1. Scope：

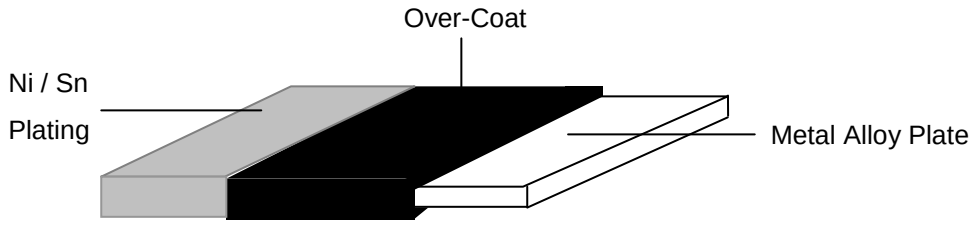
This specification applied to the products of Lead-Free current sensing resistor of metal plate for Lead-Free RLM series manufactured by TA-I TECHNOLOGY CO.,LTD.

2. Type Designation：

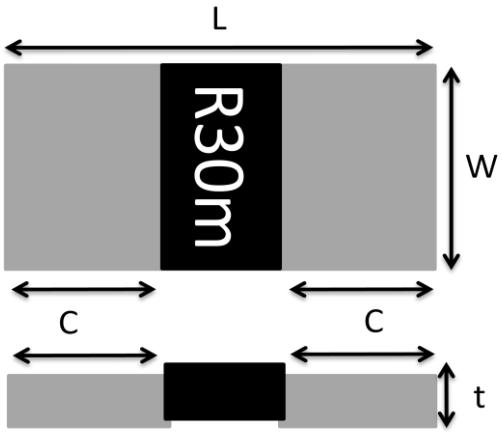
RLM	25	F	E	G	M	R30M
Item	Series No.	Resistance tolerance	Packaging	Power Rating	Metal	Resistance
	25:2512(6432)	F:±1% G:±2% J:±5%	E: Embossed Tape	C=1W E=2W G=3W	M=MnCu	e.g : R30m=0.3mΩ

3. Construction and Dimension ：

3.1 Construction:



3.2 Dimension:



UNIT： mm

Style	L	W	C	t	Material
RLM25	6.4±0.2	3.2±0.2	2.6±0.3	1.1 ± 0.20 (R≦0.30 mΩ) 0.6 ± 0.20 (0.5 mΩ≦R≦0.75 mΩ)	Metal: Copper-Manganese Alloy Over Coating：molding Compound UL-94V-0 grade

4. Features:

Type	RLM25
Power Rating	1W、2 W、3W
Resistance Value	0.3mΩ ~ 0.75mΩ
Operation Temperature Range	-55℃~+170℃
Temperature Coefficient of Resistance	±50ppm/℃
Tolerance	±1%、±2%、±5%
Insulation Resistance	Over 100MΩ
Maximum Working Voltage(V)	$(P*R)^{1/2}$

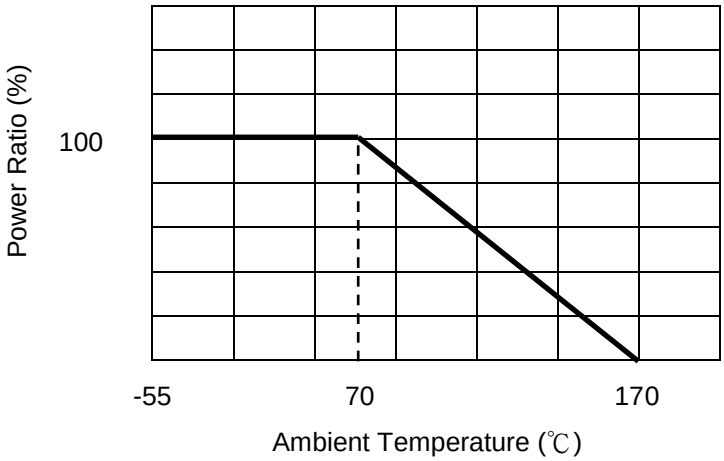
Note*: Total solder pad and trace size of 300mm^2

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=125℃,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°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.	

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℃ 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%

5.1Derating Curve



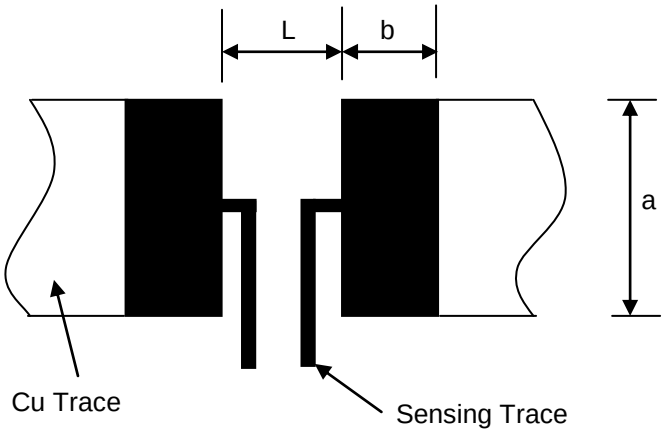
5.2 Rated Current

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



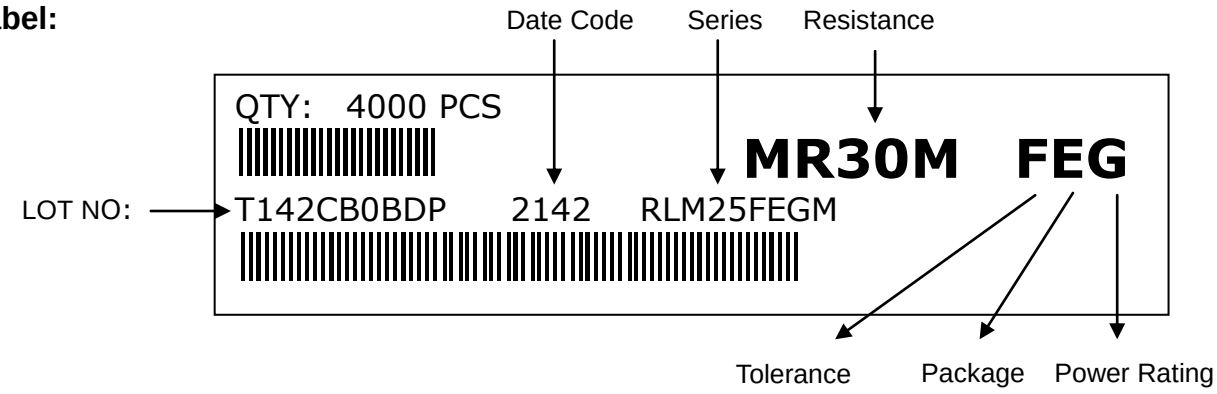
Resistance Range (Ω)	a	b	L
0.0003~0.00075	4.0	3.1	1.3

Unit: mm

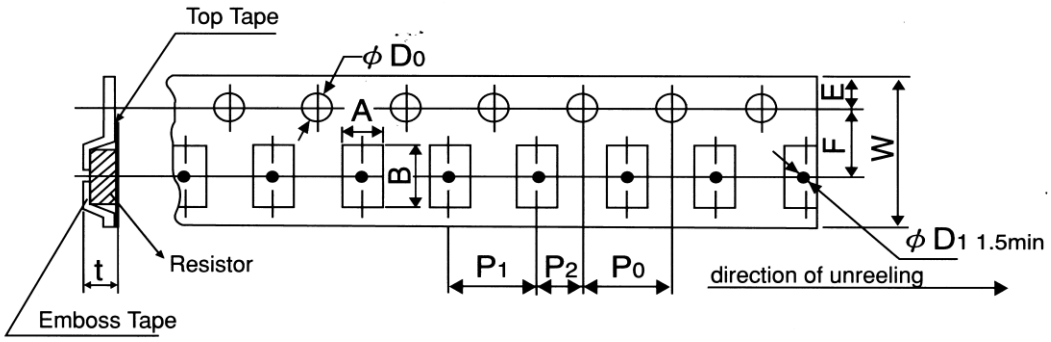
7. Number of Package:

2000 Pieces / package (R≦0.30 mΩ)
4000 Pieces / package (0.5 mΩ≦R≦0.75 mΩ)

8. Label:



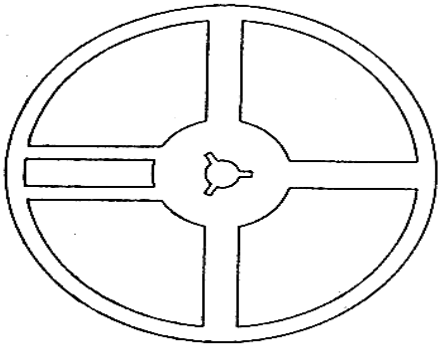
9. Taping

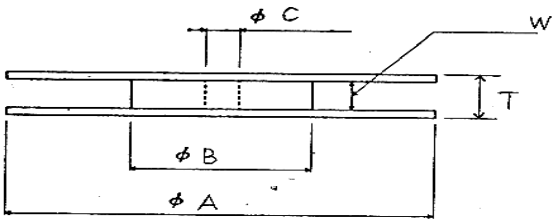


Packing	Type	A	B	W	F	E	P_1	P_2	P_0	D_0	T
Emboss	RLM25 (R≦0.30 mΩ)	3.6+0.2 -0.18	6.9±0.2	12.±0.2	5.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.05	φ1.5 (+0.1/-0)	1.5±0.15
Emboss	RLM25 (0.5 mΩ≦R≦ 0.75 mΩ)	3.6+0.2 -0.18	6.9±0.2	12.±0.2	5.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.05	φ1.5 (+0.1/-0)	0.85±0.15

Unit: mm

10. Reel Specification



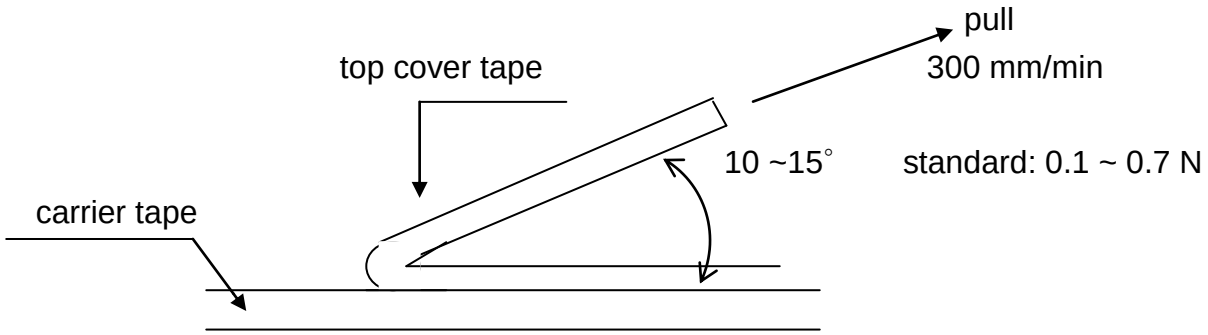


Series	ϕ A	ϕ B	ϕ C	W	T
RLM 25	180 $^{+0}_{-3}$	60 ±1.0	13.0±1.0	13.0±1.0	15.4±2.0

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:

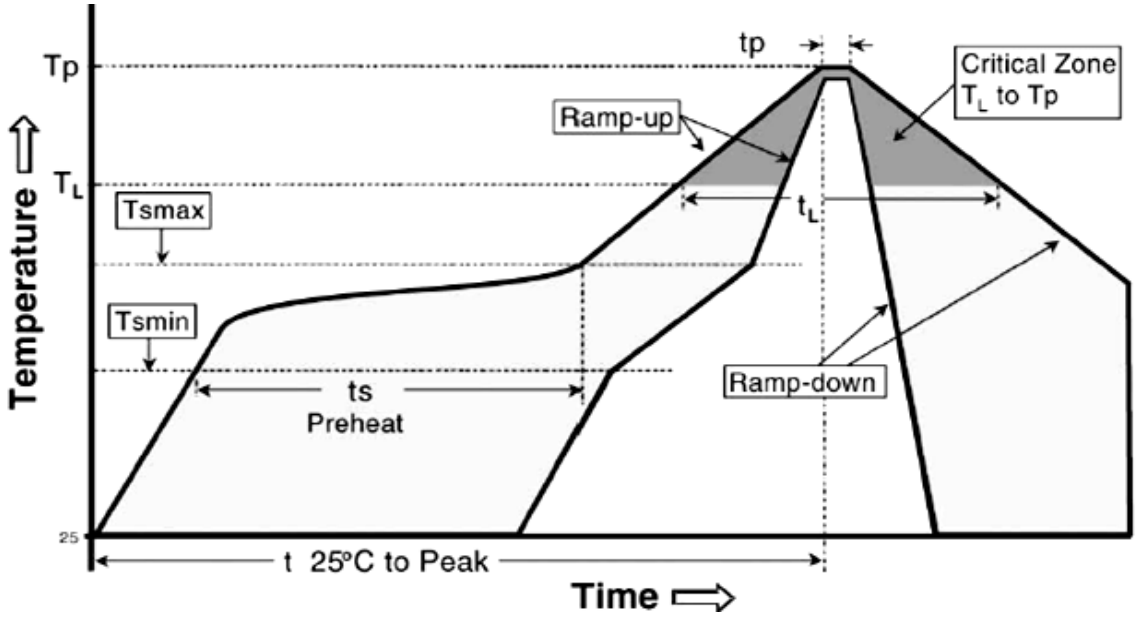
Temperature: 5℃~35℃,Humidity:40%~75%

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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