



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

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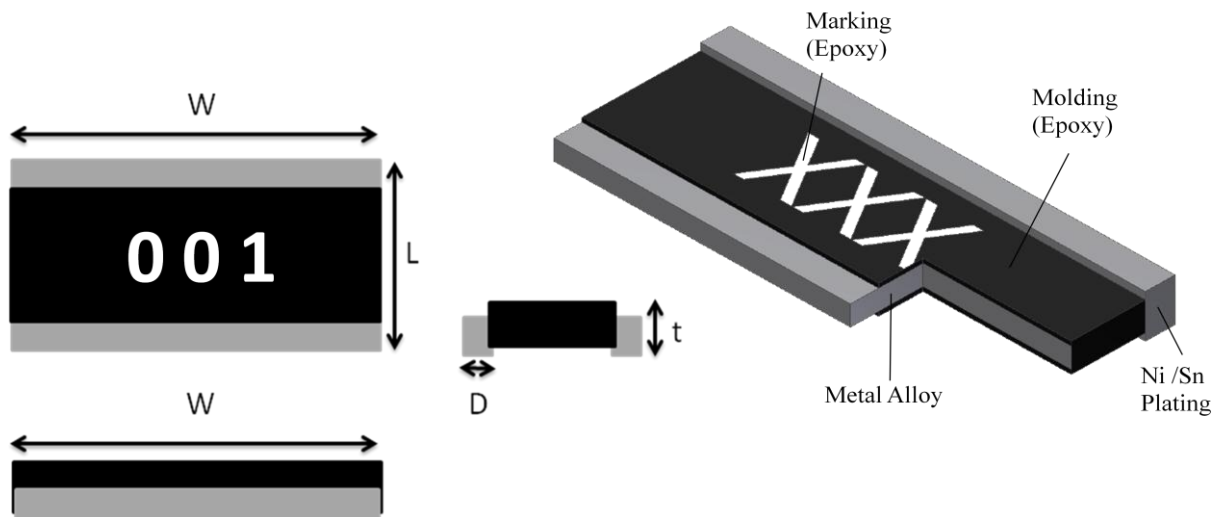
**1. Scope :**

This specification applied to the products of Lead-Free current sensing resistor of metal strip for Lead-Free RLPL12 manufactured by TA-I TECHNOLOGY CO.,LTD.

**2. Type Designation :**

RLPL12	F	E	G	M	R001
<b>Series No.</b>	<b>Tolerance</b>	<b>Packaging</b>	<b>Power</b>	<b>Material</b>	<b>Resistance</b>
L12→1225	F = ± 1% G = ± 2% J = ± 5%	E=Embossed	G = 3W	M = MnCu	R001=1mΩ

**3. Construction and Dimension :**



Series	L	W	D	T
RLPL12	3.20±0.3	6.40±0.30	0.5±0.20	0.9 ±0.25

UNIT: mm



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**4. Features:**

Series	Size	Power (W)	Resistance Value	Operation Temperature Range	TCR	Tolerance
RLPL12	1225	3.0	1 mΩ	-55°C ~+170°C	±75 ppm/°C	±1% ±2% ±5%
			2~55 mΩ		±50 ppm/°C	

**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=125°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.	



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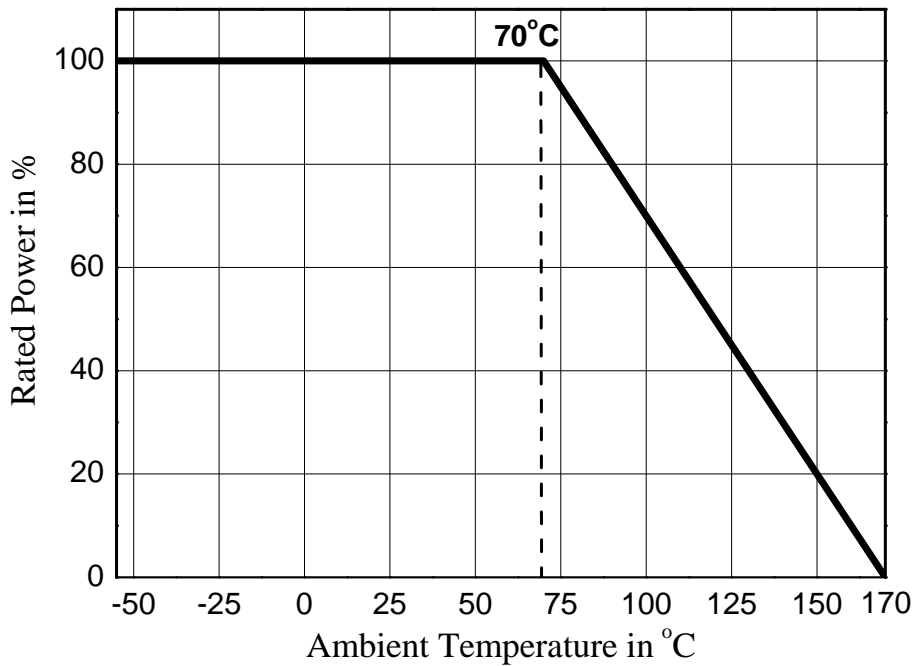
Resistance to Solvents	AEC-Q200-REV D-Test 12 MIL-STD-202 Method 215	a:Isopropyl Alcohol : Mineral Spirits= 1 : 3 b:Terpene Defluxer (Bioact EC-7R) c:Deionized water : Propylene Glycol Monomethyl Ether : monoethanolamine = 42 : 1 : 1	Marking and protective layer can not be detached
Resistance to Soldering 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-1are acceptable, Electrical test not required	V-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%



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### 5.1 Derating Curve



### 5.2 Rated Current & Voltage

The rated Current and Voltage are calculated by the following formula:

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

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

I: Rated Current (A)

V: Rated Voltage (V)

P: Rated Power (W)

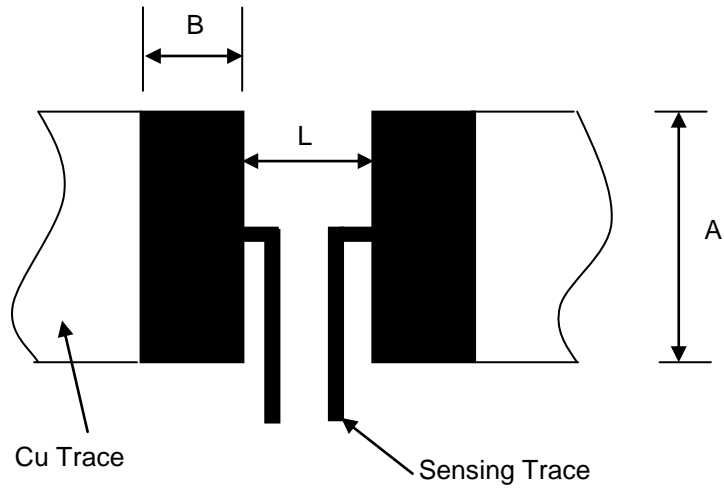
R: Resistance Value ( $\Omega$ )



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**6. Recommended Solder Pad Dimension**



Unit: mm

Series	Resistance (mΩ)	A	B	L
RLPL12	1 ~ 55	7.0	1.0	2.3

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



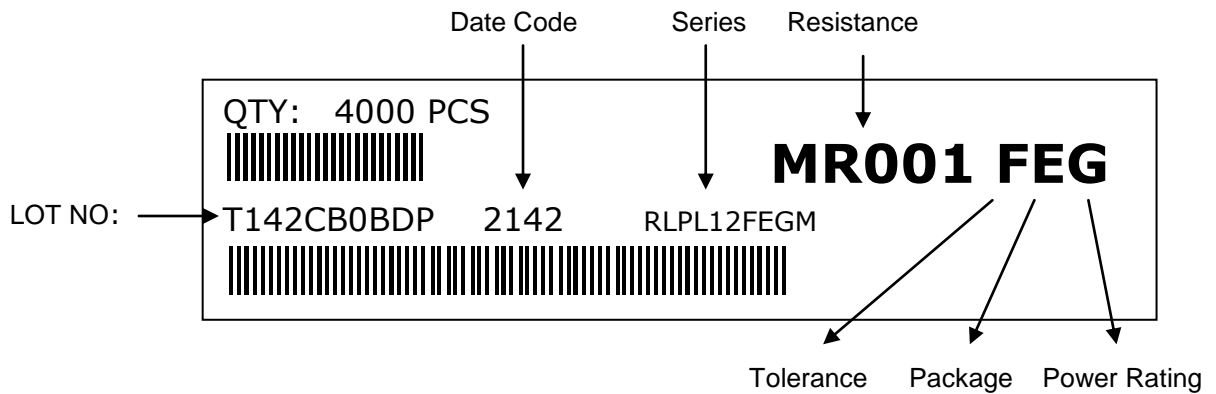
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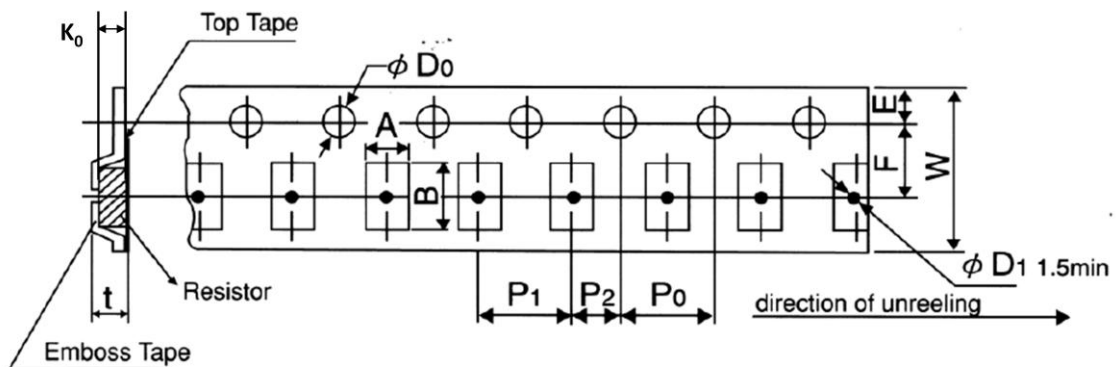
**7. Number of Package:**

Series	RLPL12
Pieces/Package	4000

**8. Label:**



**9. Packaging**



**Embossed tape packaging dimension**

Symbol	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	t	K <sub>0</sub>
RLPL12	3.6	6.9	12.0	5.5	1.75	4.0	2.0	4.0	$\phi$ 1.5	1.2	1.0
Tolerance	$\pm 0.20$	$\pm 0.20$	$\pm 0.20$	$\pm 0.05$	$\pm 0.10$	$\pm 0.10$	$\pm 0.05$	$\pm 0.05$	+0.1/-0	$\pm 0.15$	$\pm 0.15$

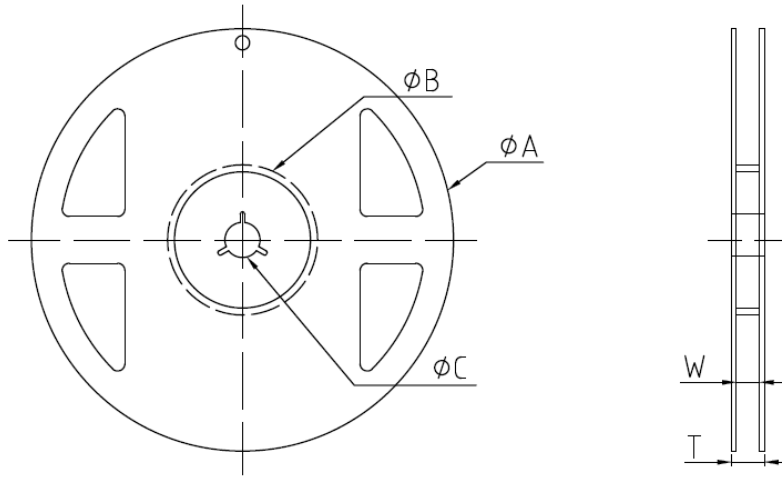
Unit: mm



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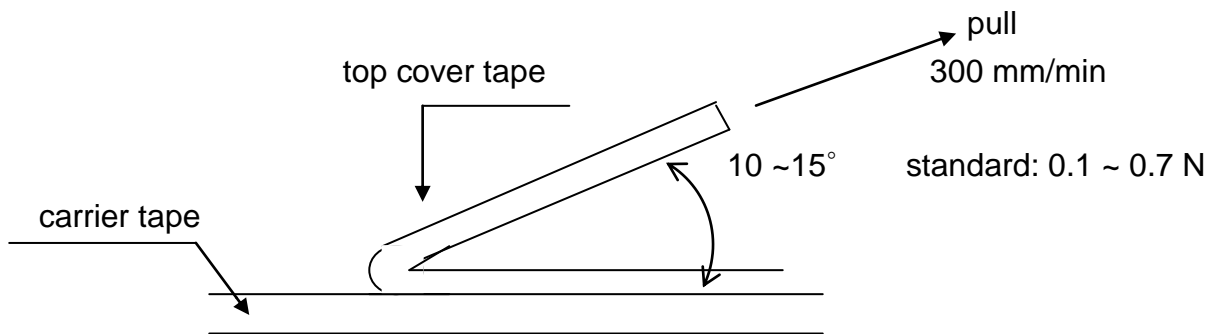
**10. Reel Specification**



Series	$\phi A$	$\phi B$	$\phi C$	W	T
RLPL12	178 $\pm$ 2.0	60 $\pm$ 1.0	13.0 $\pm$ 1.0	13.0 $\pm$ 1.0	15.4 $\pm$ 1.0

**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%

MSL level 1

**13. Shelf Life:**

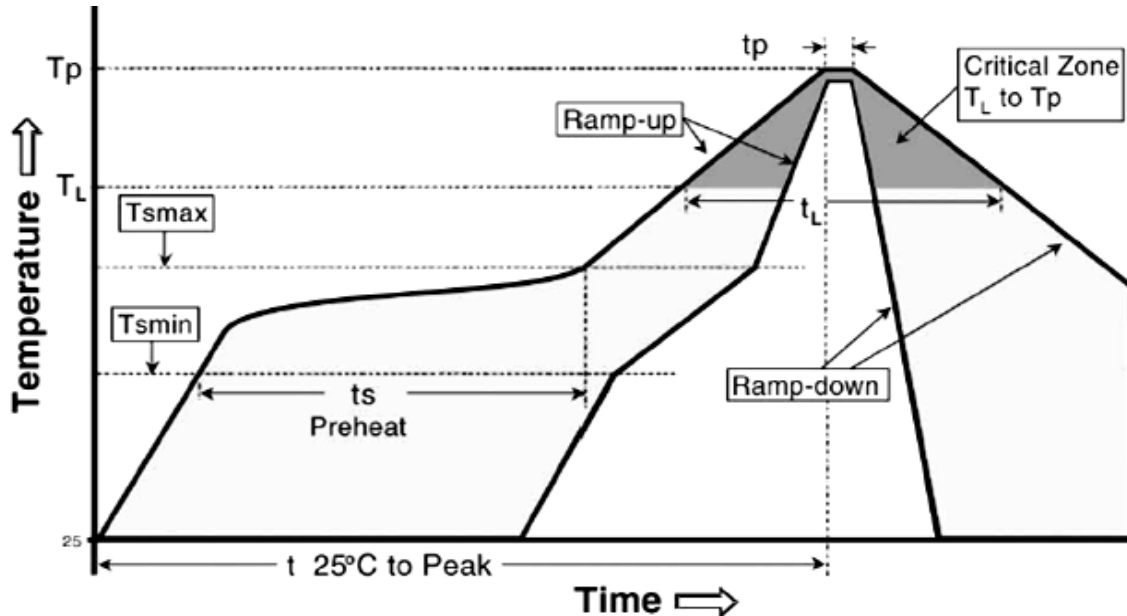
2 years from manufacturing date.



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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 <sub>smax</sub> to T <sub>p</sub> )	3°C / second max.
Preheat - Temperature Min (T <sub>smin</sub> ) - Temperature Max (T <sub>smax</sub> ) - Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )	150°C 200°C 60 -120 seconds
Time maintained above : - Temperature (T <sub>L</sub> ) - Time (T <sub>L</sub> )	217°C 60-150 seconds
Peak Temperature (T <sub>p</sub> )	260°C
Time within $\begin{matrix} +0 \\ -5 \end{matrix}$ °C of actual Peak Temperature (t <sub>p</sub> ) <sup>2</sup>	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8mimutes max.

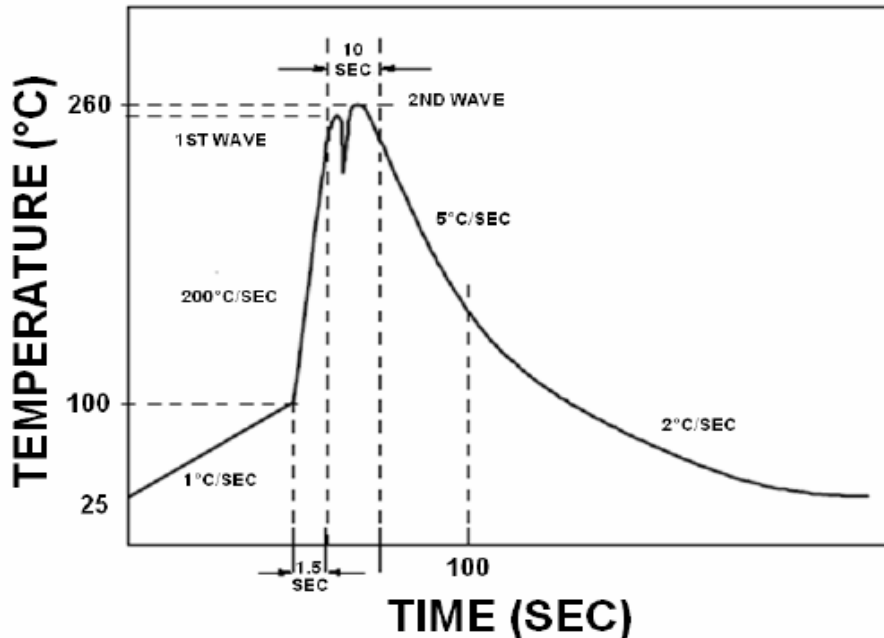




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**15. Recommend Wave-Solder profile : (solder : Sn96.5 / Ag3 / Cu0.5)**



**16. 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.

**17. Manufacturing Country & City :**

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