



High Power Current Sensing Resistors
RLP Series
(Halogen-Free)
AEC-Q 200-Ver D qualified

Document No	TRLP-XX0S001A
Issued date	2022/12/01
page	1/11

1. Scope

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

2. Type Designation

RLP 25

F

E

C

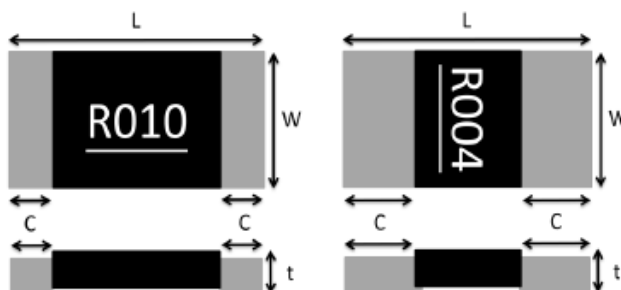
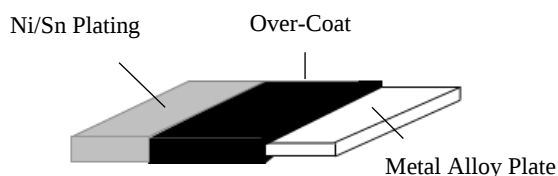
(M)

R001

Series No.	Tolerance	Packaging	Power	Metal	Resistance
25 : 2512 28 : 2817 45 : 4527	F= $\pm 1\%$ G= $\pm 2\%$ J= $\pm 5\%$	E= Embossed	C= 1W D= 1.5W E= 2W G= 3W J= 5W	M= MnCu	e.g. R010= 10m Ω R001= 1m Ω

3. Construction and Dimension

3.1 RLP25



Series	L	W	C	t	Material
RLP25	6.4 $\pm$ 0.2	3.2 $\pm$ 0.2	2.2 $\pm$ 0.2 ($\leq 4\text{m}\Omega$)	0.9 $\pm$ 0.20	Strip : Alloy Over Coating : polymer Compound UL-94V-0 grade
			0.9 $\pm$ 0.2 (R $>$ 4m Ω)		

UNIT: mm



High Power Current Sensing Resistors

RLP Series

(Halogen-Free)

AEC-Q 200-Ver D qualified

Document No	TRLP-XX0S001A
Issued date	2022/12/01
page	2/11

Marking

For RLP25

(1) If $R \leq 4\text{m}\Omega$, the marking pattern is as follows.



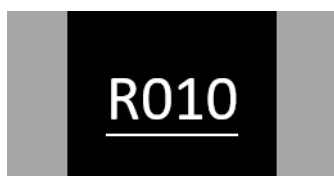
Resistance value is expressed by 4 digits.

E.G.:

$$R002 = 0.002\Omega = 2\text{m}\Omega$$

$$R004 = 0.004\Omega = 4\text{m}\Omega$$

(2) If $R > 4\text{m}\Omega$, the marking pattern is as follows.



Resistance value is expressed by 4 digits.

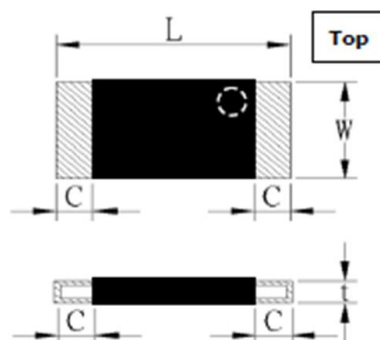
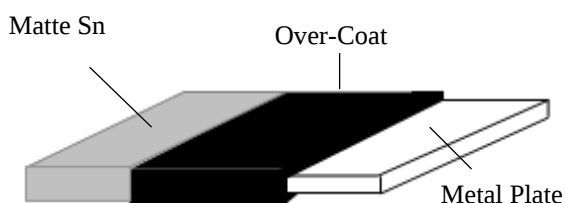
E.G.:

$$R010 = 0.010\Omega = 10\text{m}\Omega$$

$$R020 = 0.020\Omega = 20\text{m}\Omega$$

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

3.2 RLP28



Series	L	W	C	T	Material
RLP28	7.1 ± 0.2	4.2 ± 0.1	0.9 ± 0.2	0.8 ± 0.20	Strip : Alloy Over Coating : Polymer Compound UL-94V-0 grade

UNIT: mm

Marking For RLP28 : No marking



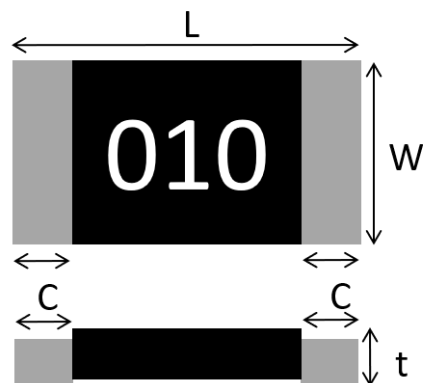
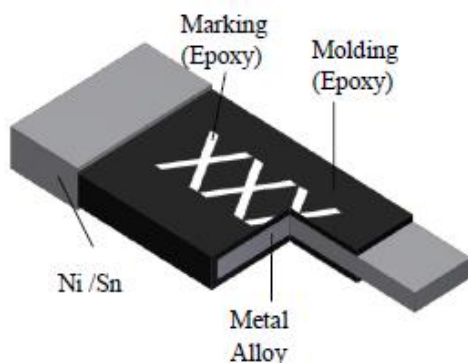
High Power Current Sensing Resistors
RLP Series
(Halogen-Free)
AEC-Q 200-Ver D qualified

Document No TRLP-XX0S001A

Issued date 2022/12/01

page 3/11

3.3 RLP45



Series	L	W	C	T
RLP45	11.65±0.25	6.85±0.25	1.85±0.25	1.10±0.25

UNIT: mm

Marking

For RLP45

The marking pattern is as follows.



Resistance value is expressed by 3 digits.

E.G.:

$$010 = 0.010\Omega = 10\text{m}\Omega$$

$$7.5 = 0.0075\Omega = 7.5\text{m}\Omega$$



High Power Current Sensing Resistors
RLP Series
(Halogen-Free)
AEC-Q 200-Ver D qualified

Document No TRLP-XX0S001A

Issued date 2022/12/01

page 4/11

4. Features

Type	*RLP25	RLP25 (MnCu)	RLP28	RLP45
Size	2512	2512	2817	4527
Power Rating	$1\text{m}\Omega < R \leq 100\text{m}\Omega$ (1W、1.5 W、2 W、3W) $100\text{m}\Omega < R \leq 680\text{m}\Omega$ (1W、1.5 W、2 W)	$1\text{m}\Omega \leq R \leq 70\text{m}\Omega$ (1W、1.5 W、2 W、3W)	5W	5W
Resistance Value	$1\text{m}\Omega < R \leq 680\text{m}\Omega$	$1 \sim 70\text{m}\Omega$	$10\text{m}\Omega / 20\text{m}\Omega$	$5 \sim 60\text{m}\Omega$
Operation Temperature Range	$-55^{\circ}\text{C} \sim +170^{\circ}\text{C}$			
TCR	$\pm 50\text{ppm}/^{\circ}\text{C}$	$\pm 50\text{ppm}/^{\circ}\text{C}$	$\pm 50\text{ppm}/^{\circ}\text{C}$	$\pm 75\text{ppm}/^{\circ}\text{C}$
Tolerance	$\pm 1\%$, $\pm 2\%$, $\pm 5\%$			
Insulation Resistance	Over $100\text{M}\Omega$			
Maximum Working Voltage(V)	$(P \cdot R)^{1/2}$			

Note1: For RLP25, 2&3watts total Solder pad and trace size of 300mm^2

Thickness does not include protective layer

Note2: For RLP25, 2&3watts, copper foil minimum thickness of PCB : $105\mu\text{m}$



High Power Current Sensing Resistors
RLP Series
(Halogen-Free)
AEC-Q 200-Ver D qualified

Document No	TRLP-XX0S001A
Issued date	2022/12/01
page	5/11

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°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%

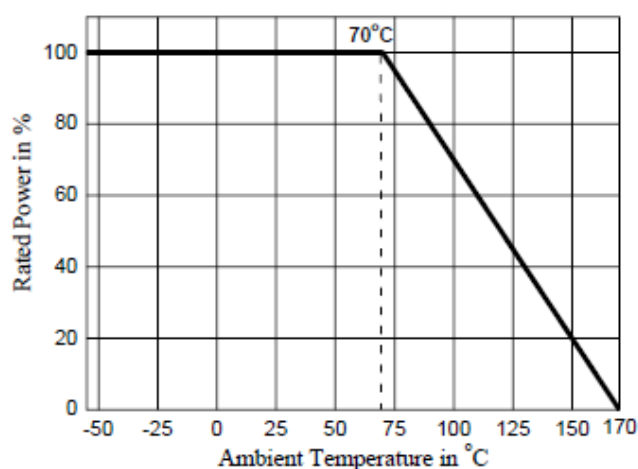


High Power Current Sensing Resistors
RLP Series
(Halogen-Free)
AEC-Q 200-Ver D qualified

Document No	TRLP-XX0S001A
Issued date	2022/12/01
page	6/11

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)



High Power Current Sensing Resistors

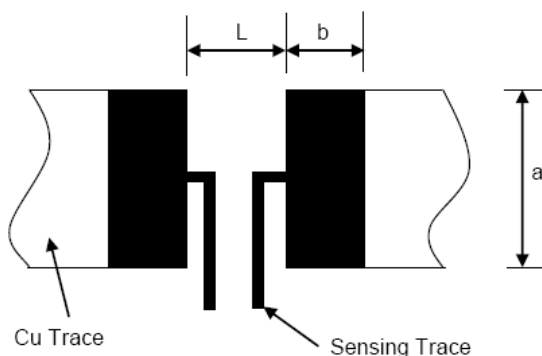
RLP Series

(Halogen-Free)

AEC-Q 200-Ver D qualified

Document No	TRLP-XX0S001A
Issued date	2022/12/01
page	7/11

6. Recommended Solder Pad Dimension



Type	Resistance Range(mΩ)	a	b	L
RLP25	$R > 4$	4.0 ± 0.1	2.1 ± 0.1	4.1 ± 0.1
	$R \leq 4$	4.0 ± 0.1	3.1 ± 0.1	1.3 ± 0.1
RLP28	10~20	5.0 ± 0.1	2.4 ± 0.1	5.2 ± 0.1
RLP45	$5 \leq R \leq 60$	8.0 ± 0.1	4.0 ± 0.1	7.6 ± 0.1

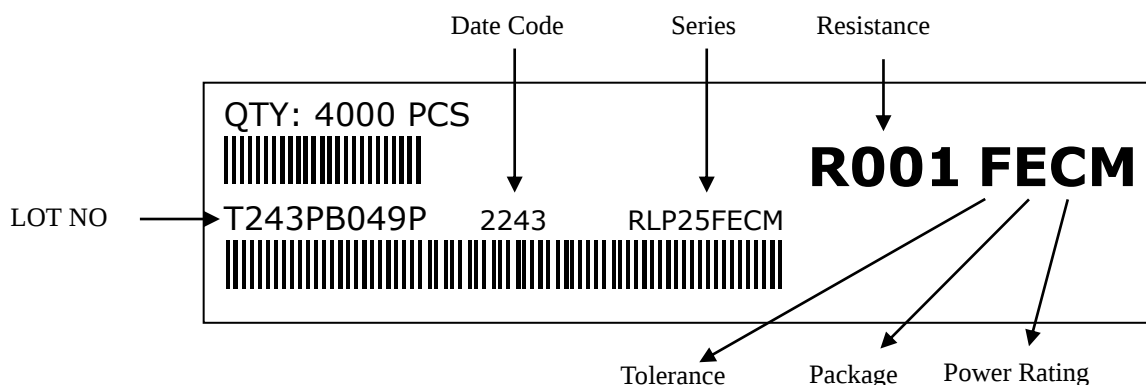
Note: *The copper foil minimum thickness of PCB needs 3 oz

Unit: mm

7. Number of Package

	RLP25	RLP28	RLP45
Pieces	4000	2000	2000

8. Label

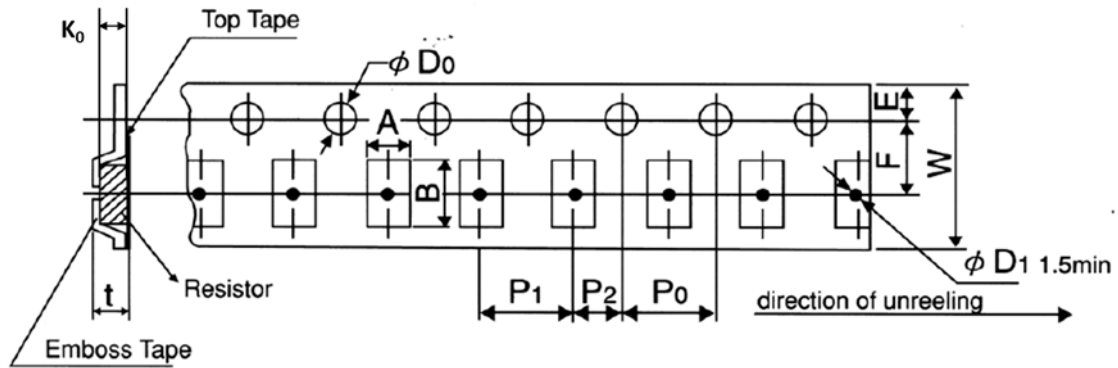




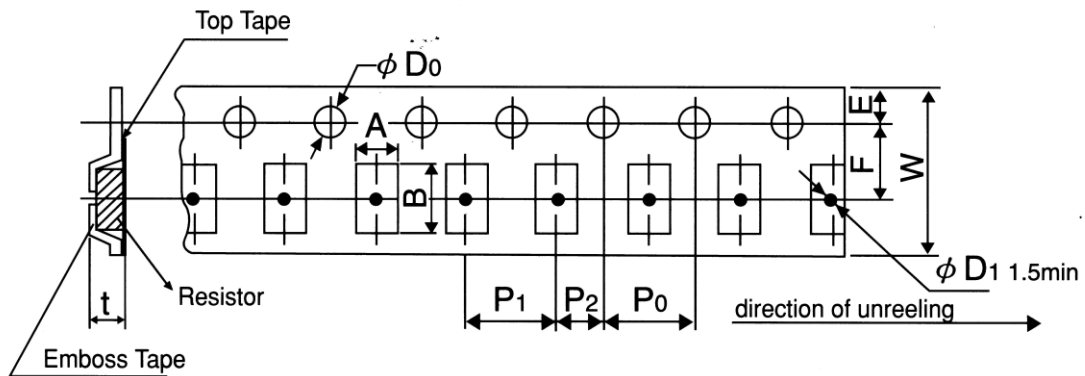
High Power Current Sensing Resistors RLP Series (Halogen-Free) AEC-Q 200-Ver D qualified

Document No	TRLP-XX0S001A
Issued date	2022/12/01
page	8/11

9. Packaging



Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	ϕD_0	t	K ₀
Emboss Tape	RLP25	3.6 ± 0.2	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	$\phi 1.5$ (+0.1/-0)	1.2 ± 0.15	1.0 ± 0.15



Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	D ₀	t
Emboss Tape	RLP28	4.5 ± 0.2	7.4 ± 0.2	12 ± 0.2	5.5 ± 0.05	1.7 ± 0.1	8.0 ± 0.1	2.0 ± 0.05	4.0 ± 0.05	$\psi 1.5$ (+0.1/-0)	0.85 ± 0.15
	RLP45	7.30 ± 0.10	11.90 ± 0.10	24.0 ± 0.20	11.50 ± 0.10	1.75 ± 0.10	12.0 ± 0.10	2.0 ± 0.10	4.0 ± 0.10	$\psi 1.55$ ± 0.10	1.3 ± 0.10

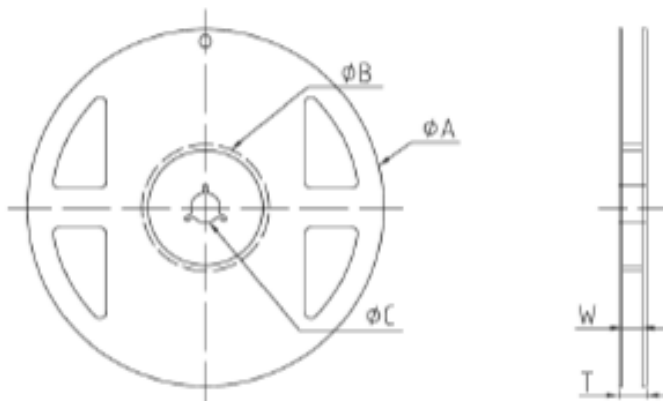
UNIT: mm



High Power Current Sensing Resistors RLP Series (Halogen-Free) AEC-Q 200-Ver D qualified

Document No	TRLP-XX0S001A
Issued date	2022/12/01
page	9/11

10. Reel Specification

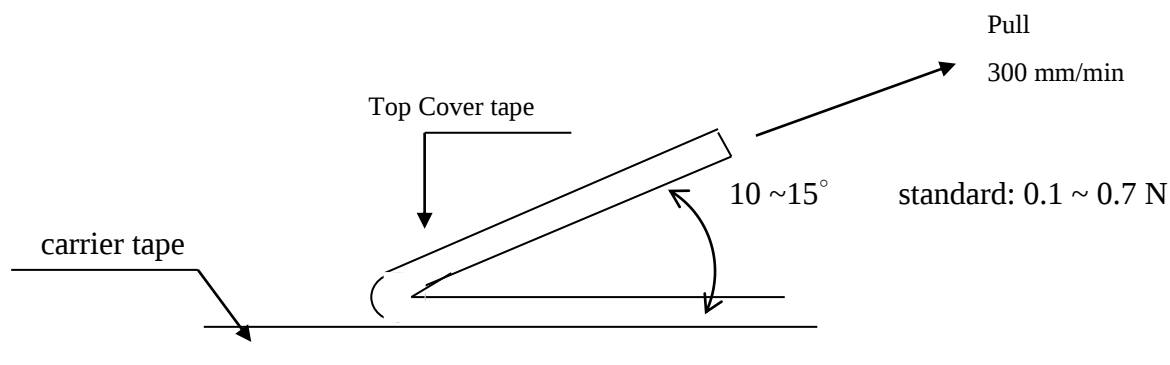


Series	ϕA	ϕB	ϕC	W	T
RLP25	180(+0/-3)	60.0 $\pm$ 1.0	13.0 $\pm$ 1.0	13.0 $\pm$ 1.0	15.4 $\pm$ 2.0
RLP28	180(+0/-3)	60.0 $\pm$ 1.0	13.0 $\pm$ 1.0	13.0 $\pm$ 1.0	15.4 $\pm$ 2.0
RLP45	350.0 $\pm$ 2.0	60.0 $\pm$ 1.0	13.0 $\pm$ 1.0	25.0 $\pm$ 1.0	27.4 $\pm$ 1.0

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%

Humidity storage level: Level 1

13. Shelf Life

2 years from manufacturing date.



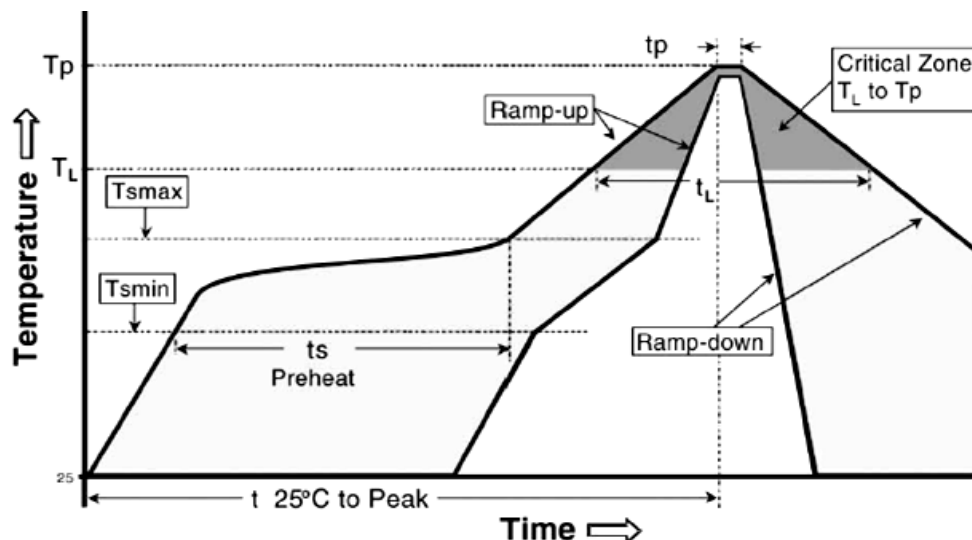
High Power Current Sensing Resistors
RLP Series
(Halogen-Free)
AEC-Q 200-Ver D qualified

Document No TRLP-XX0S001A

Issued date 2022/12/01

page 10/11

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 (Tsmax to Tp)	3°C / second max
Preheat - Temperature Min (Tsmmin) - Temperature Max (Tsmax) - Time (Tsmmin 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 +0/-5°C of actual Peak Temperature (tp) ²	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8minutes max.



High Power Current Sensing Resistors
RLP Series
(Halogen-Free)
AEC-Q 200-Ver D qualified

Document No	TRLP-XX0S001A
Issued date	2022/12/01
page	11/11

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

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

Tel: (+886) 3-3246169 Fax: (+886) 3-3246167

Associated companies

(1)TA-I TECHNOLOGY (SU ZHOU) CO., LTD. (China – Su Zhou)

Tel :(+86) 512-63457879 Fax: (+86) 512-63457869

(2)TA-I TECHNOLOGY ELECTRONIC (DONGGUAN) CO., LTD. (China –Dongguan)

Tel : (+86) 769-8339-4790~3 Fax : (+86) 769-8339-4794

(3)FORTUNE TASK RESISTOR FACTORY (China – Dongguan)

Tel : (+86) 769-8339-4790~3 Fax : (+86) 769-8339-4794

(4)TAI OHM ELECTRONICS (M) SDN. BHD. (Malaysia –Penang)

Tel: (+60)4- 3900480 Fax: (+60)4-3901481

(5)P.T.TAI ELECTRONIC Indonesia (Indonesia – Jakarta)

Tel: (+62)-21-89830123 Fax: (+62)-21-89830703