



**Lead-Free Current Sensing Resistors**  
**RLF Series**  
**AEC-Q 200-Ver E qualified**  
**(Halogen-Free)**

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## 1. Scope

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

## 2. Type Designation

**RLF06**

**F**

**E**

**C**

**(M)**

**R001**

Series No.	Tolerance	Packaging	Power	Metal	Resistance
06 : 0612 (F=4-Wire)	F= $\pm 1\%$ G= $\pm 2\%$ J= $\pm 5\%$	E= Embossed	S= 0.5W C= 1W	M= MnCu	e.g. R001=1m $\Omega$ R50M=0.5m $\Omega$

## 3. Features

Type	RLF 06
Size	0612
Power Rating	0.5W 1W
Resistance Value	0.5m $\Omega$ ~ 5m $\Omega$
Operation Temperature Range	-55 $^{\circ}$ C~+170 $^{\circ}$ C
TCR	$\pm 100$ ppm/ $^{\circ}$ C
Tolerance	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$
Insulation Resistance	Over 100M $\Omega$
Maximum Working Voltage(V)	(P*R) <sup>1/2</sup>

\* Note : The specifications and characteristics of this product are not suitable for series and parallel use.

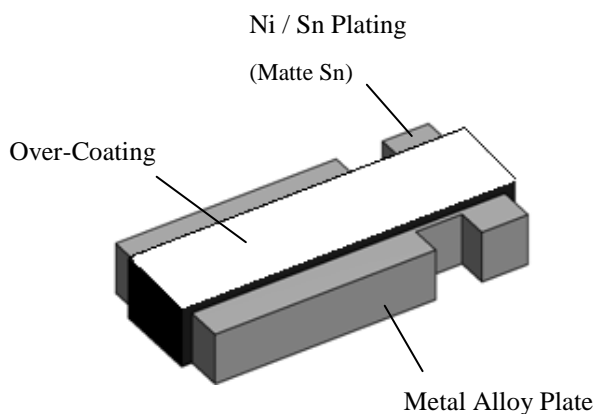


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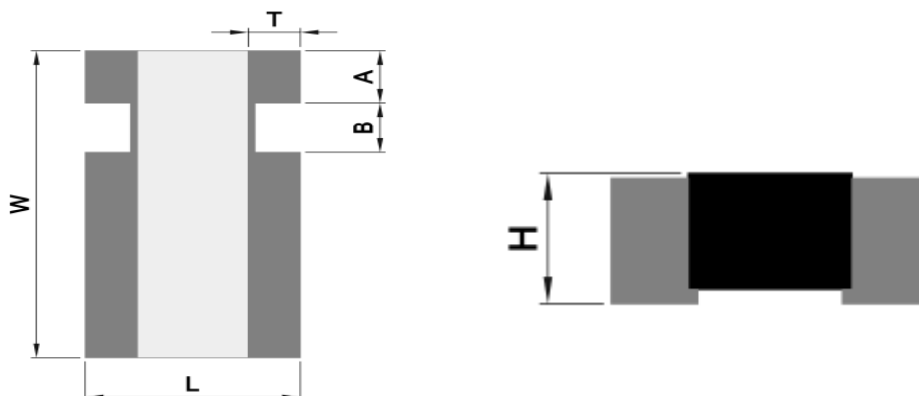
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## 4. Construction and Dimension

### 4.1 Construction



### 4.2 Dimension



Series	L	W	H	T	A	B	Material
RLF06	1.65 ±0.2	3.05 ±0.25	0.65 ±0.2	0.4 ±0.25	0.51 ±0.13	0.34 ±0.13	Strip : Alloy Over Coating : molding Compound UL-94V-0 grade

Note\* Patent Pending

Unit: mm

### Marking

For RLF06

No markings, only white coating.





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## 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 E-Test 3 MIL-STD202 Method 108	T=170°C,1000hrs, Measurement at 24hrs after test conclusion.	$< \pm(1\%+0.0005\Omega)$
Temperature Cycling	AEC-Q200-REV E-Test 4 JESD22 Method JA-104	1000Cycle (-55°C to 155°C), Measurement at 24hrs after test conclusion.	$< \pm(1\%+0.0005\Omega)$
Short time overload	IEC60115-1 4.13	5 X rated power for 5s.	$< \pm(0.5\%+0.0005\Omega)$
Biased Humidity	AEC-Q200-REV E-Test 7 MIL-STD-202 Method 103	10% Rated power at 85°C, RH:85% ,1000Hrs, Measurement at 24hrs after test conclusion.	$< \pm(1\%+0.0005\Omega)$
Operation life	AEC-Q200-REV E-Test 8 MIL-STD-202 Method 108	1000 hours TA=70°C at 100% rated power. 90min ON and 30 min OFF. Measurement at 24±4 hours after test conclusion.	$< \pm(2\%+0.0005\Omega)$
External Visual	AEC-Q200-REV E-Test 9 MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship.	
Physical Dimension	AEC-Q200-REV E-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 E-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 cannot be detached
Resistance to Soldering Heat	AEC-Q200-REV E-Test 15 MIL-STD-202 Method 210	T=260+/-5°C solder,10+/-1 sec dwell.	$< \pm(0.5\%+0.0005\Omega)$
Mechanical Shock	AEC-Q200-REV E-Test 13 MIL-STD-202 Method 213	100g's, Normal duration is 6ms, half sine shock pulse.	$< \pm(0.5\%+0.0005\Omega)$
Resistance to vibration	AEC-Q200-REV E-Test 14 MIL-STD-202 Method 204	5g's for 20min.12cycles, 10-2000Hz.	$< \pm(0.5\%+0.0005\Omega)$
Board Flex	AEC-Q200-REV E-Test 21 AEC-Q200-005	Min 2mm deflection ,60sec.	$< \pm(0.5\%+0.0005\Omega)$
Flammability	AEC-Q200-REV E-Test 20 UL-94	V-0 or V-1 are acceptable, Electrical test not required.	V-0
ESD	AEC-Q200-REV E-Test 17 AEC-Q200-002 or ISO/DIS 10605	verify the voltage setting at 500V.	$< \pm(1\%+0.0005\Omega)$
Solderability	AEC-Q200-REV E-Test 18 J-STD-002	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



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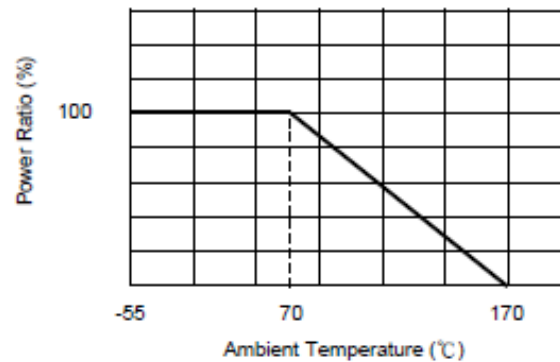
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Terminal Strength (SMD)	AEC-Q200-REV E-Test 22 AEC-Q200-006	Force of 1.8kg for 60 seconds. Remarks: 0201-NA	< ±(1%+0.0005Ω)
Low Temperature Storage	EC60115-1 4.23.4 JIS C 5201-1 4.23.4	-55°C, 1000hrs	<±(1%+0.0005Ω)

## 5.1 Derating Curve



## 5.2 Rated Current

The rated current is calculated by the following formula:

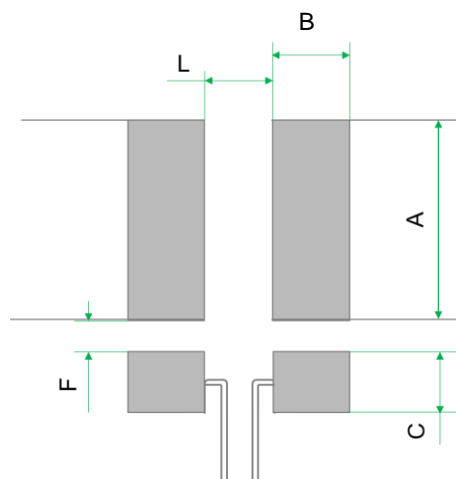
$$I = \sqrt{P \div R}$$

I: Rated Current (A)

P: Rated Power (W)

R: Resistance Value (Ω)

## 6. Recommended Solder Pad Dimension



Series	Resistance Range(mΩ)	A	B	C	L	F
RLF06	0.5~5	2.3±0.1	1.0±0.1	0.8±0.1	0.7±0.1	0.4±0.1

Note: \*Copper foil minimum thickness of PCB: 2oz

Unit: mm



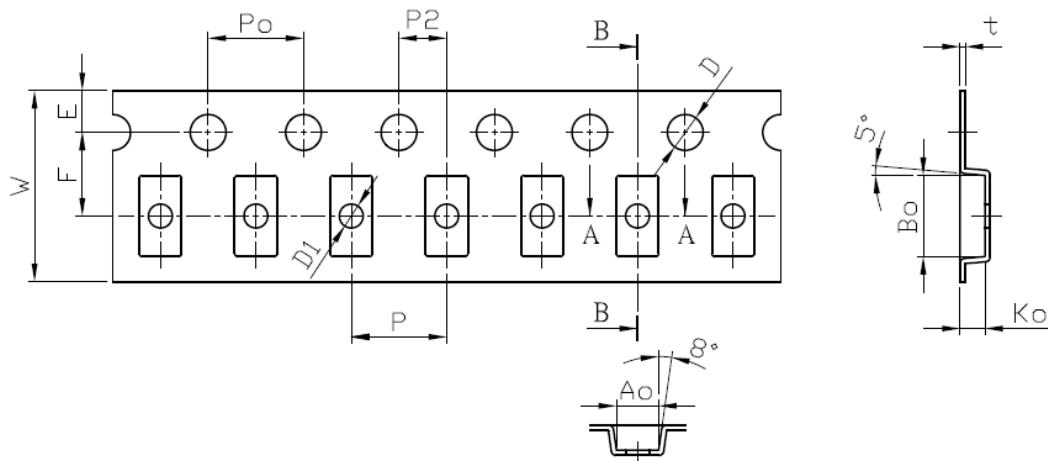
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## 7. Number of Package

4000 Pieces / Package

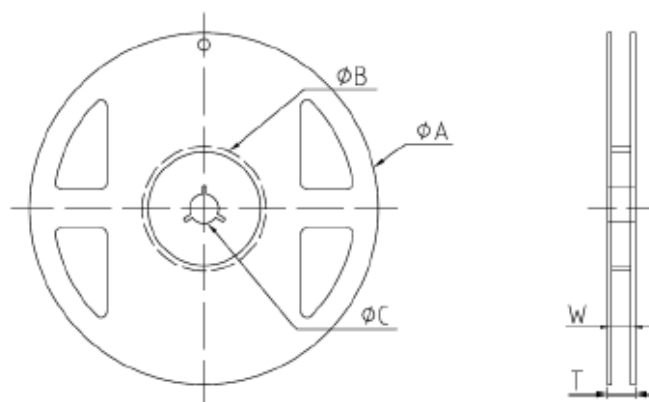
## 8. Packaging



Packing	Type	W	P	E	F	P <sub>0</sub>	10P <sub>0</sub>	P <sub>2</sub>	D	D <sub>1</sub>	A <sub>0</sub>	B <sub>0</sub>	K <sub>0</sub>	t
Emboss	RLF06	8.00	4.00	1.75	3.50	4.00	40.00	2.00	1.50	1.00	1.77	3.40	1.04	0.22
Tolerance		±0.10	±0.10	±0.10	±0.05	±0.10	±0.20	±0.05	+0.10 -0.00	±0.10	±0.10	±0.10	±0.10	±0.05

Unit: mm

## 9. Reel Specification



Unit: mm

Series	φ A	φ B	φ C	W	T
RLF06	178.0 ±2.0	60.0 ±1.0	13.0 ±1.0	9.0 ±1.0	11.5 ±1.0

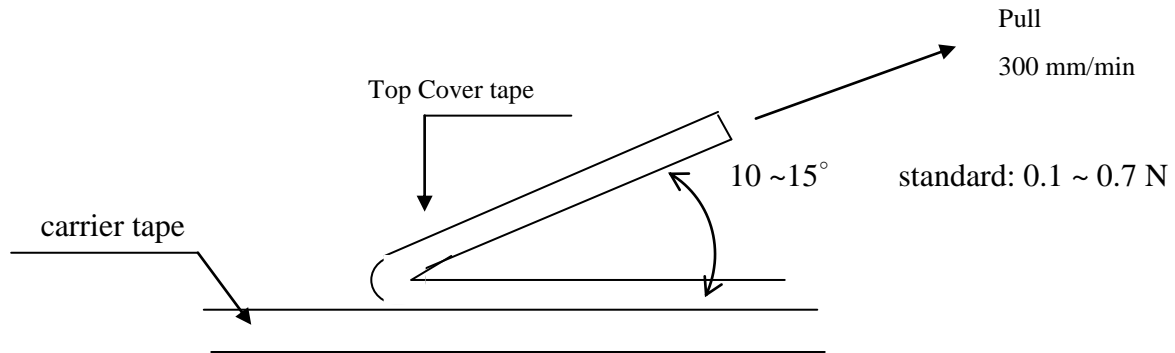


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## 10. Peeling Strength of Top Cover Tape

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



## 11. Storage Conditions

Temperature:  $5^\circ\text{C} \sim 35^\circ\text{C}$ , Humidity: 40% ~ 75%

MSL level 1

## 12. Shelf Life

2 years from manufacturing date.



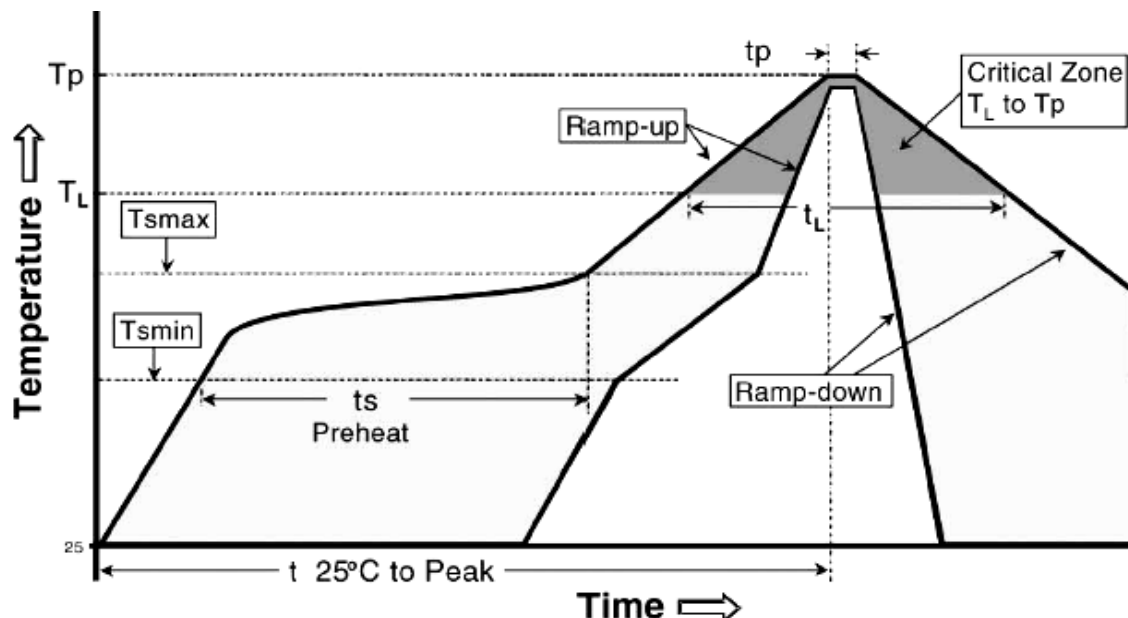
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**13. Recommend IR – Reflow profile** (solder: Sn96.5 / Ag3 / Cu0.5)



**Allowed 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 (Tsmax to Tp)	3°C / second max.
Preheat - Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (Tsmin to Tsmax) (ts)	150°C 200°C 60 -120 seconds
Time maintained above: - Temperature (Tl) - Time (Tl)	217°C 60-150 seconds
Peak Temperature (Tp)	260°C
Time within $\begin{matrix} +0 \\ -5 \end{matrix}$ °C of actual Peak Temperature (tp) <sup>2</sup>	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8minutes max.



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#### 14. 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.

#### 15. Manufacturing Country & City

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