



Lead-Free Current Sensing Resistors
RLM20 Series
(Halogen-Free)
AEC-Q 200-Ver D qualified

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1. Scope :

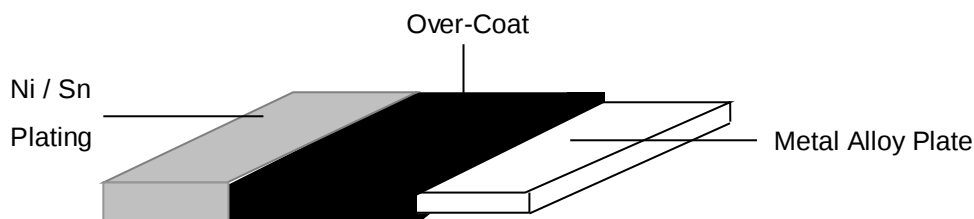
This specification applied to the products of Lead-Free current sensing resistor of metal foil for Lead-Free RLM series manufactured by TA-I TECHNOLOGY CO., LTD.

2. Type Designation :

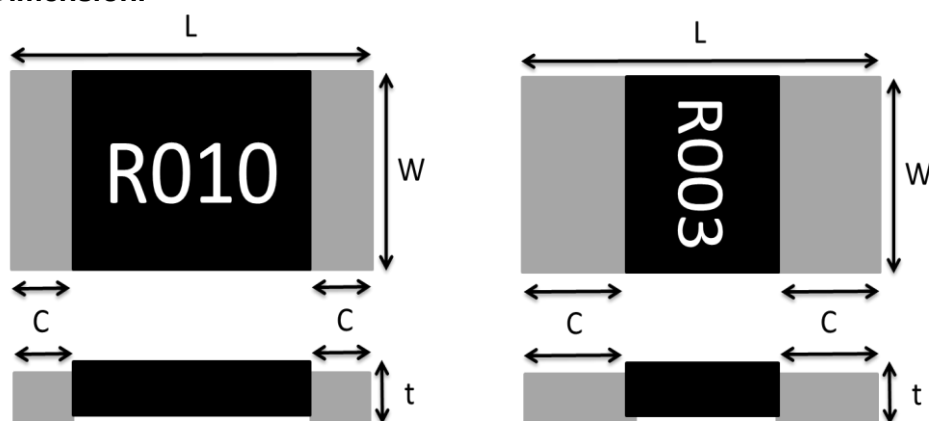
<u>RLM</u> Item	<u>20</u> Series No	<u>E</u> Resistance tolerance	<u>E</u> Packaging	<u>C</u> Power Rating	<u>R010</u> Resistance
	20:2010 (5025)	F: $\pm 1\%$ G: $\pm 2\%$ J: $\pm 5\%$	E: Embossed Tape	I=3/4W D=3/2W S=1/2W C=1W	e.g. R010=10 m Ω

3. Construction and Dimension :

3.1 Construction:



3.2 Dimension:



UNIT : mm

Style	L	W	C	T	Material
RLM20	5.0 $\pm$ 0.2	2.5 $\pm$ 0.2	1.5 $\pm$ 0.3($\leq 3\text{m}\Omega$)	0.60 $\pm$ 0.20	Strip : Alloy Over Coating : Polymer Compound UL-94V-0 grade
			0.6 $\pm$ 0.3(R>3m Ω)		



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4. Features:

Type	RLM20
Power Rating	3/2W 、 3/4W 、 1/2W 、 1W
Resistance Value	2~50mΩ
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}

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=170℃ ,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℃ 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
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%



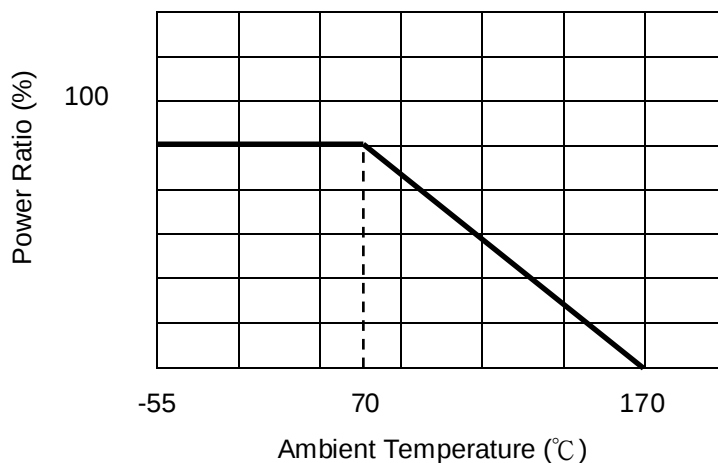
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5.1 Derating Curve



5.2 Rated Current

The rated current is calculated by the following formula:

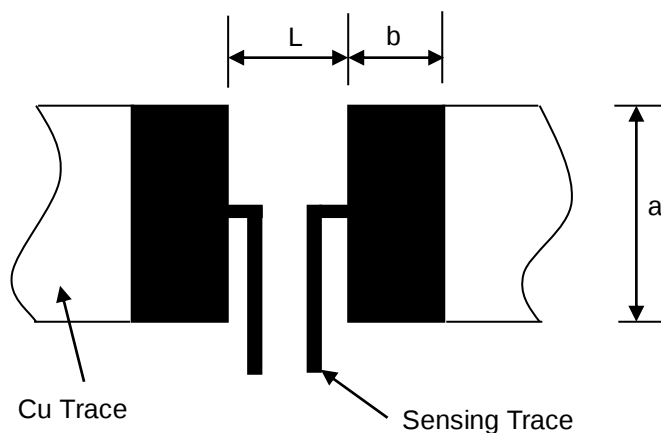
$$I = \sqrt{P \div R}$$

I: Rated Current (A)

P: Rated Power (W)

R: Resistance Value (Ω)

6. Recommended Solder Pad Dimension



Resistance Range (Ω)	a	b	L
0.002-0.003	3.4±0.2	3.5±0.2	2.0±0.2
0.004-0.050	3.4±0.2	1.5±0.2	3.5±0.2

Unit: mm



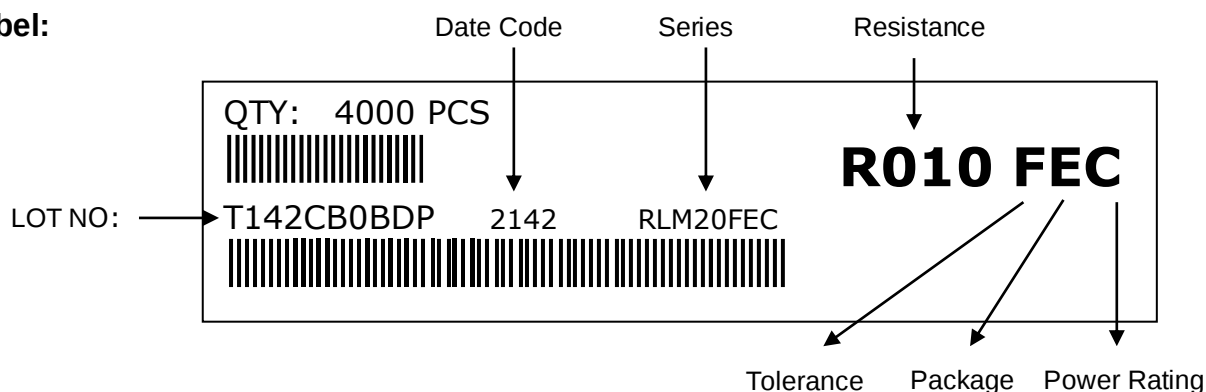
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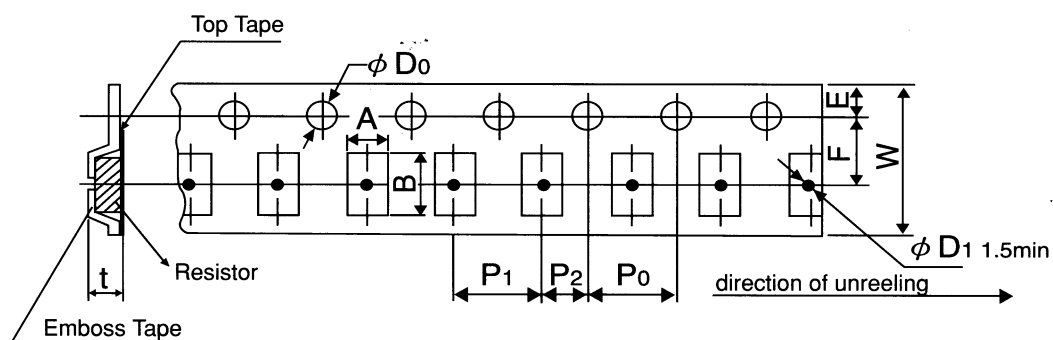
7. Number of Package:

4000 Pieces / package

8. Label:



9. Taping



Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	D ₀	T
Emboss	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	$\phi 1.5$ (+0.1/-0.1)	0.85±0.15

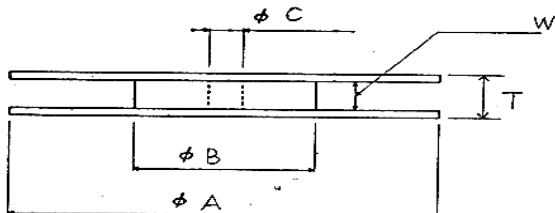
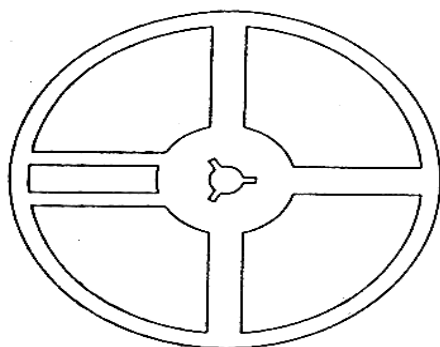
Unit: mm



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10. Reel Specification

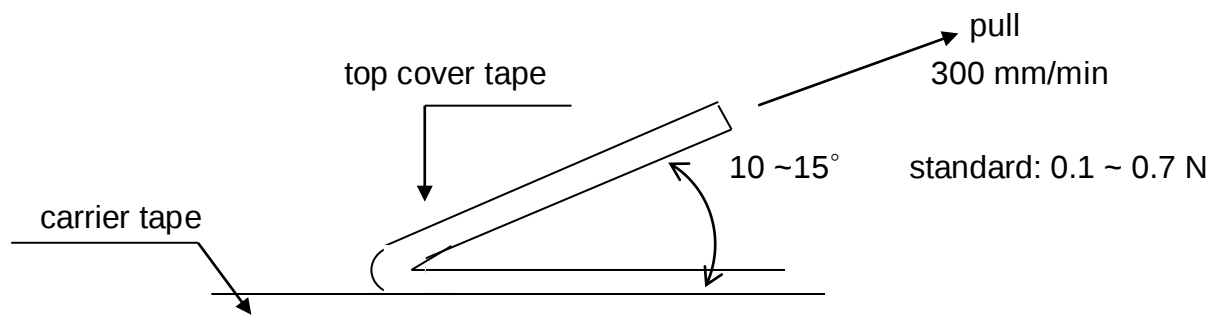


Series	ϕA	ϕB	ϕC	W	T
RLM 20	178.0 ± 2.0	60.0 ± 1.0	13.0 ± 1.0	13.0 ± 1.0	15.5 ± 1.0

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°C ~35°C, Humidity: 40%~75%

MSL level 1

13. Shelf Life:

2 years from manufacturing date.



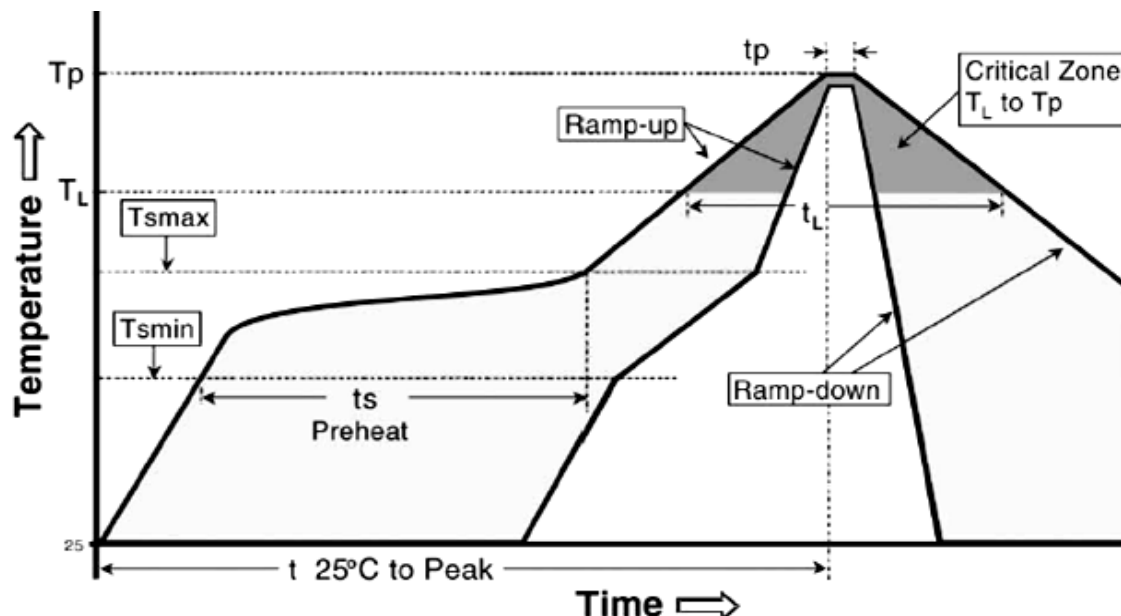
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14. Recommend IR – Reflow profile : (solder : Sn96.5 / Ag3 / Cu0.5)



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



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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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