1. Scope

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

2. Type Designation

RLP	25	F	E	C	M	R010
Item	**Series No.**	**Resistance tolerance**	**Packaging**	**Power rating**	**Metal**	**Resistance**
	25:2512 (6432)	F: ±1% G: ±2% J: ±5%	E: Embossed Tape	C= 1W D= 1.5W E= 2W G= 3W	M=Mn/Cu	**e.g:** R010=10mΩ

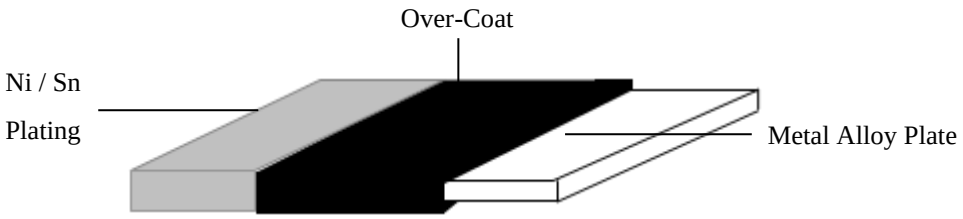
3. Features

Type	RLP25
Power Rating	1W、1.5 W、2 W、3W
Resistance Value	1mΩ~70mΩ
Operation Temperature Range	-55℃~+170℃
Temperature Coefficient of Resistance	±50ppm/℃
Tolerance	±1%, ±2%, ±5%
Insulation Resistance	Over 100MΩ
Maximum Working Current (I)	$(P/R)^{1/2}$

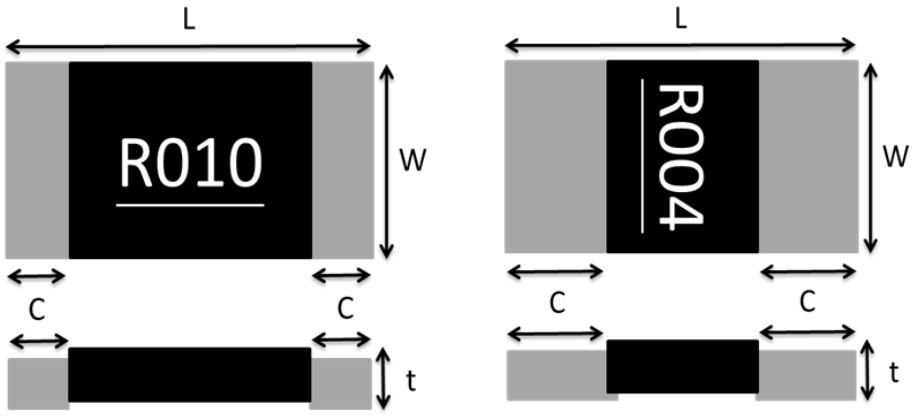
Note: For 2&3watts, copper foil minimum thickness of PCB： 105μm

4. Construction and Dimension

4.1 Construction



4.2 Dimension



Unit : mm

Style	L	W	C	t	Material
RLP25	6.4±0.2	3.2±0.2	2.2±0.2(≦4mΩ) 0.9±0.2(R>4mΩ)	0.9 ±0.20	Strip： Alloy Over Coating：molding Compound UL-94V-0 grade

4.3 Marking

(1) If R≦4mΩ, the marking pattern is as follows.

Resistance value is expressed by 4 digits.

E.G.: R002 = 0.002Ω = 2mΩ；1R5m = 0.0015Ω = 1.5mΩ

(2) If R>4mΩ, the marking pattern is as follows.

Resistance value is expressed by 4 digits.

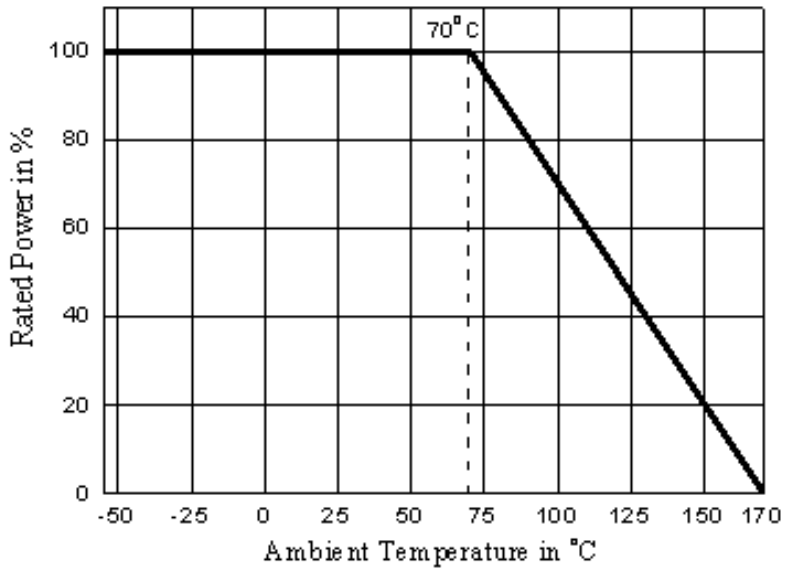
E.G.: R010 = 0.010Ω = 10mΩ；R020 = 0.020Ω = 20mΩ

5. Reliability Tests

Test Items	Reference	Condition of Test	Test Limits
Temperature Coefficient of Resistance	IEC60115-1 4.8	+25 ~ 125℃	Refer 4.0
High Temperature Exposure(Storage)	AEC-Q200-REV D-Test 3 MIL-STD-202 Method 108	T=170℃,1000hrs,Measurement at 24hrs after test conclusion.	< ±1%
Temperature Cycling	AEC-Q200-REV D-Test 4 JESD22 Method JA-104	1000Cycle (-55℃ to 125℃),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℃,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℃ 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 c:Deionized water ：Propylene Glycol Monomethyl Ether：monoethanolamine = 42：1：1	Marking and protective layer can not 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:

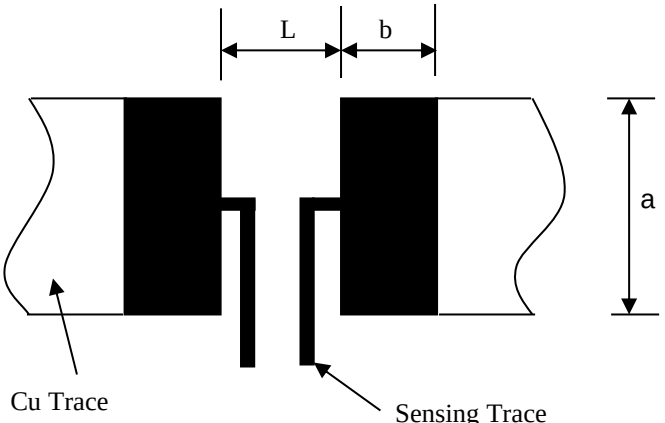
$$I = \sqrt{P \div R}$$

I:Rated Current(I)

P:Rated Power(W)

R:Resistance Value(Ω)

6. Recommended Solder Pad Dimension



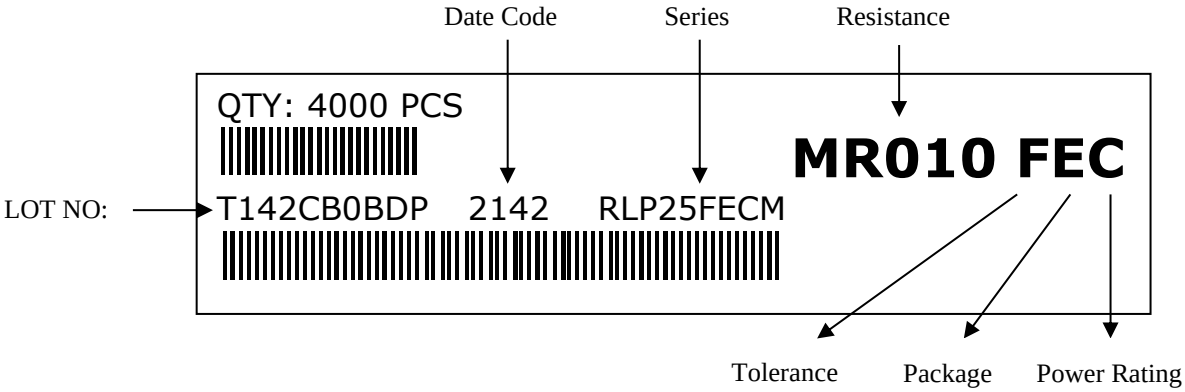
Resistance Range (Ω)	a	b	L
R > 0.004	4.0±0.1	2.1±0.1	4.1±0.1
R≦0.004	4.0±0.1	3.1±0.1	1.3±0.1

Unit: mm

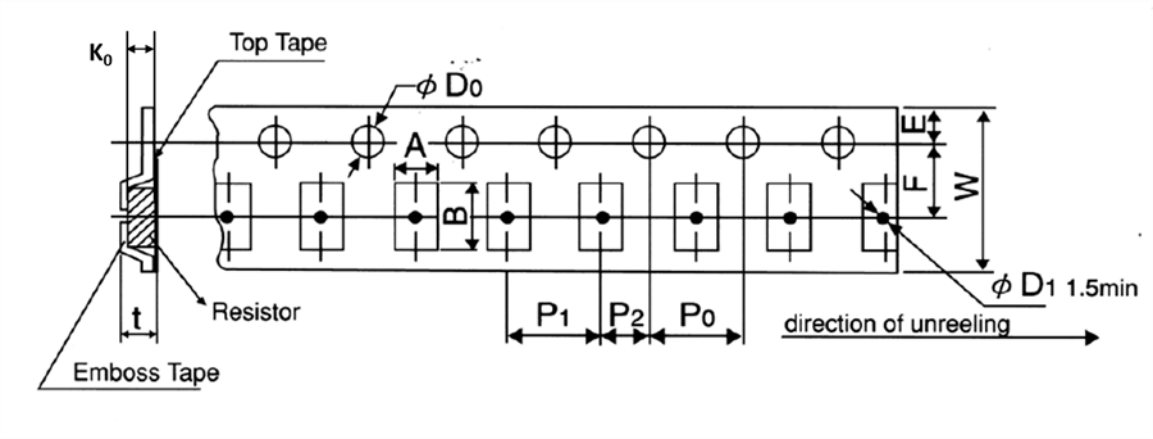
7. Number of Package

4000 Pieces / package

8. Label



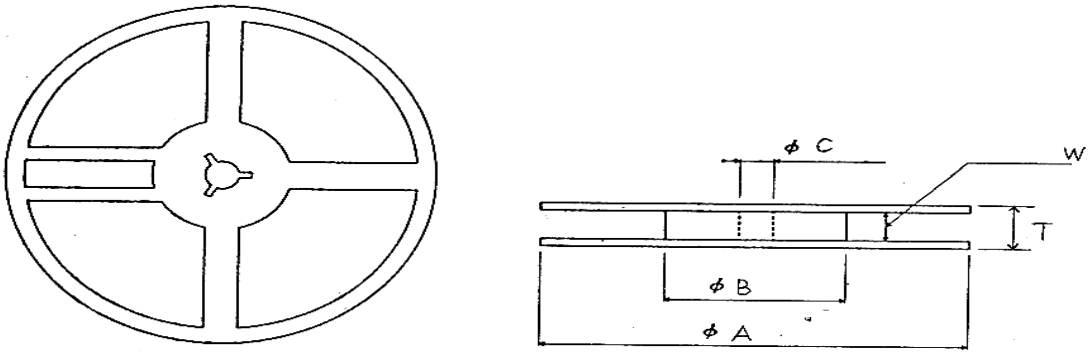
9. Taping



Packing	Type	A	B	W	F	E	P_1	P_2	P_0	ϕD_0	t	K_0
Emboss Tape	RLP25	3.6 ±0.2	6.9 ±0.2	12 ±0.2	5.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.05	ϕ 1.5 (+0.1/-0)	1.2 ±0.15	1.0 ±0.15

Unit: mm

10. Reel Specification

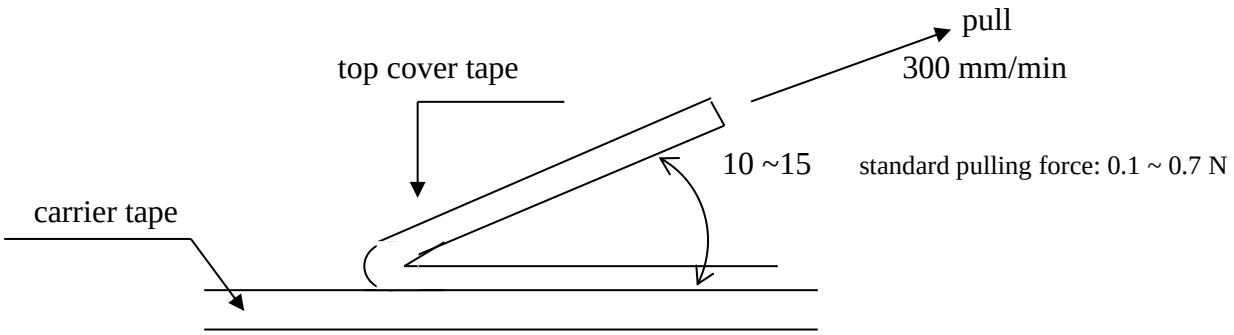


Series	ϕ A	ϕ B	ϕ C	W	T
RLP 25	180^{+0}_{-3}	60 ±1.0	13.0±1.0	13.0±1.0	15.4±2.0

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

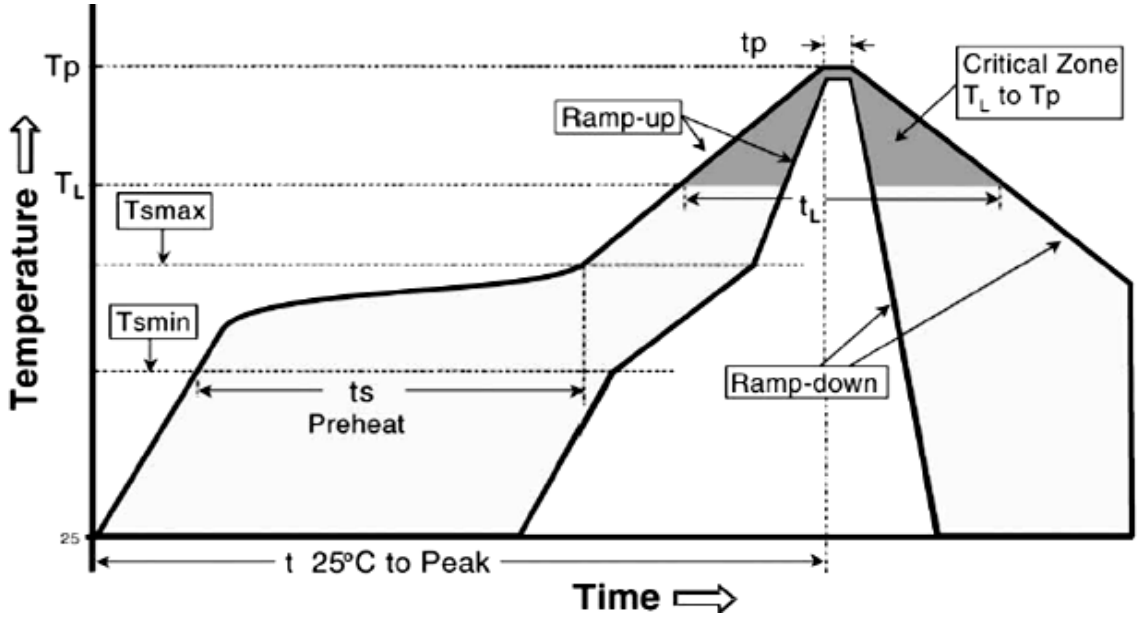
Temperature: 5℃~35℃,Humidity:40%~75%

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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Record of change

No	Date	Item	Content of change	Owner
1	2023.11.21	Ver.1(11J)	First issue	Chun Lee