1. Scope

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

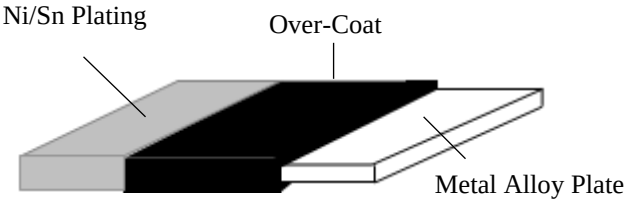
2. Type Designation

RLM10	F	T	S	(M)	R003

Series No.	Tolerance	Packaging	Power	Metal	Resistance
10：0805(2012) 12：1206(3216) 20：2010(5025) 25：2512(6432)	F= ±1% G= ±2% J = ±5%	T=Paper E=Embossed Tape	B= 0.125W A= 0.25W S= 0.5W I= 0.75W C= 1W D= 1.5W E= 2W G=3W	M= MnCu	e.g. R003= 3mΩ R020= 20mΩ R50m= 0.5mΩ

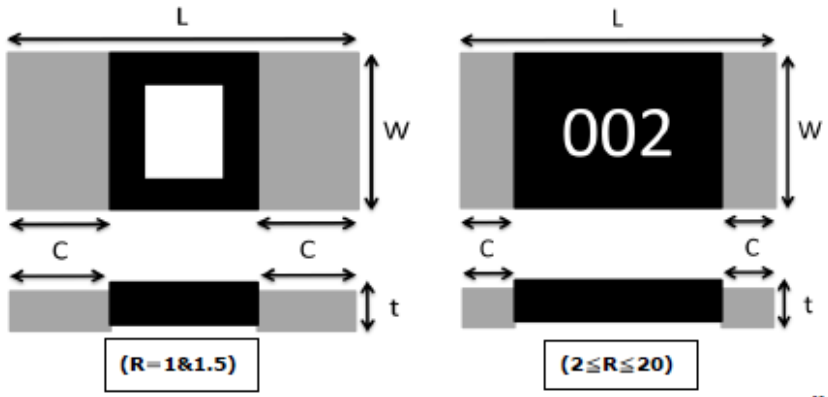
3. Construction and Dimension

3.1 Construction:



3.2 Dimension:

RLM10



Type	L	W	C	t	Material
RLM10	2.0±0.1	1.25±0.1	0.65±0.2(1≦R＜2) 0.4±0.2(2≦R≦25)	0.6±0.20	Strip：Alloy Over Coating：molding Compound UL-94V-0 grade

UNIT: mm

Marking

For RLM10

(1) If R=1&1.5, the marking pattern is a white rectangle.

(2) If 2≦R≦25, the marking pattern is as follows.

Resistance value is expressed by 3 digits.

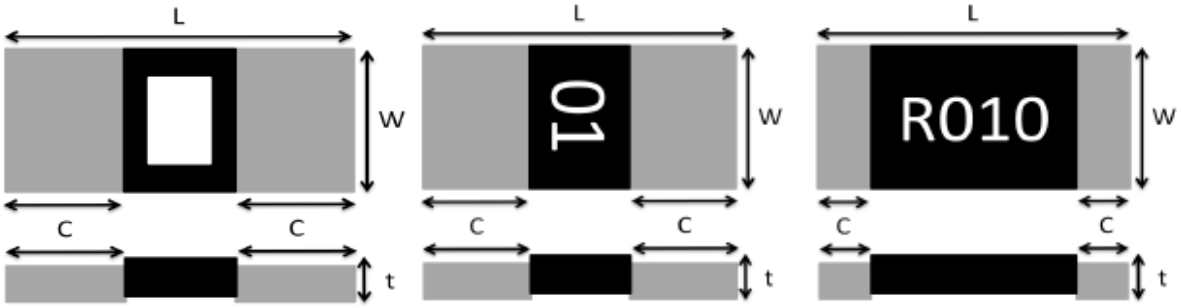
E.G.:

002 = 0.002Ω = 2mΩ

010 = 0.010Ω = 10mΩ

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

RLM 12



Type	L	W	C	t	Material
RLM12	3.2±0.20	1.6±0.20	1.1 ± 0.30 (0.5mΩ≦R＜2mΩ)	1.1 ± 0.20 (0.5mΩ≦R＜1mΩ)	Metal：Alloy Over Coating: molding Compound UL-94 grade
			0.5 ± 0.30 (2mΩ≦R≦50mΩ)	0.75 ± 0.20 (1mΩ≦R＜2mΩ)	
				0.6 ± 0.20 (2mΩ≦R≦50mΩ)	

UNIT: mm

Marking

For RLM12

(1) If 0.5mΩ≦R＜1mΩ, the marking pattern is a white rectangle.

(2) If 1mΩ≦R＜2mΩ, the marking pattern is as follows

Resistance value is expressed by 2 digits.

E.G.:

01 = 0.001Ω = 1mΩ

(3) If 2mΩ≦R≦50mΩ, the marking pattern is as follows

Resistance value is expressed by 4 digits.

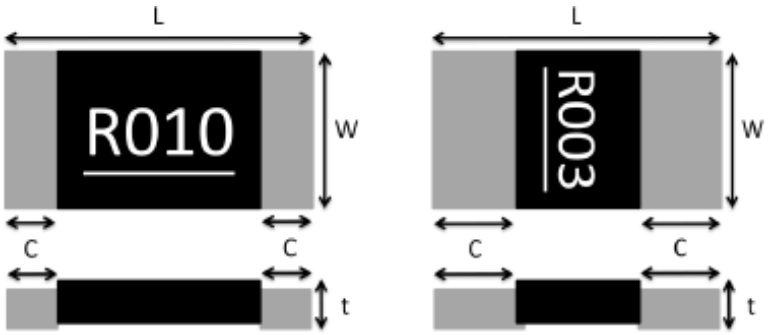
E.G.:

R002= 0.002Ω= 2mΩ

R010 = 0.010Ω = 10mΩ

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

RLM 20



Type	L	W	C	t	Material
RLM20	5.0±0.2	2.5±0.2	1.5±0.3(≦3mΩ)	0.6±0.20	Strip： Alloy Over Coating：polymer Compound UL-94V-0 grade
			0.6±0.3(R>3mΩ)		

UNIT: mm

Marking

For RLM20

(1) If R≦3mΩ, the marking pattern is as follows

Resistance value is expressed by 4 digits.

E.G.:

R003 = 0.003Ω = 3mΩ

(2) If R>3mΩ, the marking pattern is as follows

Resistance value is expressed by 4 digits.

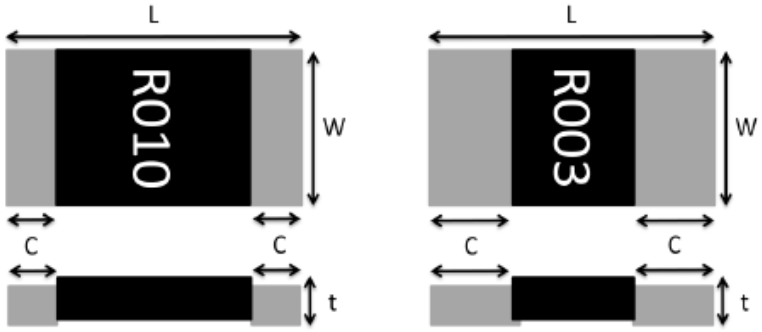
E.G.:

R005= 0.005Ω= 5mΩ

R010 = 0.010Ω = 10mΩ

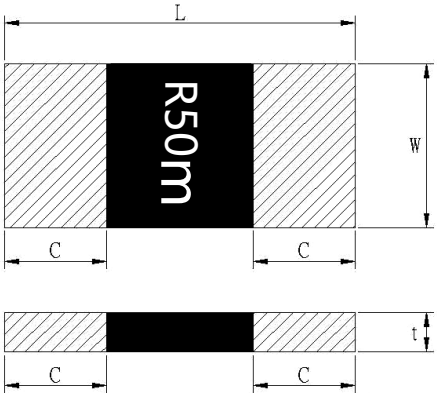
*Note: If the marking pattern has underline，it is indicated as a MnCu material

RLM25



Type	L	W	C	t	Material
RLM25	6.4±0.2	3.2±0.2	2.2±0.2(≦3mΩ) 0.9±0.2(R>3mΩ)	0.6 ±0.20	Metal：Alloy Over Coating：molding Compound UL-94V-0 grade

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

UNIT: mm

Marking

For RLM25

(1) IF R≦3mΩ, the marking pattern is as follows

Resistance value is expressed by 4 digits.

E.G.:

R003 = 0.003Ω = 3mΩ

(2) IF R>3mΩ, the marking pattern is as follows

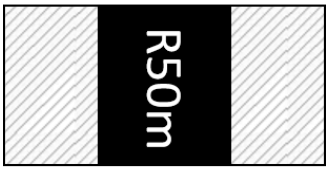
Resistance value is expressed by 4 digits.

E.G.:

R005= 0.005Ω= 5mΩ

R010 = 0.010Ω = 10mΩ

(3) If 0.3mΩ≦R≦0.75mΩ, the marking pattern is as follows



Resistance value is expressed by 4 digits.

E.G.:

R30m= 0.0003Ω= 0.3mΩ

R50m = 0.0005Ω = 0.5mΩ

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

4. Features

Type	RLM10 (MnCu)	*RLM12 (MnCu/NiCu)	RLM20 (NiCu)	RLM20 (MnCu)	RLM25 (MnCu)	RLM25 (MnCu)	RLM25 (NiCu)
Size	0805	1206	2010		2512		
Power Rating	0.125W 0.25W 0.5W	0.5mΩ≦R＜1mΩ (0.25W,0.5W,1W,1.5W) 1mΩ≦R≦50mΩ (0.25W,0.5W,1W)	0.5W 0.75W 1W 1.5W		1W (R=0.5mΩ~50mΩ) 1.5W (1mΩ ≦ R ≦ 15mΩ) 2W (0.5mΩ ≦ R ≦ 10mΩ) 3W(0.3mΩ ≦ R ≦ 0.75mΩ)		
Resistance Value	1~25mΩ	0.5~50mΩ	2~50mΩ	1~50mΩ	1~50mΩ	0.3 ~0.75mΩ	1~50mΩ
Operation Temperature Range	-55°C~+170°C						
TCR	±50ppm/°C				±50ppm/°C	±50ppm/°C	±275 ppm/°C (R≦1mΩ) ±50ppm/°C (1mΩ<R≦50mΩ)
Tolerance	±1%、±2%、±5%						
Insulation Resistance	Over 100MΩ						
Maximum Working Voltage(V)	$(P*R)^{1/2}$						

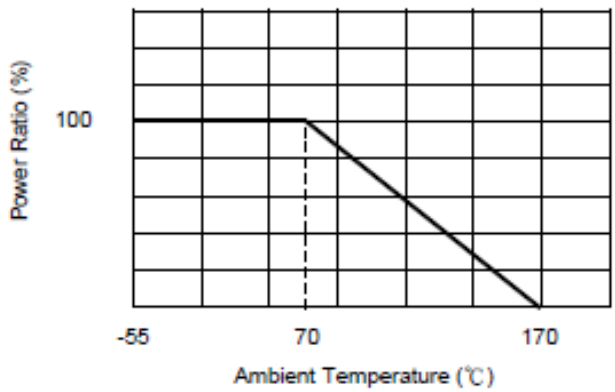
Note*:1 Watts with total solder pad and trace size of 300mm^2

5. Reliability Tests

Test Items	Reference	Condition of Test	Test Limits
Temperature Coefficient of Resistance	IEC60115-1 4.8	+25 ~ 125°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.	< ±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.	
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℃ 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%

5.1 Derating Curve



5.2 Rated Current

The rated current is calculated by the following formula:

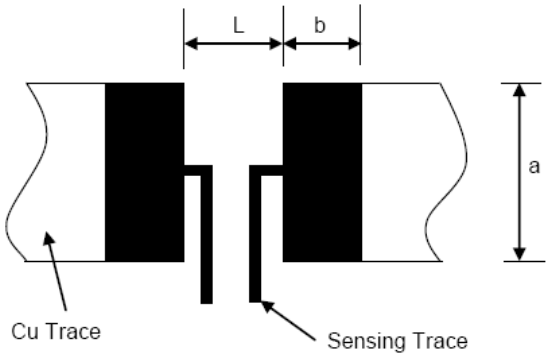
$$I = \sqrt{P \div R}$$

I: Rated Current (A)

P: Rated Power (W)

R: Resistance Value (Ω)

6. Recommended Solder Pad Dimension



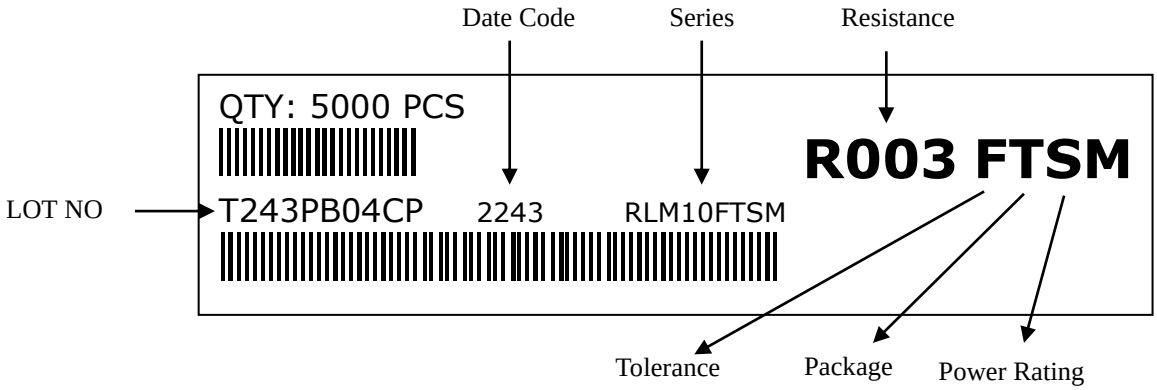
Type	Resistance Range(mΩ)	a	b	L
RLM10	1≦R＜2	1.4±0.1	1.15±0.1	0.7±0.1
	2≦R≦25	1.4±0.1	1.15±0.1	1.2±0.1
RLM12	R＜2	1.8±0.1	2.3±0.1	1.0±0.1
	2≦R＜50	1.8±0.1	1.7±0.1	1.6±0.1
RLM20 (NiCu)	2~3	3.4±0.2	3.5±0.2	2.0±0.2
	4~50	3.4±0.2	1.5±0.2	3.5±0.2
RLM20 (MnCu)	1~3	3.4±0.2	3.5±0.2	2.0±0.2
	4~50	3.4±0.2	1.5±0.2	3.5±0.2
RLM25	1~3	4.0±0.1	3.1±0.1	1.3±0.1
	4~50	4.0±0.1	2.1±0.1	4.1±0.1
	0.3~0.75	4.0±0.1	3.1±0.1	1.3±0.1

Unit: mm

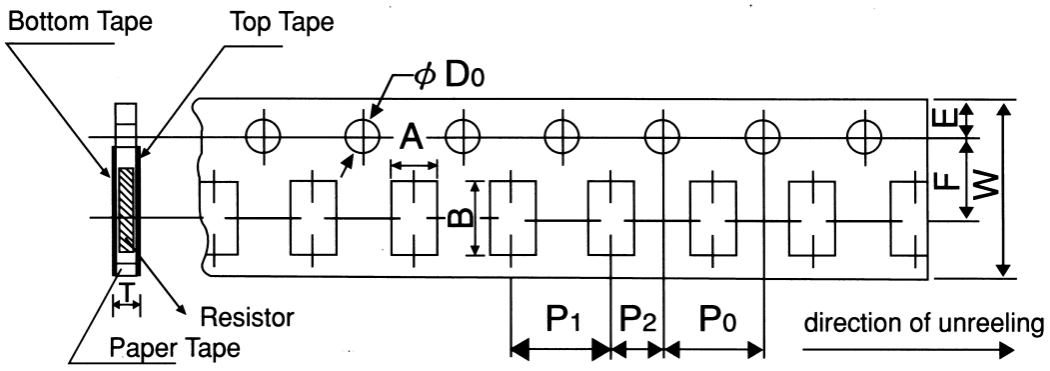
7. Number of Package

Type	RLM 10	RLM 12	RLM 20	RLM 25
Pieces	5000	3000 (0.5mΩ≦R＜1mΩ)	4000	2000 (R≦0.30 mΩ)
		5000 (1mΩ≦R≦50mΩ)		4000 (0.5 mΩ≦R≦50 mΩ)

8. Label

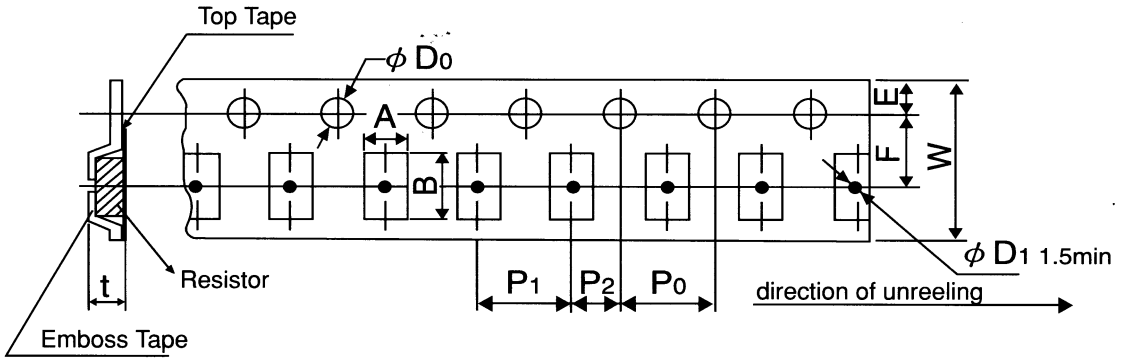


9. Packaging



Packing	Type	A	B	W	F	E	P_1	P_2	P_0	ϕD_0	T
Paper Tape	RLM10	1.6 ±0.15	2.4 ±0.2	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	4.0 ±0.1	ϕ1.5 (+0.1/-0)	0.84 ±0.1
	RLM12	2.0 ±0.15	3.6 ±0.2	8.0. ±0.2	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	ϕ1.5 (+0.1/-0)	0.84 ±0.1

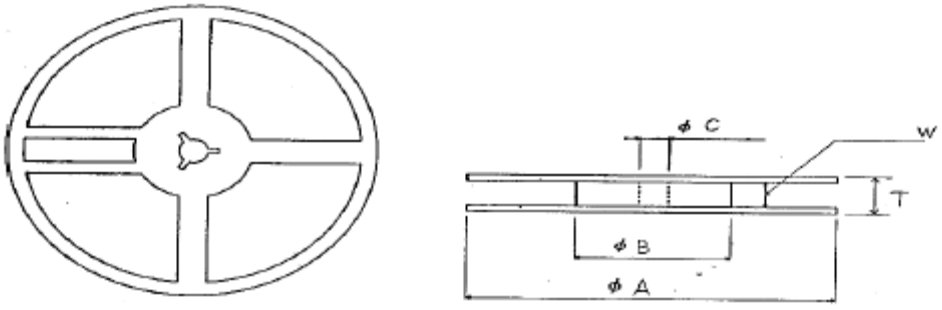
Unit: mm



Packing	Type	A_0	B_0	W	F	E	P	P_2	P_0	φ D0	t
Embossed Tape	RLM12	1.78 ±0.1	3.5 ±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	φ 1.5 (+0.1/-0)	1.27 ±0.1
	RLM20	2.8 ±0.2	5.3 ±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	φ 1.5 (+0.1/-0)	0.85 ±0.15
	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	φ 1.5 (+0.1/-0)	1.5 ±0.15
	RLM25 (0.5 mΩ≦R ≦50mΩ)	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	φ 1.5 (+0.1/-0)	0.85 ±0.15

Unit: mm

10. Reel Specification



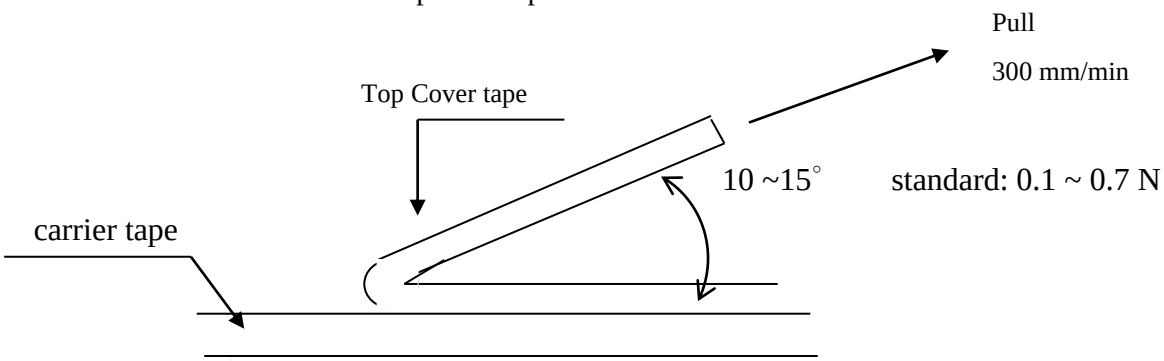
Series	φ A	φ B	φ C	W	T
RLM 10	178.0 ±2.0	60.0 ±1.0	13.0 ±1.0	9.0 ±1.0	11.4 ±1.0
RLM 12	178.0 ±2.0	60.0 ±1.0	13.0 ±1.0	9.0 ±1.0	11.5±1.0
RLM 20	178.0 ±2.0	60.0 ±1.0	13.0 ±1.0	13.0 ±1.0	15.5 ±1.0
RLM 25	180(+0/-3)	60.0 ±1.0	13.0 ±1.0	13.0 ±1.0	15.4±2.0

Unit: mm

11. Peeling Strength of Top Cover Tape

Peel – off force of paper and blister tape is in accordance with "JIS"

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



12. Storage Conditions:

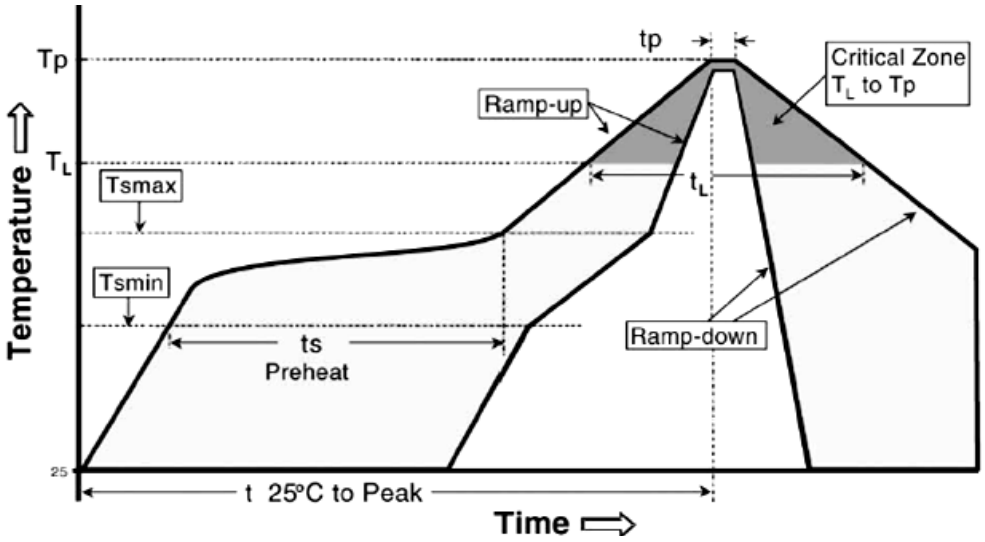
Temperature: 5℃~35℃, Humidity:40%~75%

Humidity storage level: 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 (T_{smin}) - Temperature Max (T_{smax}) - Time (T_{smin} to T_{smax}) (ts)	 150℃ 200℃ 60 -120 seconds
Time maintained above: - Temperature (TL) - Time (TL)	 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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(4) TAI OHM ELECTRONICS (M) SDN. BHD. (Malaysia –Penang)

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单击下面可查看定价，库存，交付和生命周期等信息

>>TA-I(大毅)