



Current Sensing Resistors
RLT Series
AEC-Q 200-Ver E qualified

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1. Scope

This specification applied to the products of current sensing resistor of metal alloy for RLT series manufactured by TA-I TECHNOLOGY CO., LTD.

2. Type Designation

RLT10	F	T	S	R002
Series No.	Tolerance	Packaging	Power	Resistance
06 : 0603 10 : 0805 12 : 1206	F= $\pm 1\%$ G= $\pm 2\%$ J= $\pm 5\%$	T= Paper	S= 0.5W I= 0.75W C= 1.0W	e.g. R002= 2m Ω R0015=1.5m Ω

3. Features

Type	RLT06	RLT10	RLT12
Size	0603	0805	1206
Power Ratings (W)	0.5W	0.75W	1W
Resistance Value (m Ω)	1~5m Ω	1~3m Ω	1~3m Ω
T.C.R (ppm/ $^{\circ}$ C)	± 50 ppm/ $^{\circ}$ C		
Operation Temperature Range	-55 ~ +155		
Resistance Tolerance (%)	$\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$		
Insulation Resistance (M Ω)	Over 100		
Maximum Working Voltage (V)	$(P * R)^{1/2}$		

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



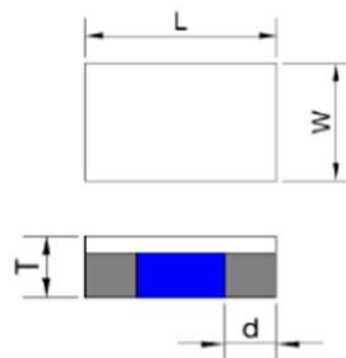
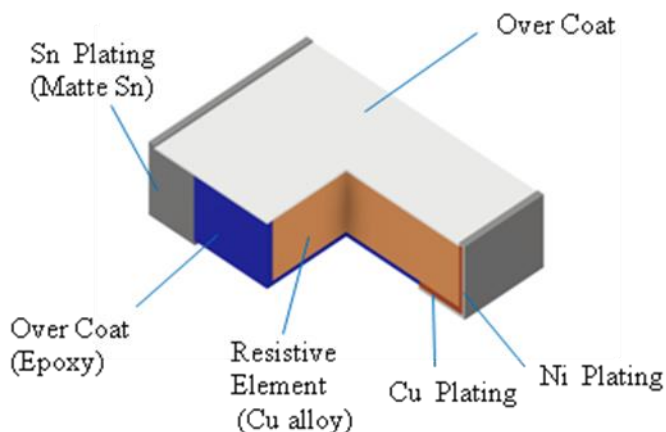
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4. Construction and Dimension



Type	L	W	d	T
RLT06	1.60±0.15	0.80±0.20	0.6 ± 0.20 (R = 1mΩ)	0.40±0.10
			0.35 ± 0.20 (R > 1mΩ)	
RLT10	2.05±0.15	1.30±0.20	0.35±0.20	0.40 ± 0.10 (R ≤ 2mΩ)
				0.25 ± 0.10 (R > 2mΩ)
RLT12	3.2±0.15	1.6±0.20	0.9±0.30	0.40±0.10

UNIT: mm

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=125°C,1000hrs, Measurement at 24hrs after test conclusion.	< ±(1%+0.0005Ω)
Temperature Cycling	AEC-Q200-REV E-Test 4 JESD22 Method JA-104	1000Cycle (-55°C to 155°C), Measurement at 24hrs after test conclusion.	< ±(1%+0.0005Ω)
Short time overload	IEC60115-1 4.13	5 X rated power for 5s.	< ±(1%+0.0005Ω)
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.	< ±(1%+0.0005Ω)
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.	< ±(1%+0.0005Ω)



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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.	< ±(0.5%+0.0005Ω)
Mechanical Shock	AEC-Q200-REV E-Test 13 MIL-STD-202 Method 213	100g's, Normal duration is 6ms, half sine shock pulse.	< ±(1%+0.0005Ω)
Resistance to vibration	AEC-Q200-REV E-Test 14 MIL-STD-202 Method 204	5g's for 20min. 12cycles, 10-2000Hz.	< ±(1%+0.0005Ω)
Board Flex	AEC-Q200-REV E-Test 21 AEC-Q200-005	Min 2mm deflection ,60sec.	< ±(0.5%+0.0005Ω)
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.	< ±(1%+0.0005Ω)
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
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

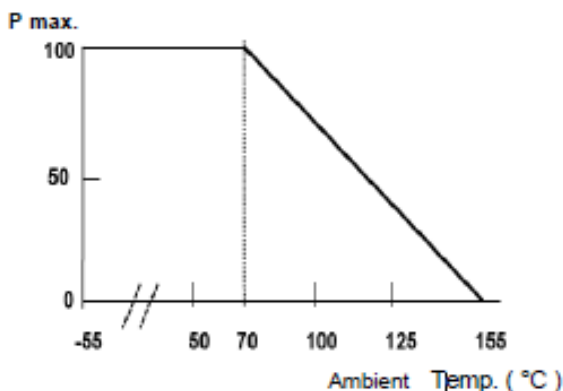


Figure 1

5.2 Rated Current



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The rated current is calculated by the following formula:

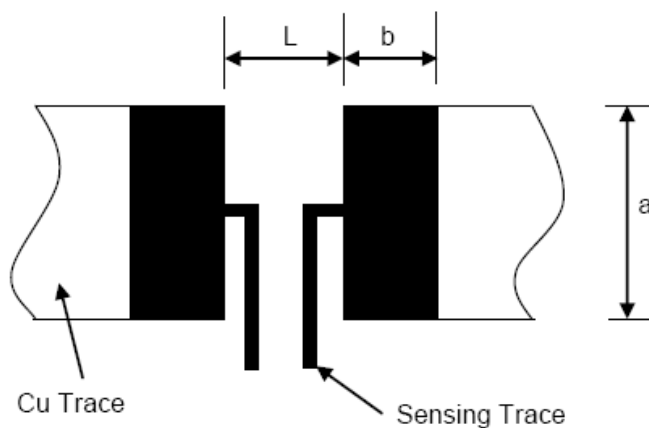
$$I = \sqrt{P \div R}$$

I: Rated Current (A)

P: Rated Power (W)

R: Resistance Value (Ω)

6. Recommended Solder Pad Dimension



Land pattern		Dimension (mm)		
Type	Size	a	b	L
RLT	06 (0603)	1.0±0.1	0.75±0.1	0.45±0.1 (R = 1m Ω)
		1.0±0.1	0.75±0.1	0.8±0.1 (R > 1m Ω)
RLT	10 (0805)	1.4±0.1	1.2±0.1	0.8±0.1
RLT	12 (1206)	1.8±0.1	1.7±0.1	1.0±0.1 (R = 1m Ω)
				1.6±0.1 (R > 1m Ω)

UNIT: mm

7. Number of Package

Type	Paper Tape
	4 mm pitch
	178mm/R
RLT	5000



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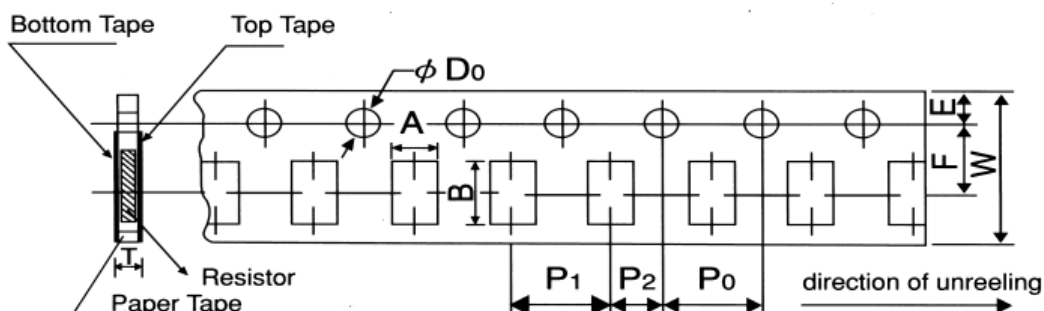
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8. Packaging

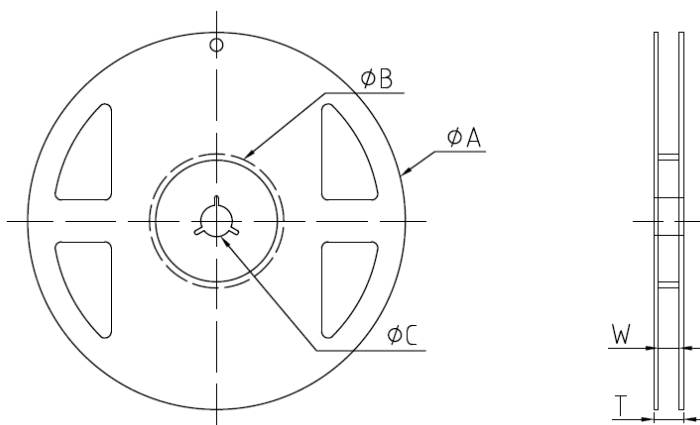
4mm pitch paper



Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	ψD_0	T
Paper Tape	RLT06	1.1 ±0.1	1.9 ±0.1	8.0±0.2	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.1	$\phi 1.5^{+0.1}_{-0}$	0.64 ±0.1
	RLT10	1.6 ±0.15	2.4 ±0.2								
	RLT12	2.0 ±0.15	3.6 ±0.2								

Unit: mm

9. Reel Specification



Series	ϕA	ϕB	ϕC	W	T
RLT	178.0 ±2.0	60.0 ±1.0	13.0 ±1.0	9.0 ±1.0	11.5 ±1.0

Unit: mm

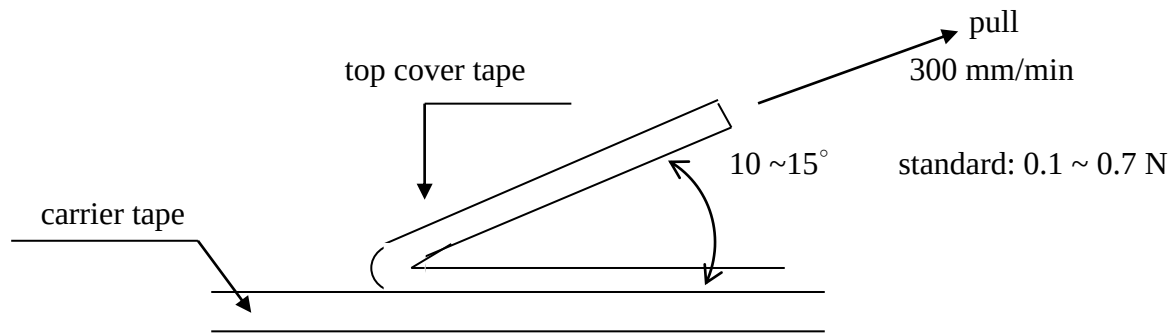


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10. Peeling Strength of Top Cover Tape

Peel – off force of paper and blister tape is in accordance with “JIS”
that is, 0.1 to 0.7 N at a peel-off speed of 300 mm / minute.



11. Storage Conditions:

Temperature: 5°C~35°C, Humidity:40%~75%
Humidity storage level: Level 1

12. Shelf Life:

2 years from manufacturing date.



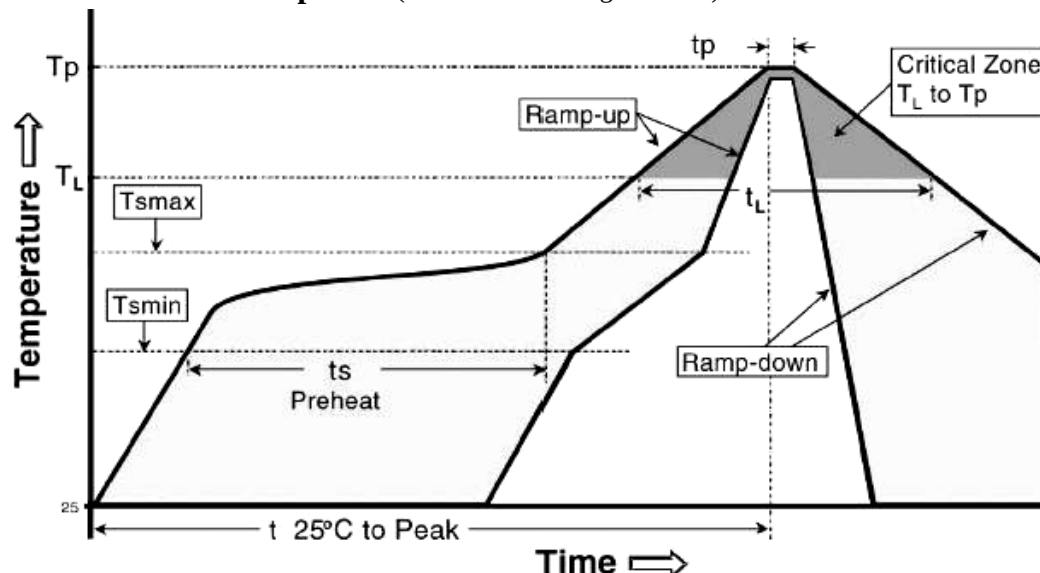
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13. Recommend IR – Reflow profile (solder: Sn96.5 / Ag3 / Cu0.5)



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) ²	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:

TA-I TECHNOLOGY CO., LTD. (Taiwan– Tao Yuan)

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