1. Scope

This specification applied to the products of Lead-Free current sensing resistor of metal strip for Lead-Free RLN series manufactured by TA-I TECHNOLOGY CO.,LTD.

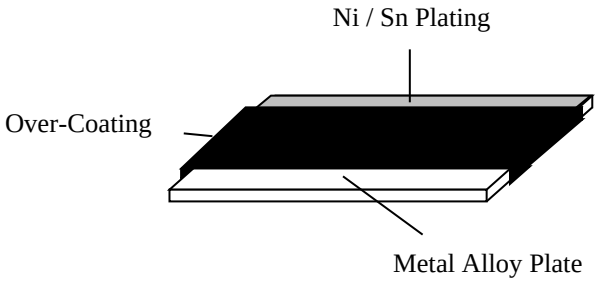
2. Type Designation

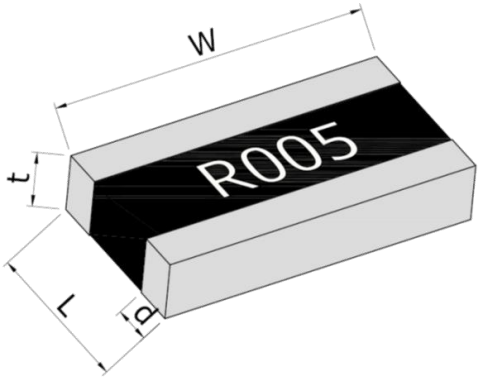
RLN06	F	T	C	(M)	R005

Series No.	Tolerance	Packaging	Power	Metal	Resistance
06：0612 27：2725 37：3720	F= ±1% G= ±2% J= ±5%	T=Paper Tape E= Embossed	S=0.5W C=1W J =5W	M= MnCu	e.g. R50M=0.5mΩ R001=1mΩ R005=5mΩ

3. Construction and Dimension

3.1 RLN06





Series	W	L	D	t	Material
RLN06	3.2±0.2	1.7±0.2	0.4±0.2	0.6±0.2	Strip：Alloy Over Coating：molding Compound UL-94V-0 grade

UNIT: mm

Marking

For RLN06

The marking pattern is as follows.



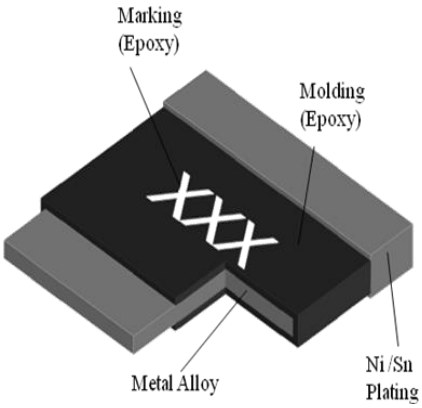
Resistance value is expressed by 4 digits.

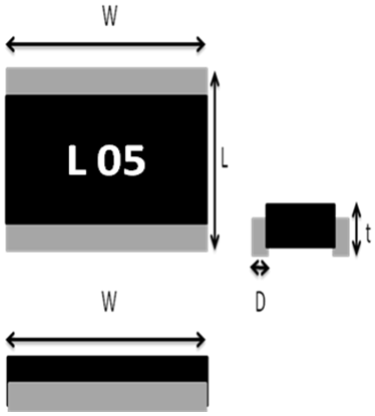
E.G.:

R005 = 0.005Ω = 5mΩ

R010 = 0.010Ω = 10mΩ

3.2 RLN27





Series	W	L	D	t
RLN27	6.85±0.25	6.45±0.25	1.65±0.25	1.35±0.25

UNIT: mm

Marking

For RLN27

The marking pattern is as follows.



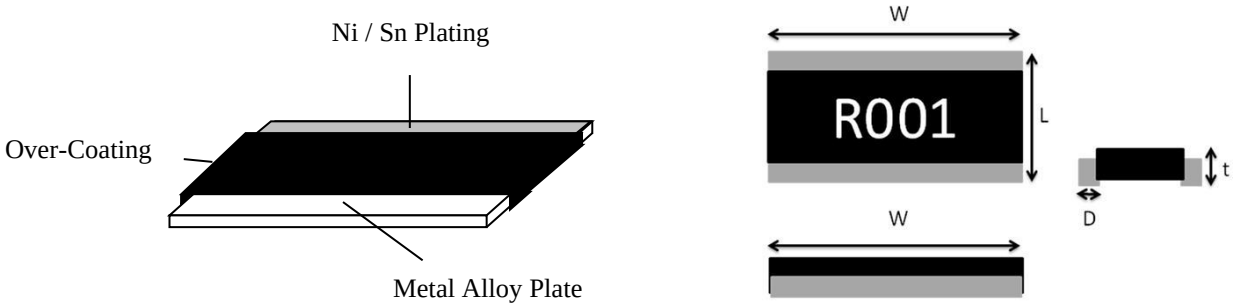
Resistance value is expressed by 3 digits.

E.G.:

L 05= 0.0005Ω = 0.5mΩ

L 10 = 0.001Ω = 1mΩ

3.3 RLN37



Style	W	L	D	t	Material
RLN37	3.75±0.3	2.3±0.2	0.5±0.2	0.7±0.20	Strip: Alloy Over Coating：molding Compound UL-94V-0 grade

UNIT: mm

Marking

For RLN37

The marking pattern is as follows.



Resistance value is expressed by 4 digits.

E.G.:

R001= 0.001Ω = 1mΩ

R010 = 0.010Ω = 10mΩ

4. Features

Series	Size	Power Rating	Resistance Value	Operation Temperature Range	TCR (ppm/°C)	Tolerance	Insulation Resistance	Maximum Working Voltage(V)
*RLN06	0612	0.5W 1W	1~10mΩ	-55~+170°C	±100ppm/°C	±1% ±2% ±5%	Over 100 MΩ	(P*R)1/2
RLN06 (MnCu)	0612	0.5W 1W	1~5mΩ					
RLN27	2725	5W	0.2mΩ		±100ppm/°C			
			0.2<R≦1mΩ		±75ppm/°C			
RLN37	3720	0.5W 1W	1mΩ~30mΩ		50ppm/°C			
*RLN37 (MnCu)	3720	0.5W 1W	1mΩ~10mΩ					

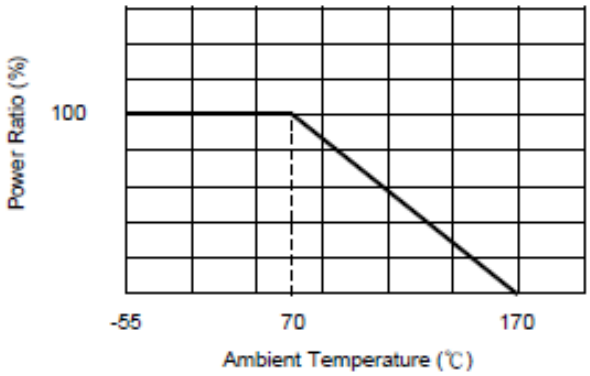
Note*:1 Watts with total solder pad and trace size of 300mm^2

5. Reliability Tests

Test Items	Reference	Condition of Test	Test Limits
Temperature Coefficient of Resistance	IEC60115-1 4.8	+25 ~ 125°C	Refer 4.0
High Temperature Exposure (Storage)	AEC-Q200-REV D-Test 3 MIL-STD-202 Method 108	T=170°C,1000hrs, Measurement at 24hrs after test conclusion.	< ±1%
Temperature Cycling	AEC-Q200-REV D-Test 4 JESD22 Method JA-104	1000Cycle (-55°C to 125°C), Measurement at 24hrs after test conclusion.	< ±0.5%
Short time overload	IEC60115-1 4.13	5 X rated power for 5s	< ±0.5%
Moisture Resistance	AEC-Q200-REV D-Test 6 MIL-STD-202 Method 106	T=24 hours / Cycle ,10 Cycles. Notes: Steps 7a& 7b not required. Unpowered	< ±1%
Biased Humidity	AEC-Q200-REV D-Test 7 MIL-STD-202 Method 103	10% Rated power at 85°C, RH:85% ,1000Hrs, Measurement at 24hrs after test conclusion.	< ±0.5%

Operation life	AEC-Q200-REV D-Test 8 MIL-STD-202 Method 108	1000 hours TA=125°C at 45% rated power. Measurement at 24±4 hours after test conclusion.	< ±1%
External Visual	AEC-Q200-REV D-Test 9 MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship.	
Physical Dimension	AEC-Q200-REV D-Test 10 JESD22 Method JB-100	Verify physical dimensions to the applicable device detail specification. Note: User(s) and Suppliers spec. Electrical test not required.	
Resistance to Solvents	AEC-Q200-REV D-Test 12 MIL-STD-202 Method 215	a: Isopropyl Alcohol：Mineral Spirits = 1：3 b: Terpene Defluxer (Bioact EC-7R) c: Deionized water ：Propylene Glycol Monomethyl Ether: monoethanolamine =42:1:1	Marking and protective layer cannot be detached
Resistance to Soldering Heat	AEC-Q200-REV D-Test 15 MIL-STD-202 Method 210	T=260+/-5℃ solder,10+/-1 sec dwell	< ±0.5%
Mechanical Shock	AEC-Q200-REV D-Test 13 MIL-STD-202 Method 213	100g's, Normal duration is 6ms, half sine shock pulse	< ±0.5%
Resistance to vibration	AEC-Q200-REV D-Test 14 MIL-STD-202 Method 204	5g's for 20min.12cycles, 10-2000Hz	<±0.5%
Board Flex	AEC-Q200-REV D-Test 21 AEC-Q200-005	Min 2mm deflection ,60sec.	< ±0.5%
Flammability	AEC-Q200-REV D-Test 20 UL-94	V-0 or V-1are acceptable, Electrical test not required	V-0
Thermal Shock	AEC-Q200-REV D-Test 16 MIL-STD-202 Method 107	-55°C/+155°C. Note: Number of cycles required-300, Maximum transfer time-20 seconds, Dwell time-15 minutes. Air-Air.	< ±1.0%
ESD	AEC-Q200-REV D-Test 17 AEC-Q200-002 or ISO/DIS 10605	verify the voltage setting at 500V	< ±1.0%
Solderability	AEC-Q200-REV D-Test 18 J-STD-002	Method B, aging 4 hours at 155 °C dry heat Lead-free solder bath at 235±3 °C Dipping time: 3±0.5 seconds	> 95% area covered with tin
Terminal Strength (SMD)	AEC-Q200-REV D-Test 22 AEC-Q200-006	Force of 1.8kg for 60 seconds Remarks: 0201-NA	< ±1.0%

5.1 Derating Curve



5.2 Rated Current

The rated current is calculated by the following formula:

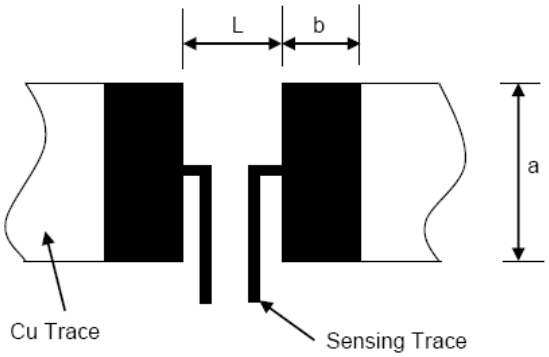
$$I = \sqrt{P \div R}$$

I: Rated Current (A)

P: Rated Power (W)

R: Resistance Value (Ω)

6. Recommended Solder Pad Dimension



Series	Resistance Range (mΩ)	a	b	L
RLN06	1~10	3.8±0.1	0.7±0.1	0.7±0.1
RLN27	0.2~1	6.9±0.1	3.2±0.1	2.0±0.1
RLN37	1~30	4.2±0.1	0.8±0.1	1.2±0.1

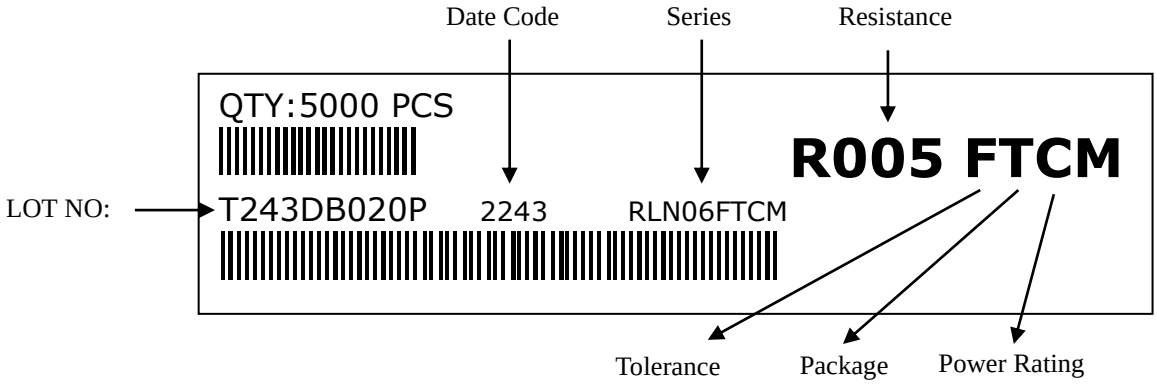
Unit: mm

Note: *The copper foil minimum thickness of PCB needs 3 oz

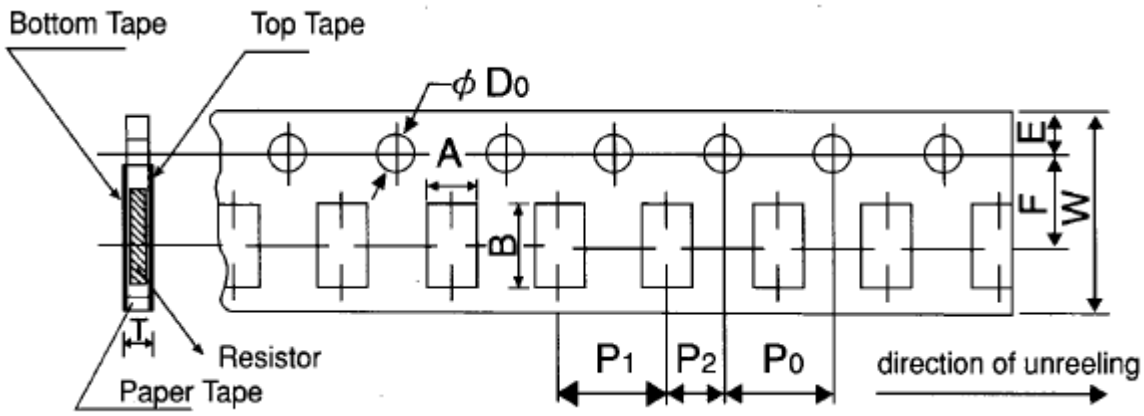
7. Number of Package

	RLN06	RLN 27	RLN 37
Pieces	5000	1000	4000

8. Label

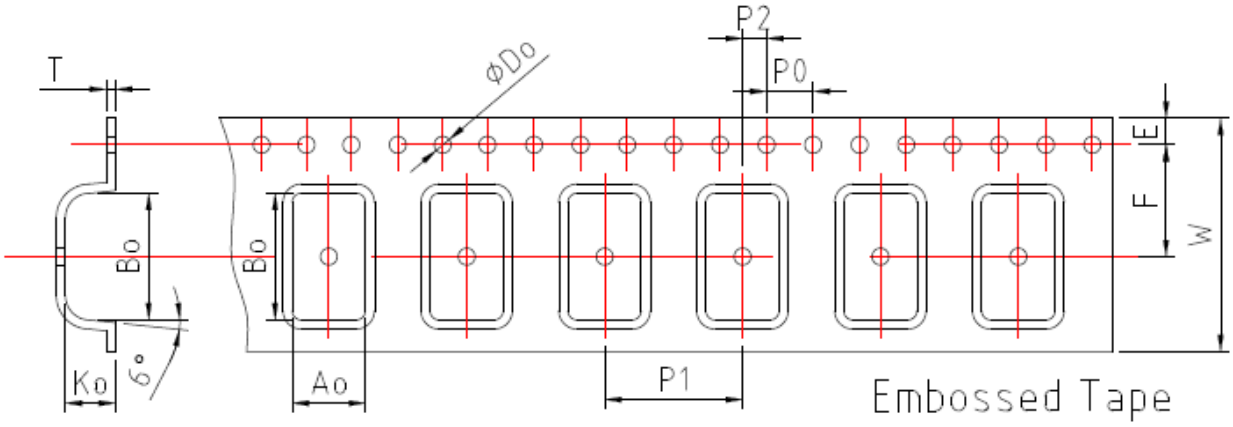


9. Packaging



Packing	Type	A	B	W	F	E	P_1	P_2	P_0	ϕD_0	T
Paper Tape	RLN06	2.0±0.15	3.6±0.2	8.0±0.2	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.1	ϕ 1.5 (+0.1/-0)	0.84±0.1

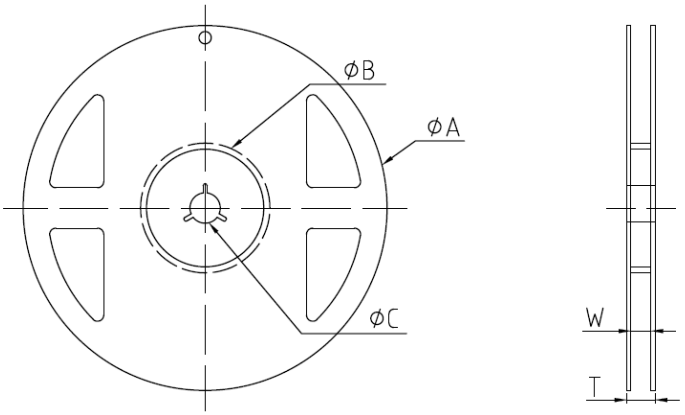
Unit: mm



Packing	Type	A_0	B_0	E	F	W	ϕD_0	K_0	T	P_0	P_1	P_2
Emboss	RLN27	7.0±0.1	7.5±0.1	1.75±0.1	7.5±0.1	16±0.3	ϕ 1.50 ±0.1	1.7±0.15	0.3±0.1	4.0±0.1	12±0.1	2.0±0.1
	RLN37	2.6±0.2	4.5±0.2	1.75±0.1	5.5±0.1	12.0±0.2	ϕ 1.55 ±0.05	1.1±0.1	0.3±0.05	4.0±0.1	4.0±0.1	2.0±0.2

UNIT: mm

10. Reel Specification

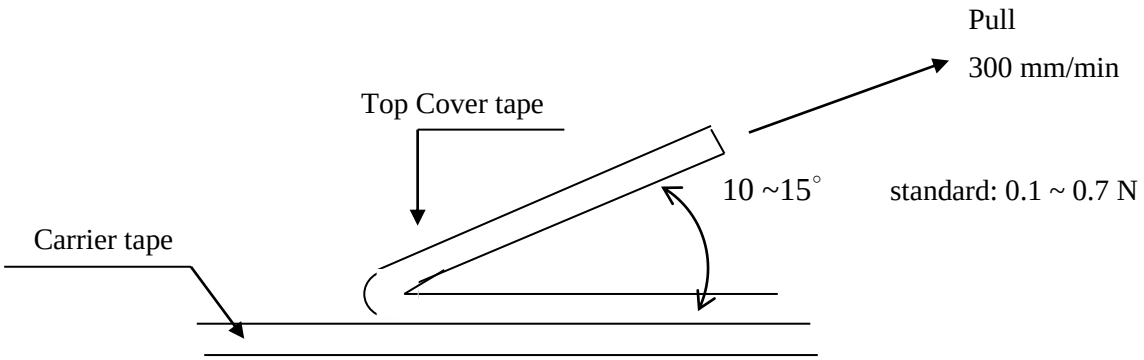


Series	ϕ A	ϕ B	ϕ C	W	T
RLN06	178±2.0	60.0±1.0	13.0±1.0	9.0±1.0	11.5±1.0
RLN27	178±2.0	60.0±1.0	13.0±1.0	13.0±1.0	15.4±1.0
RLN37	180(+0/-3)	60.0±1.0	13.0±1.0	13.0±1.0	15.4±2.0

Unit: mm

11. Peeling Strength of Top Cover Tape

Test Condition: 0.1 to 0.7 N at a peel-off speed of 300 mm / min.



12. Storage Conditions

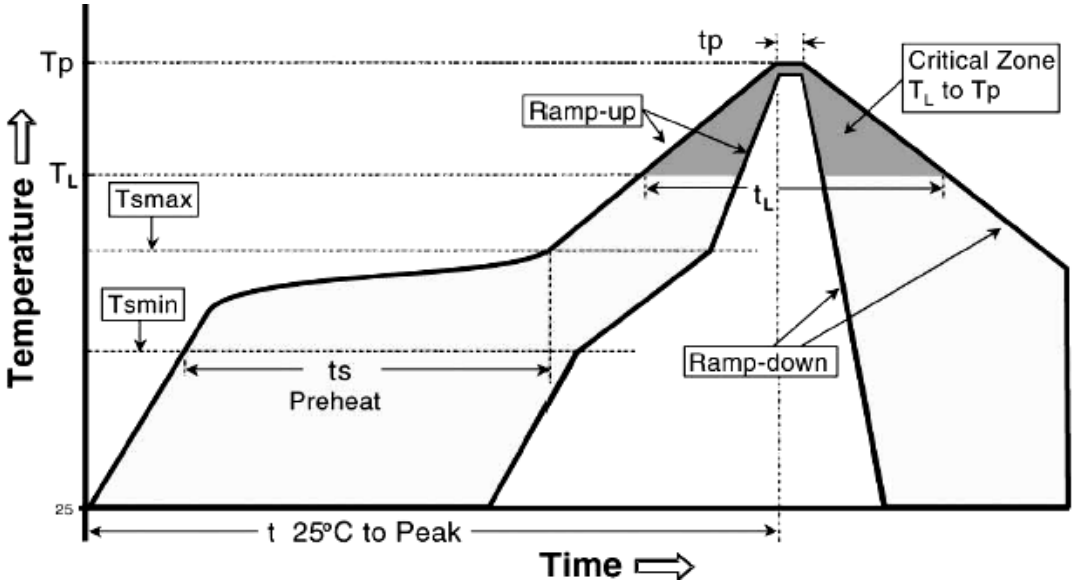
Temperature: 5℃~35℃, Humidity:40%~75%

MSL level 1

13. Shelf Life

2 years from manufacturing date.

14. Recommend IR – Reflow profile (solder: Sn96.5 / Ag3 / Cu0.5)



Alloyed Re-flow times: 3 times

Remark: To avoid discoloration phenomena of chip on terminal electrodes, please use N2 Re-flow furnace.

Iron Solder:350±10℃, 3+1/-0 sec, 1 time

Profile Feature	Lead (Pb)-Free Assembly
Average ramp-up rate (Tsmax to Tp)	3℃ / second max.
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (Ts_{min} to Ts_{max}) (ts)	 150℃ 200℃ 60 -120 seconds
Time maintained above: - Temperature (T_L) - Time (T_L)	 217℃ 60-150 seconds
Peak Temperature (Tp)	260℃
Time within $^{+0}_{-5}$ ℃ of actual Peak Temperature (tp)[2]	10 seconds
Ramp-down Rate	6℃/second max.
Time 25℃ to Peak Temperature	8mimutes max.

15. ECN

Engineering Change Notice: The customer will be informed with ECN if there is significant modification on the characteristics and materials described in Approval Sheet.

16. Manufacturing Country & City

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