

# ROYALOHM

*C O N F I D E N T I A L   D O C U M E N T*

## SPECIFICATION FOR APPROVAL

Description : Metal Strip Chip Resistors

**Royalohm Part no.:**

LR121WxxxxT4E ( LR12 1W +/-1%, 5% 50 PPM T/R-4,000 )  
LR122WxxxxT4E ( LR12 2W +/-1%, 5% 50 PPM T/R-4,000 )  
LR123WxxxxT4E ( LR12 3W +/-1%, 5% 50 PPM T/R-4,000 )

Approved by

**RoHS V3 Compliant (EU) 2015/863**

**REACH Compliant**

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## Metal Strip Chip Resistors

1. Scope:

This specification for approval relates to Metal Strip Chip Resistors manufactured by ROYALOHM 's specifications.

2. Type designation:

The type designation shall be in the following form:

	Type	Power Rating	Resistance tolerance	Nominal Resistance
Ex.	LR12 (2512)	2W	F,J	15mΩ

3. Ratings:

Type	LR12 (2512)		
Power Rating	1W	2W	3W
Resistance Range	1mΩ ~ 220mΩ		
Temperature Range	-55°C ~ +170°C		
Ambient Temperature	70 °C		

3.1 Nominal Resistance

Effective figures of nominal resistance shall be in accordance :

E-24 values – these are preferred and will have standard MOQ

E-96 values – are available on case by case basis and availability and MOQ need to be confirmed with factory first

3.2 Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating , as determined from the following formula :

$$RCWV = \sqrt{P \times R}$$

Note : Max. Working Voltage or  $\sqrt{P \times R}$  whichever is lesser

Max. Overload Voltage or  $2.5 \sqrt{P \times R}$  whichever is lesser

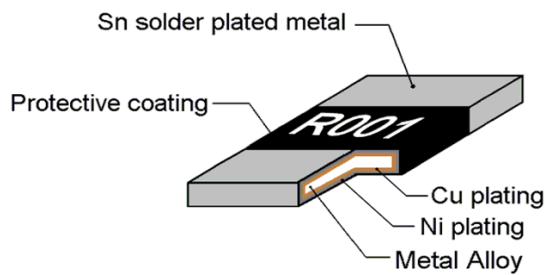
Where : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

R = Nominal Resistance (ohm)

### Metal Strip Chip Resistors

4. Construction :

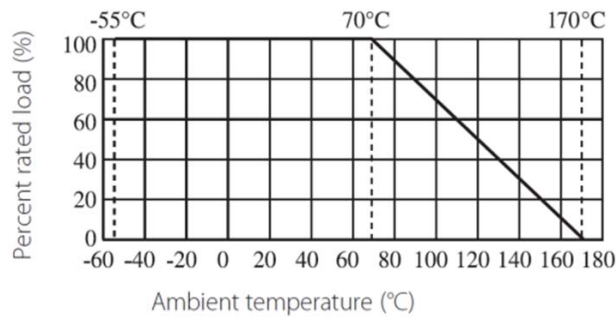


5. Power rating and dimensions

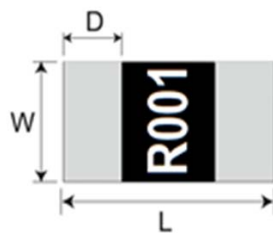
5.1 Power rating:

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.

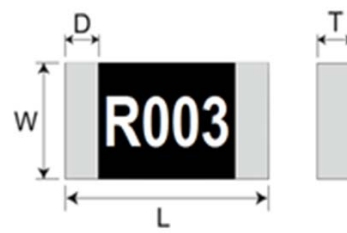
Figure 1



Type	Power Rating at 70 °C	Tolerance %	TCR (PPM/°C)	Resistance value (mΩ)
LR12 (2512)	1W	±1%, ±5%	±50ppm/°c	1 ~ 220
	2W			
	3W			



1~2mΩ



3~220mΩ

Type	Power Rating at 70 °C	Resistance Value (mΩ)	Dimension (mm)			
			L	W	T	D
LR12 (2512)	1W & 2W	1 ~ 2	6.35±0.25	3.18±0.25	0.70±0.20	1.80±0.20
		3 ~ 25				0.90±0.30
		26 ~ 220			0.70±0.30	
	3W	1 ~ 2			0.70±0.20	1.80±0.20
		5 ~ 220			0.70±0.30	0.90±0.30

### Metal Strip Chip Resistors

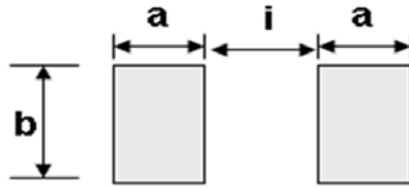
\*Value list :

Value	Power Rating	T.C.R
1mR	1W,2W	50ppm
1.5mR	1W,2W	50ppm
2mR	1W,2W	50ppm
3mR	1W,2W	50ppm
3.5mR	1W,2W	50ppm
4mR	1W,2W	50ppm
5mR	1W,2W	50ppm
6mR	1W,2W	50ppm
6.8mR	1W,2W	50ppm
7mR	1W,2W	50ppm
7.5mR	1W,2W	50ppm
8mR	1W,2W	50ppm
9mR	1W,2W	50ppm
10mR	1W,2W	50ppm
12mR	1W,2W	50ppm
15mR	1W,2W	50ppm
16mR	1W,2W	50ppm
18mR	1W,2W	50ppm
20mR	1W,2W	50ppm
22mR	1W,2W	50ppm
25mR	1W,2W	50ppm
27mR	1W,2W	50ppm
30mR	1W,2W	50ppm
33mR	1W,2W	50ppm
40mR	1W,2W	50ppm
43mR	1W,2W	50ppm
47mR	1W,2W	50ppm
50mR	1W,2W	50ppm
60mR	1W,2W	50ppm
65mR	1W,2W	50ppm
68mR	1W,2W	50ppm
70mR	1W,2W	50ppm
75mR	1W,2W	50ppm
80mR	1W,2W	50ppm
90mR	1W,2W	50ppm
100mR	1W,2W	50ppm
120mR	1W,2W	50ppm
150mR	1W,2W	50ppm
200mR	1W,2W	50ppm
220mR	1W,2W	50ppm

Value	Power Rating	T.C.R
1mR	3W	50ppm
2mR	3W	50ppm
5mR	3W	50ppm
10mR	3W	50ppm
12mR	3W	50ppm
15mR	3W	50ppm
16mR	3W	50ppm
20mR	3W	50ppm
22mR	3W	50ppm
25mR	3W	50ppm
28mR	3W	50ppm
30mR	3W	50ppm
33mR	3W	50ppm
40mR	3W	50ppm
43mR	3W	50ppm
47mR	3W	50ppm
50mR	3W	50ppm
60mR	3W	50ppm
65mR	3W	50ppm
68mR	3W	50ppm
70mR	3W	50ppm
75mR	3W	50ppm
80mR	3W	50ppm
90mR	3W	50ppm
100mR	3W	50ppm
120mR	3W	50ppm
150mR	3W	50ppm
200mR	3W	50ppm
220mR	3W	50ppm

**Metal Strip Chip Resistors**

Recommend Land Pattern:



Type	Resistance Value (mΩ)	Dimension (mm)		
		a	b	i
LR12	1 ~ 2	3.2	3.68	1.35
	3 ~ 220	2.3		3.15

6. Marking :

6.1 Resistors

A. Resistance (4Marking):


Resistance	1mΩ	2mΩ	3mΩ	4mΩ	5mΩ	7mΩ	10mΩ
Ex. Codes	R001	R002	R003	R004	R005	R007	R010

6.2 Labels

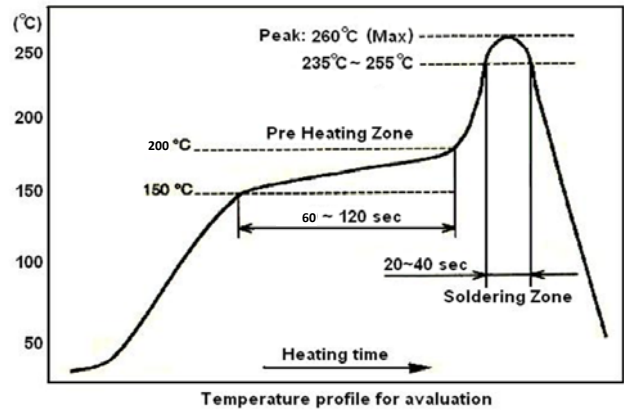
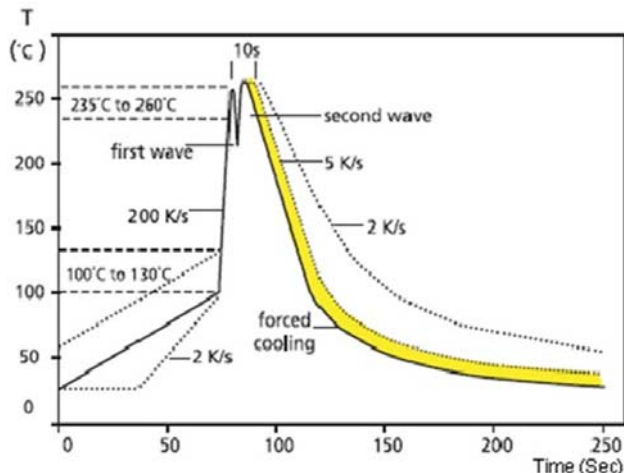
Label shall be marked with the following item :

- A. Nominal Resistance
- B. Resistance Tolerance
- C. Power Rating
- D. Size
- E. Quantity
- F. Lot Number

Ex.

<b>ROYALOHM</b>		
<b>Chip Resistors</b>		
Resistance :	15mΩ	± 1%
Wattage :	2W	Size : LR12
Quantity :	4000 Pcs.	50 PPM
Part No.:		
Lot No. :	82572395	LR122WF150MT4E
		

Label is 15mΩ, value is 0.015Ω, marking is R015

<b>Metal Strip Chip Resistors</b>		
7. Performance specification :		
Characteristics	Limits	Test Methods
		( JIS C 5201-1 )
Temperature Coefficient	Refer to item 5.	Natural resistance change 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 temperature (t1) ; R2: Resistance at test temperature (Upper limit temperature or Lower limit temperature) t1: +25°C or specified room temperature t2: Upper limit temperature or Lower limit temperature test temperature
Short Time Overload	$\Delta R \leq \pm 0.5\%$	The number of rated power are as follows : LR12-1W: 5 times of rated power LR12-2W: 5 times of rated power LR12-3W: 4 times of rated power (JIS C 5201.4.13)
Solderability	> 95 % coverage	Test temperature of solder : $245 \pm 3^\circ\text{C}$ Dipping them solder : 2-3 seconds (JIS C 5201-1 clause 4.17) <u>Reflow:</u>  <p style="text-align: center;">Temperature profile for avarulation</p> <u>Wave Soldering</u> 

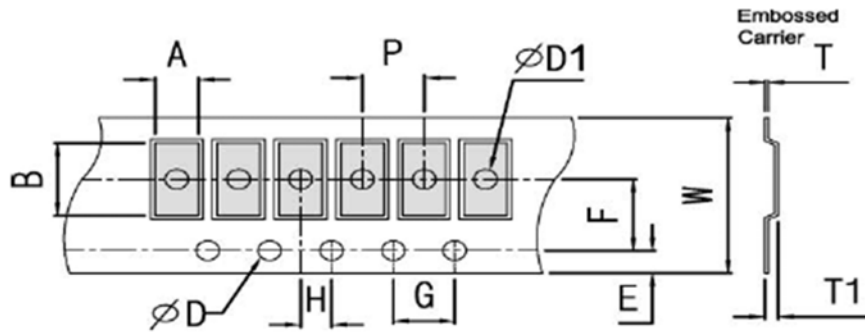
<b>Metal Strip Chip Resistors</b>		
<b>7. Performance specification :</b>		
Characteristics	Limits	Test Methods
		( JIS C 5201-1 )
High Temperature Exposure	$\Delta R \leq \pm 1\%$	Exposed to a temperature of $170 \pm 2^\circ\text{C}$ for 1000 hours MIL-STD-202 108A
Biased Humidity	$\Delta R \leq \pm 0.5\%$	1000 hours $85^\circ\text{C}/85\%\text{RH}$ . Note: Specified conditions:10% of operating power. Measurement at $24 \pm 4$ hours after test conclusion. MIL-STD-202 Method 103
Dielectric Withstanding Voltage	No short or burned on the appearance .	Applied 500 VAC for 1 minute , and Limit surge current 50 mA (max.) (JIS C 5201 4.7)
Resistance to Solder Heat	$\Delta R \leq \pm 0.5\%$	Dip the resister into a temperature of $260 \pm 5^\circ\text{C}$ and hold it for a $10 \pm 1$ seconds. (JIS C 5201 4.18)
Terminal Strength	No broken	5N , 10 seconds (JIS C 5201 4.16)
Load Life	$\Delta R \leq \pm 1\%$	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 4“OFF” at $70 \pm 2^\circ\text{C}$ ambient. (JIS C 5201 4.25.1)
Terminal bending	$\Delta R \leq \pm 0.5\%$	2mm, 10Sec (JIS C 5201 4.33)
Rapid Change of Temperature	$\Delta R \leq \pm 0.5\%$	30 min at $-55^\circ\text{C}$ and 30 min at $155^\circ\text{C}$ ; 100 cycles (JIS C 5201 4.19)



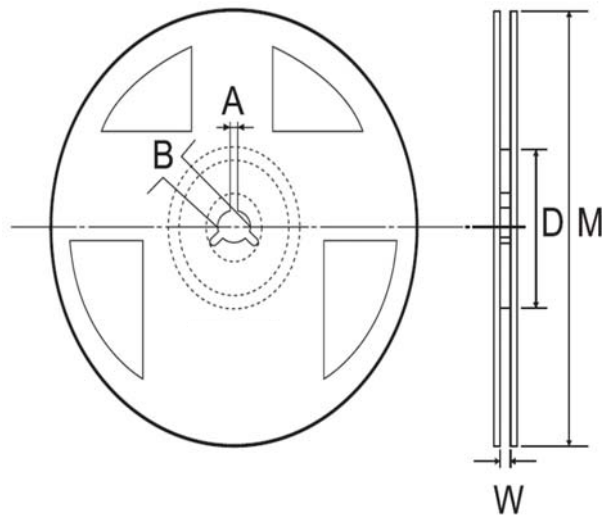
**Metal Strip Chip Resistors**

8. Packing specification :

\* Taping Dimension (mm)



Type	W± 0.30	P ± 0.10	E± 0.10	F ± 0.10	ØD +0.1/-0	ØD1 ± 0.10	G ± 0.1	H ± 0.10	A ± 0.10	B± 0.10	T ± 0.10	T ± 0.05
LR12	12.00	4.00	1.75	5.50	1.50	1.55	4.00	2.00	3.50	6.80	1.10	0.20

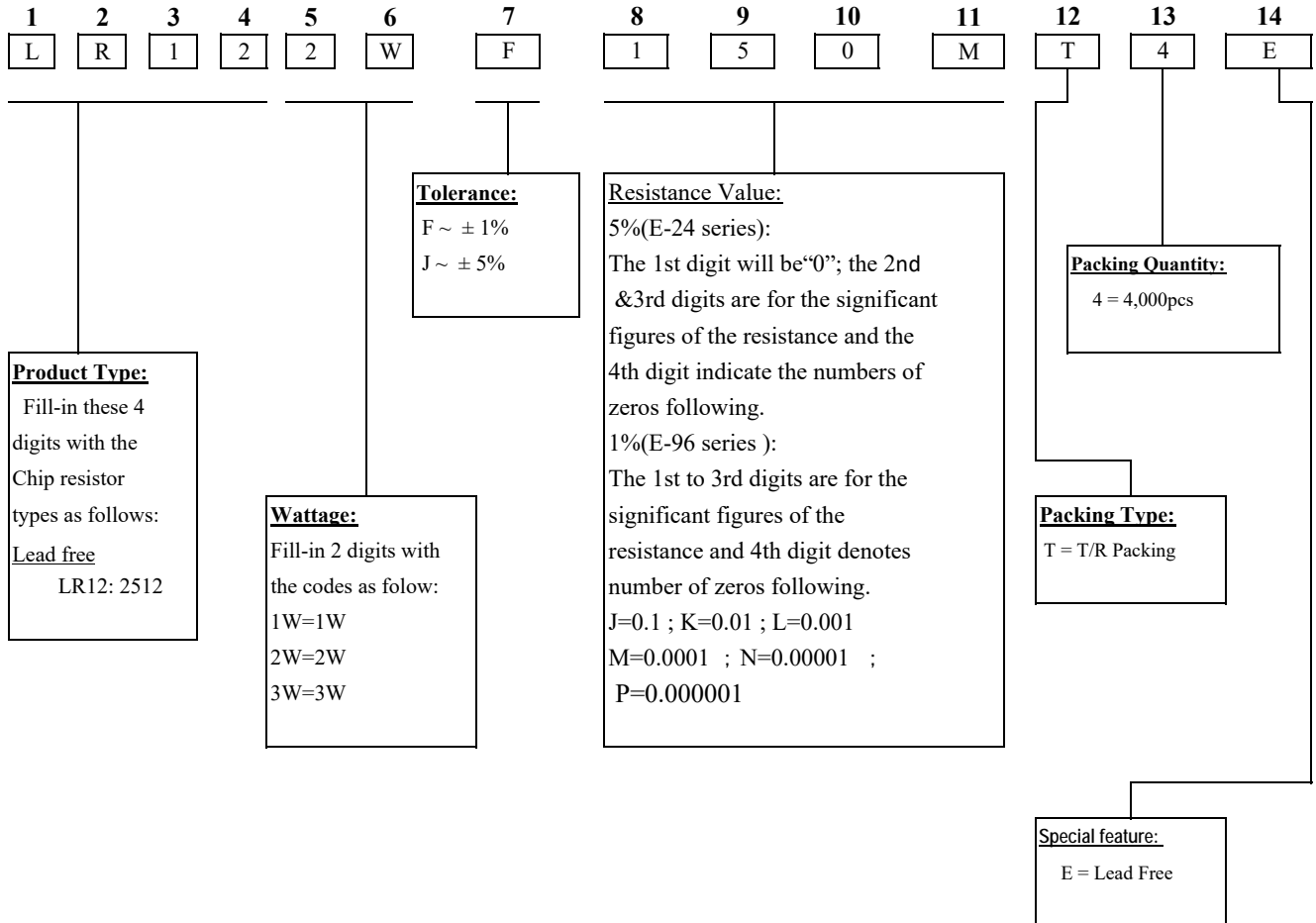


\* Packing Quantity

Type	Packaging	Qty/Reel	A	ΦB	ΦD	W	ΦM
LR12	Embossed	4,000 pcs.	2.0±0.5	13.0±0.5	60.0±1	13.8±1	178±2.0

### Part Number System

#### Explanation of Part Number System ( Metal Strip Chip Resistors)



Sample : LR12 2W (2512) +/-1% 15mΩ 50ppm T/R-4,000 → LR122WF150MT4E

## Metal Strip Chip Resistors

### Environment Related Substance

This product complies to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.

Ozone layer depleting substances.

Ozone depleting substances are not used in our manufacturing process of this product.

This product is not manufactured using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

### Storage Condition (MSL1)

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of  $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$  and a relative humidity of  $60\%RH \pm 10\%RH$ , chemical and dust free atmosphere

Even within the above guarantee periods, do not store these products in the following conditions.

Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as  $\text{Cl}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ ,  $\text{SO}_2$ , or  $\text{NO}_2$
2. In direct sunlight