.80	1.45	1.52
0603	2	0.5	1.35	0.92
	3~20	0.6	1.30	0.92

Label

Storage requirement

*The temperature condition must be controlled at 5~35℃,the R.H. must be controlled at 40~75%. 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 Cl2、H2S、NH3、SO2 and NO2.

***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:

①Handle 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.。

②Make sure the power rating is under the limit when using the resistor. When power rating is over the limit, the resister will be overloaded. There might be machinery damage due to the climbing temperature.。

③Avoid damage to the edge of resistor and protective layer caused by mechanical stress.

Notice

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文件修订履历表

文件名称	LRNN series Current sensing Resistor	编号	NQ-APS-206

版本日期	版次	修订页次	修订内容		修定者	备注
			修订前	修订后		
2025/07/16	A0	/	/	新制发行	管静	