



Lead-Free Current Sensing Resistors
RLPL12
(Halogen-Free)
AEC-Q 200-Ver D qualified

Document No TRLPL-120S001E

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1. Scope

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

2. Type Designation

RLPL12

F

E

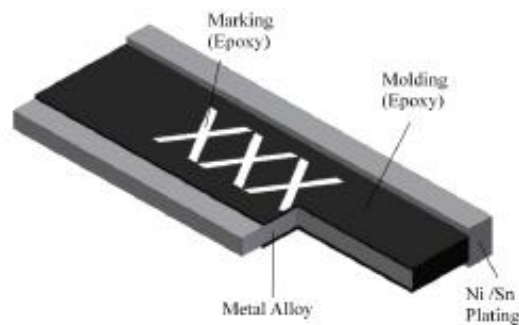
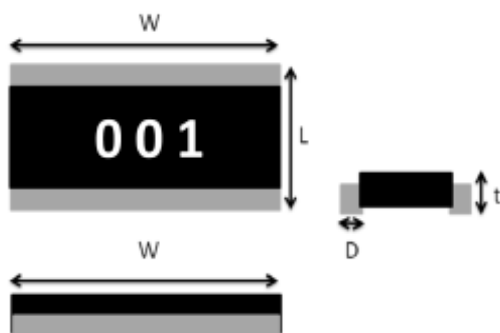
C

M

R001

Series No.	Tolerance	Packaging	Power	Metal	Resistance
L12 : 1225	F= $\pm 1\%$ G= $\pm 2\%$ J= $\pm 5\%$	E= Embossed	C= 1W E= 2W G= 3W	M= MnCu	e.g. R001=1m Ω

3. Construction and Dimension



Series	L	W	D	T
RLPL12	3.20 $\pm$ 0.3	6.40 $\pm$ 0.30	0.5 $\pm$ 0.20	0.9 $\pm$ 0.25

UNIT: mm



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Marking

For RLPL12

The marking pattern is as follows.



Resistance value is expressed by 3 digits.

E.G.:

001 = $0.001\Omega = 1\text{m}\Omega$

010 = $0.010\Omega = 10\text{m}\Omega$

*Note: If the marking pattern has underline , it is indicated as a MnCu material

4. Features

Series	Size	Power (W)	Resistance Value	Operation Temperature Range	TCR	Tolerance
RLPL12	1225	1W	1m Ω	-55°C~+170°C	± 75 ppm/°C	$\pm 1\%$
		2W 3W	2~55m Ω		± 50 ppm/°C	$\pm 2\%$ $\pm 5\%$

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-STD202 Method 108	T=170°C,1000hrs, Measurement at 24hrs after test conclusion.	< $\pm 1\%$
Temperature Cycling	AEC-Q200-REV D-Test 4 JESD22 Method JA-104	1000Cycle (-55°C to 125°C), Measurement at 24hrs after test conclusion.	< $\pm 0.5\%$
Short time overload	IEC60115-1 4.13	5 X rated power for 5s.	< $\pm 0.5\%$
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.	< $\pm 1\%$
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.	< $\pm 0.5\%$
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 $\pm$ 4 hours after test conclusion.	< $\pm 1\%$
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.	

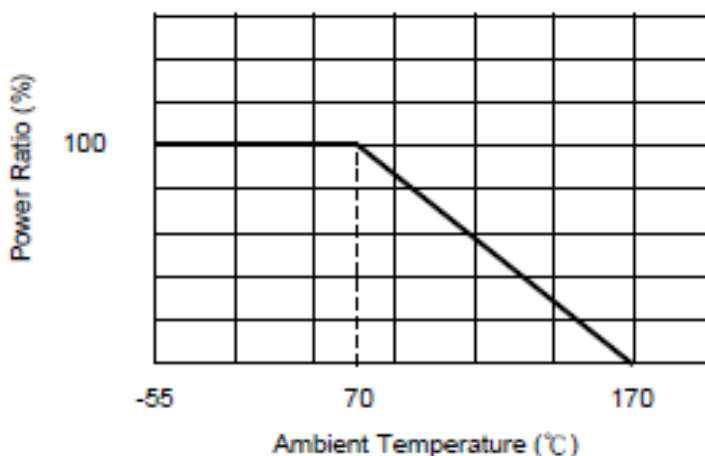


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Resistance to Solvents	AEC-Q200-REV D-Test 12 MIL-STD-202 Method 215	a: Isopropyl Alcohol : Mineral Spirits = 1 : 3 b: Terpene Defluxer (Bioact EC-7R). c: Deionized water : Propylene Glycol Monomethyl Ether : monoethanolamine = 42 : 1 : 1	Marking and protective layer cannot be detached
Resistance to Soldering Heat	AEC-Q200-REV D-Test 15 MIL-STD-202 Method 210	T=260+/-5°C 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-1 are 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





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5.2 Rated Current

The rated current is calculated by the following formula:

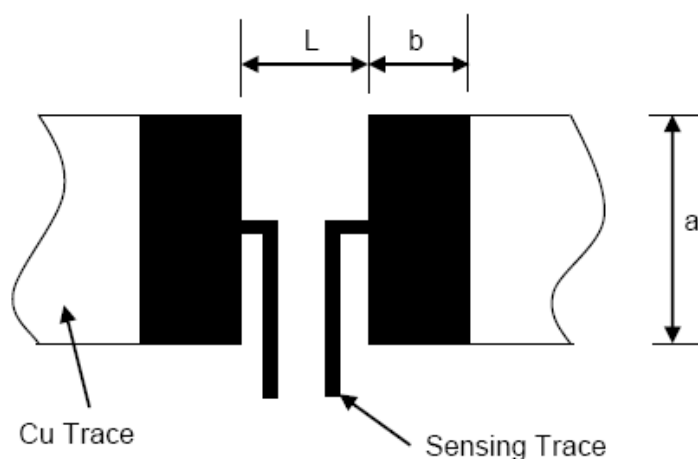
$$I = \sqrt{P \div R}$$

I: Rated Current (A)

P: Rated Power (W)

R: Resistance Value (Ω)

6. Recommended Solder Pad Dimension



Type	Resistance Range (m Ω)	a	b	L
RLPL12	1~55	7.0 $\pm$ 0.1	1.0 $\pm$ 0.1	2.3 $\pm$ 0.1

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

Unit: mm

7. Number of Package

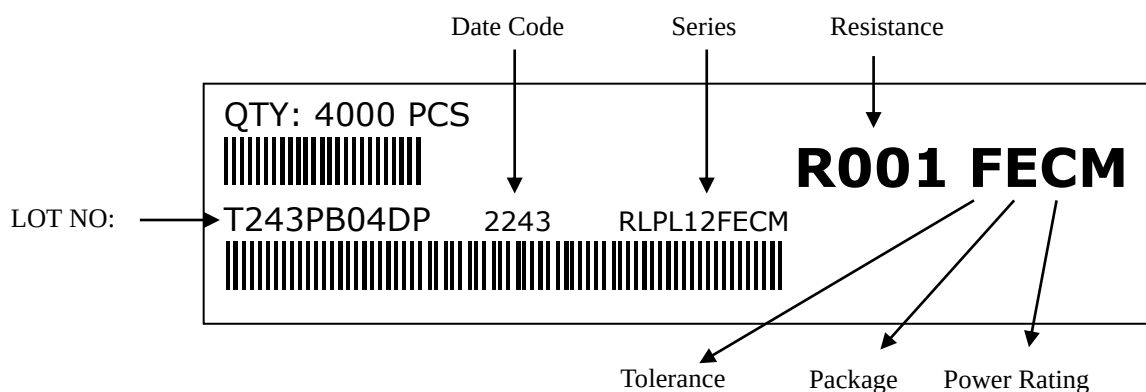
Series	RLPL12
Pieces	4000



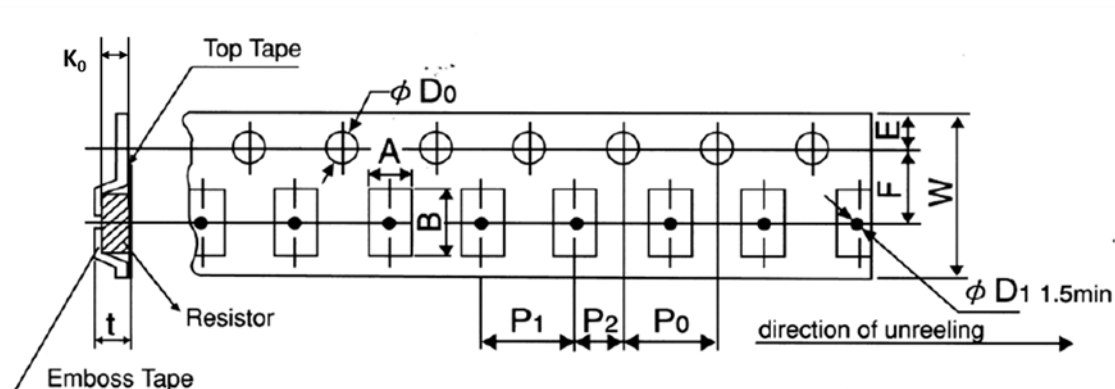
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8. Label



9. Packaging



Packing	Type	A	B	W	E	F	P_1	P_2	P_0	ϕD_0	K_0	t
Emboss	RLPL12	3.60	6.90	12.00	1.75	5.50	4.0	2.0	4.0	ϕ 1.5	1.0	1.2
	Tolerance	± 0.20	± 0.20	± 0.20	± 0.10	± 0.05	± 0.1	± 0.05	± 0.05	$+0.1/-0$	± 0.15	± 0.15

Unit: mm



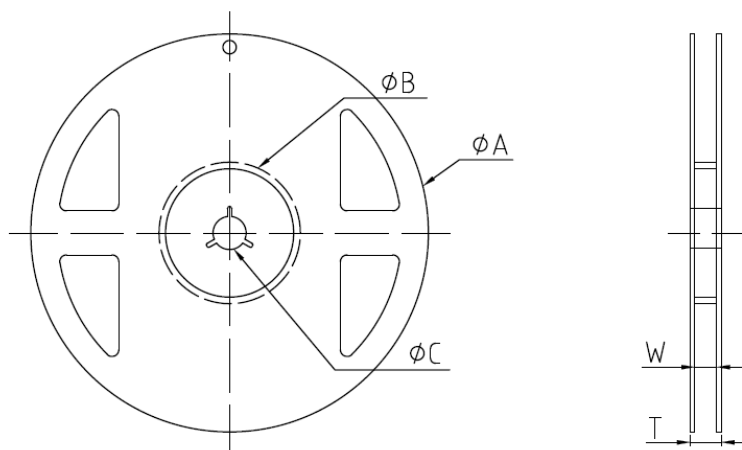
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10. Reel Specification

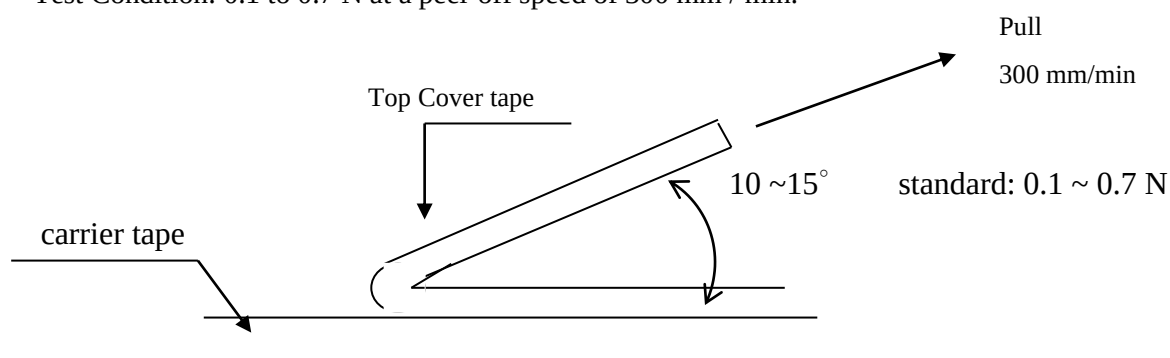


Series	ϕA	ϕB	ϕC	W	T
RLPL12	178 ± 2.0	60.0 ± 1.0	13.0 ± 1.0	13 ± 1.0	15.4 ± 1.0

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°C~35°C, Humidity: 40%~75%

Humidity storage level: Level 1

13. Shelf Life

2 years from manufacturing date.



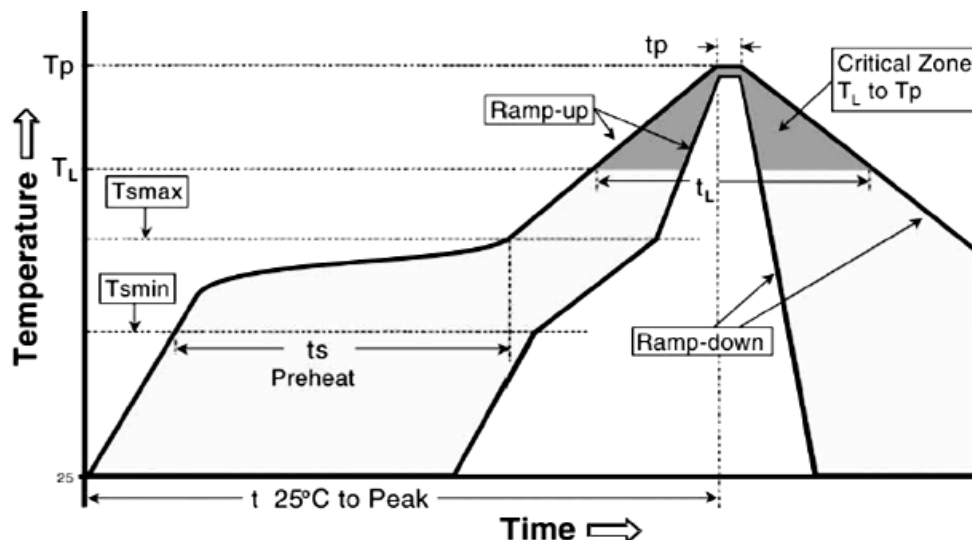
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14. Recommend IR – Reflow profile (solder: Sn96.5 / Ag3 / Cu0.5)



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°C, 3+1/-0 sec, 1 time

Profile Feature	Lead (Pb)-Free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C / second max
Preheat - Temperature Min (T _{smin}) - Temperature Max (T _{smax}) - Time (T _{smin} to T _{smax}) (t _s)	150°C 200°C 60 -120 seconds
Time maintained above: - Temperature (T _L) - Time (T _L)	217°C 60-150 seconds
Peak Temperature (T _p)	260°C
Time within +0/-5°C of actual Peak Temperature (t _p) ²	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8minutes max.



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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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