



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	1/11

1. Scope :

The specification applies for the RLHA Series of low resistance chip resistors made by TA-I.

2. Features:

- ◆ Low Resistance and High Accuracy Resistor for Current Detection
- ◆ Large Electrode (All series)
- ◆ Good Performance for Heat Dissipation
- ◆ High Purity Alumina Substrate for High Power Dissipation
- ◆ Pb-free to Meet RoHS Requirements

3. Applications:

- ◆ Power Management Applications
- ◆ Switching Power Supply
- ◆ DC-DC Converter, Battery Pack, Charger, Adaptor
- ◆ Portable Instruments (PDA and Cell Phone)
- ◆ Voltage Regulation Module (VRM)
- ◆ Computer

4. Type Designation:

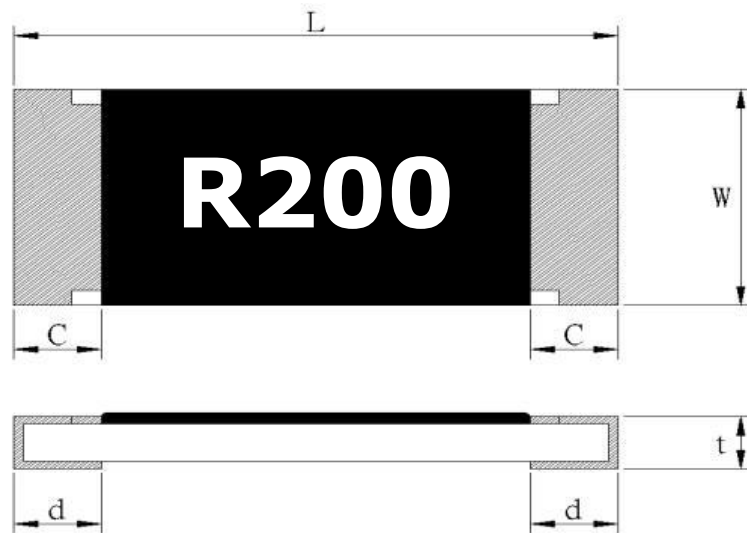
RLHA	25	F	T	C	R200
Alloy Film High Power Low Resistance Chip Resistors	Size 06:0603 10:0805 12:1206 20:2010 25:2512 (6.4x3.2mm)	Tolerance of Resistance at F : $\pm 1.0\%$ G : $\pm 2.0\%$ J : $\pm 5.0\%$	Packaging T: Paper E: Embossed Tape	Power Rating (70°C) A = 0.25W I = 0.75W C = 1W D = 1.5W E = 2W	Nominal Resistance R200 : 200mΩ



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	2/11

5. Dimensions:



Unit: mm

Item	L	w	c	d	t
RLHA06	1.60±0.10	0.80±0.10	0.30±0.20	0.35±0.20	0.45±0.10
RLHA10	2.00±0.10	1.25±0.10	0.40±0.20	0.35±0.20	0.50±0.10
RLHA12	3.10±0.20	1.55±0.20	0.50±0.30	0.40±0.20	0.55±0.10
RLHA20	5.00±0.20	2.50±0.25	0.60±0.30	0.50±0.25	0.60±0.10
RLHA25	6.30±0.20	3.20±0.20	0.60±0.30	0.50±0.25	0.60±0.10



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	3/11

6. Derating Curve :

For resistors operated at ambient temperature over 70°C, power rating shall be derated in accordance with figure 1.

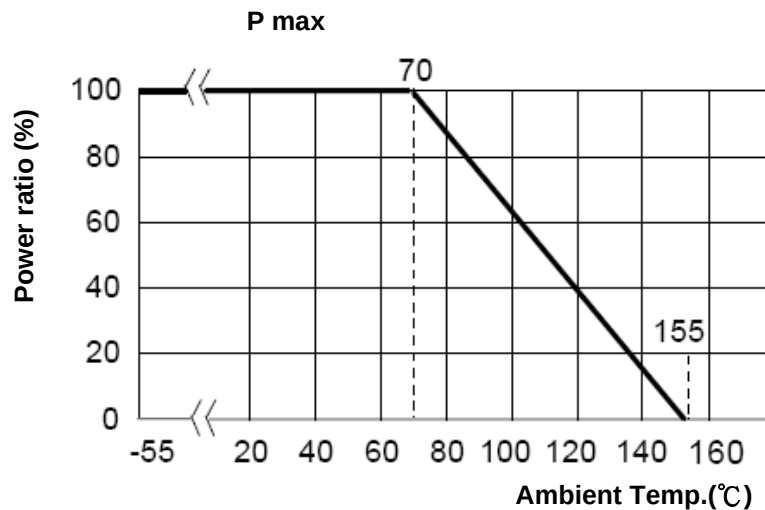


Figure 1

7. Electrical Characteristics

Type	RLHA 06	RLHA 10	RLHA 12	RLHA 20	RLHA 25
Power Rating (W)	0.25	0.75	1	1/ 1.5	1/ 1.5/ 2
Resistance Value	200mΩ~910mΩ				
Operation Temperature Range	-55°C ~ +155°C				
Temperature Coefficient of Resistance	100ppm/°C				
Tolerance	±1% , ±2% , ±5%				
Insulation Resistance	Over 100MΩ				
Maximum Working Voltage(V)	$(P \cdot R)^{1/2}$				



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	4/11

8. Reliability Tests:

Test Items	Reference standard	Condition of Test	Test Limits ΔR
Temperature Coefficient of Resistance	IEC 60115-1 4.8	-At +25/-55 °C and +25/+125 °C	Refer 5.0
Short Time Overload	IEC60115-1 4.13	5 X rated power, 5s	$\pm(1\% + 0.5m\Omega)$
High Temperature Exposure (Storage)	AEC-Q200-REV D-Test 3 MIL-STD-202 Method 108	1000 hrs. @ T=125°C. Unpowered. Measurement at 24 $\pm$ 2 hours after test conclusion.	$\pm(3\% + 0.5m\Omega)$
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 .	$\pm(1\% + 0.5m\Omega)$
Biased Humidity	AEC-Q200-REV D-Test 7 MIL-STD-202 Method 103	1000 hours 85°C/85%RH. Note: Specified conditions: 10% of operating power(not exceeding max working voltage). Measurement at 24 $\pm$ 2 hours after test conclusion.	$\pm(3\% + 0.5m\Omega)$
Operational Life	AEC-Q200-REV D-Test 8 MIL-STD-202 Method 108	1000 hours TA=125°C at 35% rated power. Measurement at 24 $\pm$ 4 hours after test conclusion.	$\pm(3\% + 0.5m\Omega)$
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 c:Deionized water : Propylene Glycol Monomethyl Ether : monoethanolamine = 42 : 1 : 1	Marking and protective layer can not be detached
Mechanical Shock	AEC-Q200-REV D-Test 13 MIL-STD-202 Method 213	Wave Form : Tolerance for half sine shock pluse. Peak value is 100g's. Normal duration(D) is 6(ms)	$\pm(1\% + 0.5m\Omega)$
Vibration	AEC-Q200-REV D-Test 14 MIL-STD-202 Method 204	5 g's for 20 min., 12 cycles each of 3 orientations. Note: Test from 10-2000 Hz.	$\pm(1\% + 0.5m\Omega)$
Resistance to Soldering Heat	AEC-Q200-REV D-Test 15 MIL-STD-202 Method 210	Condition B : Immerse the specimens in and eutectic solder at 260 $\pm$ 5°C for 10 $\pm$ 1S .	$\pm(1\% + 0.5m\Omega)$
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.	$\pm(2\% + 0.5m\Omega)$
ESD	AEC-Q200-REV D-Test 17	verify the voltage setting at 500V	$\pm(2\% + 0.5m\Omega)$



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	5/11

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
Flammability	AEC-Q200-REV D-Test 20 UL-94	V-0 or V-1 are acceptable. Electrical test not required.	V-0 or V-1
Board Flex (Bending)	AEC-Q200-REV D-Test 21	3mm deflection (RLHA06~ RLHA12) 2mm deflection (RLHA20~ RLHA25)	±(1% + 0.5mΩ)
Terminal Strength (SMD)	AEC-Q200-REV D-Test 22	Force of 1.8kg for 60 seconds	±(1% + 0.5mΩ)

MSL Level: 1

Note* :RCWV : Rated continuous working voltage .

9. Marking:

9.1 Type: 0805/1206/ 2010/ 2512

Resistance value is expressed by 4 digits, the first “R” means decimal point and the other digits represent for the normal resistance in Ω.

eg., 200mΩ= R200

9.2 Type: 0603

9.2.1 E96: 1%

When the marking space is too small in such small-sized resistors as RLHA06, the marking cannot made by 4 digits and may be made by two digits combined with one English capital.

Significant figures of nominal resistance

Symbol	E96	Symbol	E96	Symbol	E96	Symbol	E96
01	100	25	178	49	316	73	562
02	102	26	182	50	324	74	576
03	105	27	187	51	332	75	590
04	107	28	191	52	340	76	604
05	110	29	196	53	348	77	619
06	113	30	200	54	357	78	634
07	115	31	205	55	365	79	649
08	118	32	210	56	374	80	665
09	121	33	215	57	383	81	681
10	124	34	221	58	392	82	698
11	127	35	226	59	402	83	715
12	130	36	232	60	412	84	732
13	133	37	237	61	422	85	750
14	137	38	243	62	432	86	768
15	140	39	249	63	442	87	787
16	143	40	255	64	453	88	806
17	147	41	261	65	464	89	825
18	150	42	267	66	475	90	845



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	6/11

19	154	43	274	67	487	91	866
20	158	44	280	68	499	92	887
21	162	45	287	69	511	93	909
22	165	46	294	70	523	94	931
23	169	47	301	71	536	95	953
24	174	48	309	72	549	96	976

Symbol for multipliers

Symbol	A	B	C	D	E	F	G	H	X	Y	Z
multipliers	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-1}	10^{-2}	10^{-3}

e.g., 30Z = $200 \times 10^{-3} = 200 \text{ m}\Omega$

Notes:

When the resistance value is not in the list of E96, 3 digitals with underline in E-24 series is used as mark.

e.g., 0603 : 270m Ω , 1% marking is 027

9.2.2 E24: 2%, 5%

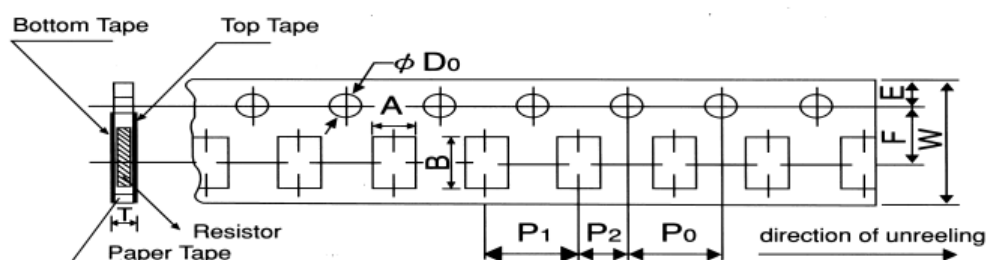
Resistance value is expressed by 3 digits, the first "0" means decimal point and the other digits represent for the normal resistance in Ω .

e.g., 020 =200 m Ω

10. Taping & Reel

10.1 Taping Dimensions

10.1.1 4 mm pitch paper



UNIT: mm

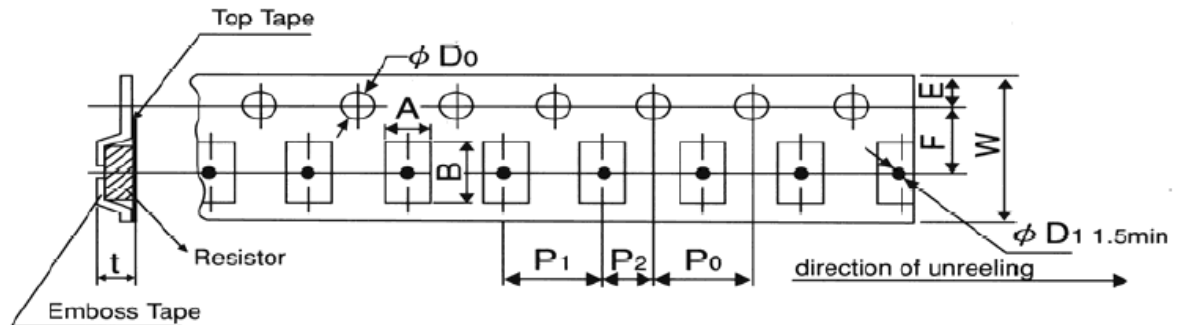
Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	D ₀	T
Paper Tape	RLHA06	1.1 ±0.1	1.9 ±0.1	8.0±0.2	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.1	4.0±0.1	$\phi 1.5$ +0.1 -0.1	0.64 ±0.1
	RLHA10	1.6 ±0.15	2.4 ±0.2								0.84±0.1
	RLHA12	2.0±0.15	3.6±0.2								



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	7/11

10.1.2 4 mm pitch Emboss



UNIT: mm

Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	D ₀	T
Emboss	RLHA20	2.8±0.2	5.3±0.2	12.0±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
	RLHA25	3.6±0.2	6.9±0.2								

UNIT: pcs

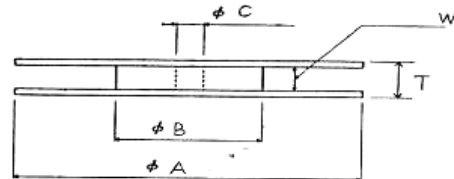
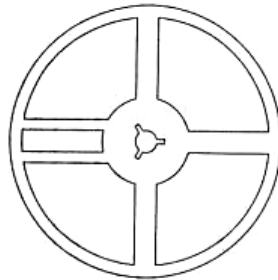
Type Size		Paper Tape		Emboss Plastic Tape 4 mm pitch
		4 mm pitch	2 mm pitch	
		178mm/R	178mm/R	
RLHA	06	5000		
RLHA	10	5000		
RLHA	12	5000		
RLHA	20			4000
RLHA	25			4000



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	8/11

10.2 Reel Specifications

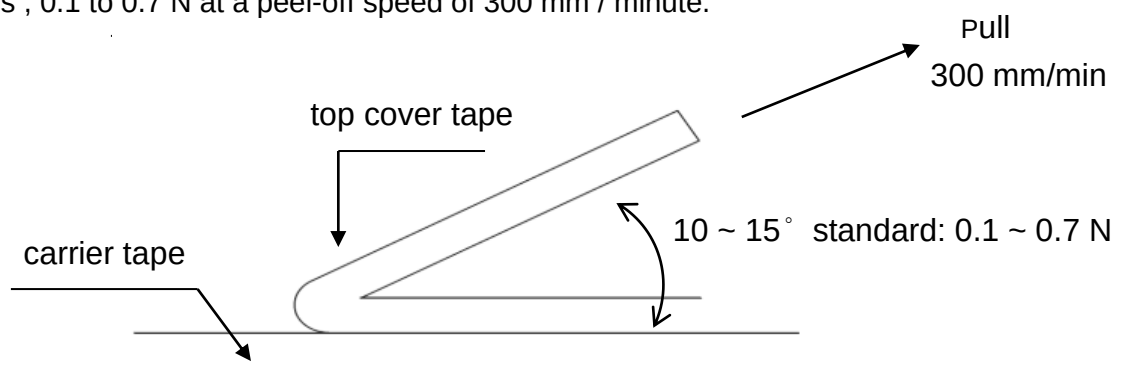


UNIT: mm

	ϕA	ϕB	ϕC	W	T
RLHA 06 / 10 / 12	178.0 ± 2.0	60.0 ± 1.0	13.0 ± 1.0	9.0 ± 1.0	11.5 ± 1.0
RLHA 20 / 25				13.0 ± 1.0	15.5 ± 1.0

10.3 Peel – off force :

Peel – off force of paper and blister tape is in accordance with “JIS-C5202 ”
that is , 0.1 to 0.7 N at a peel-off speed of 300 mm / minute.



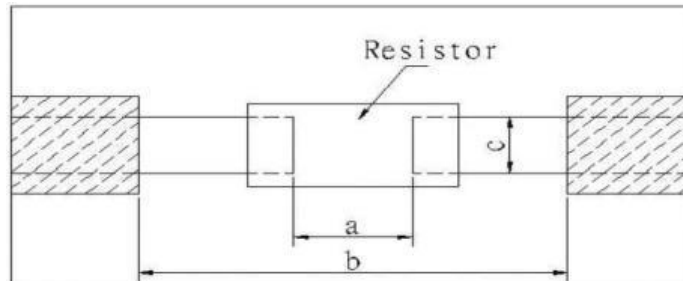
UNIT: mm



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	9/11

11.Recommended land patterns



Type	Size	Dimension (mm)		
		a	b	c
RLHA	06 (0603)	0.7~0.9	2.0~2.2	0.8~1.0
	10 (0805)	0.6~1.0	3.2~3.8	0.9~1.4
	12 (1206)	1.6~2.0	4.4~5.0	1.2~1.8
	20 (2010)	3.3~3.7	5.7~6.5	2.3~3.5
	25 (2512)	3.6~4.0	7.6~8.6	2.8~4.0

12.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.

13.Storage Conditions

Temperature: 5°C~35°C , Humidity : 40%~75%

14.Shelf Life

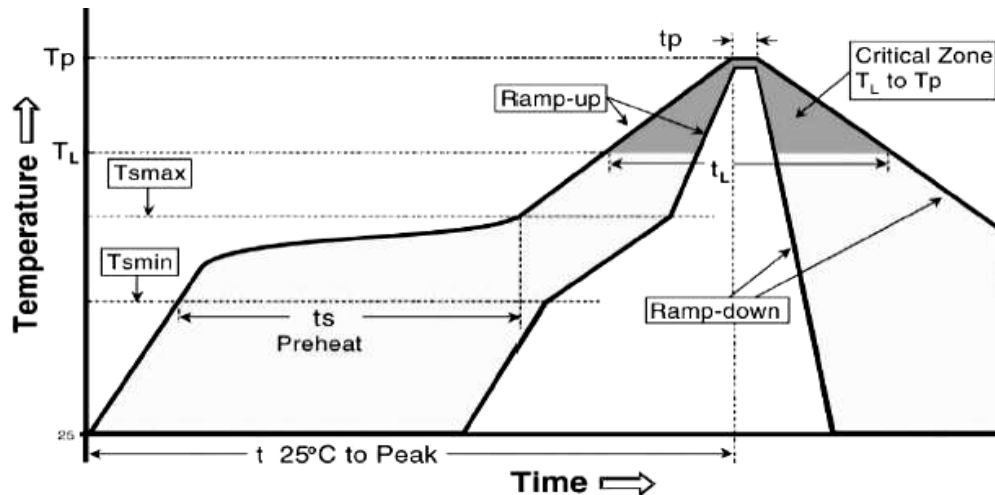
2 years from manufacturing date.



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	10/11

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



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 $+0^{\circ}\text{C}$ of actual Peak -5°C Temperature (t_p) ²	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8minutes max.

Allowed Re-flow times : 3 times

Remark : To avoid discoloration phenomena of chip on terminal electrodes,
please use N2 Re-flow furnace.



**Alloy Film High Power Low Resistance
Chip Resistors
(RLHA series standard)
AEC-Q200 qualified**

Document No	TRLHA-XX0S001C
Issued date	2024/07/09
Page	11/11

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 ENTERPRISES LIMITED.(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