



# Alloy Film High Power Low Resistance (Standard) Chip Resistors

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## 1. Scope :

The specification applies for the RLH 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:

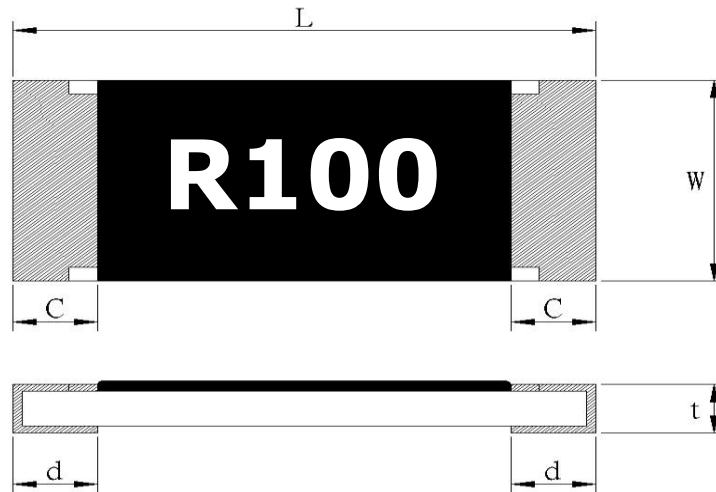
RLH	12	F	T	C	R100
Alloy Film High Power Low Resistance Chip Resistors	Size	Tolerance of Resistance at	Packaging	Power Rating (70°C)	Nominal Resistance
	04:0402 06:0603 10:0805 12:1206 20:2010 25:2512 (6.4x3.2mm)	F:±1.0% G:±2.0% J:±5.0%	T: Paper E: Embossed Tape	B=0.125W K=0.2W I =0.75W C=1W D=1.5W E=2W	R100: 100mΩ



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## 5. Dimensions:



Unit: mm

Item	L	w	c	d	t
RLH04	1.00 <sup>+0.10</sup> <sub>-0.05</sub>	0.50±0.05	0.20±0.10	0.25±0.10	0.35±0.05
RLH06	1.60±0.10	0.80±0.10	0.30±0.20	0.35±0.20	0.45±0.10
RLH10	2.00±0.10	1.25±0.10	0.40±0.20	0.35±0.20	0.50±0.10
RLH12	3.10±0.20	1.55±0.20	0.50±0.30	0.40±0.20	0.55±0.10
RLH20	5±0.20	2.5±0.25	0.6±0.30	0.5±0.25	0.6±0.10
RLH25	6.30±0.2	3.20±0.2	0.6±0.3	0.5±0.25	0.55±0.1

## 6. Derating Curve :

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

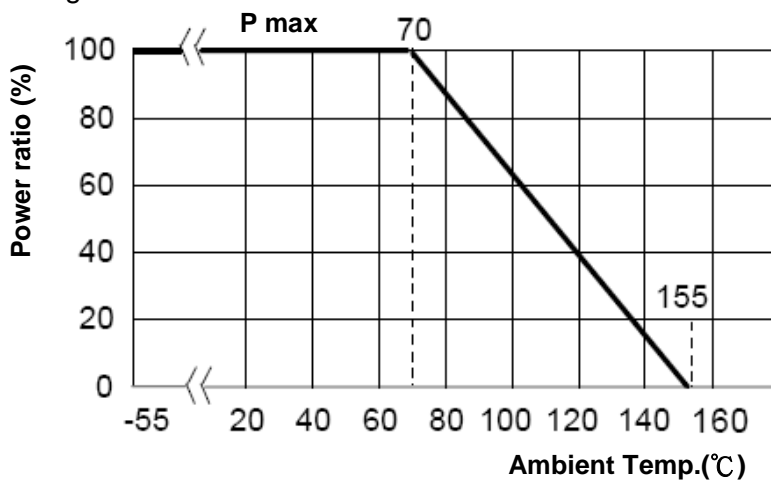


Figure 1



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## 7. Electrical Characteristics

Type	RLH 04	RLH 06	RLH10	RLH 12	RLH 20	RLH 25
Power Rating (W)	0.125	0.25	0.75	1	1/ 1.5	1/ 1.5/ 2
Resistance Value	100mΩ~910mΩ					
Operation Temperature Range	-55°C~ +155°C					
Temperature Coefficient of Resistance	200ppm/°C	100ppm/°C				
Tolerance	±1% , ±2% , ±5%					
Insulation Resistance	Over 100MΩ					
Maximum Working Voltage(V)	$(P \cdot R)^{1/2}$					

## 8. Reliability Tests:

Test Item	Reference standard	Condition of Test	Test Limits
Temperature Coefficient of Resistance	IEC60115-1-4.8 JIS-C5201-1-4.8	25°C ~ 125°C	Refer to paragraph 6
Short Time Overload	IEC60115-1-4.13 JIS-C5201-1-4.13	5 X rated power, 5s	±(1.0%+0.5m Ω)
Load Life	IEC60115-1-4.25.1 JIS-C5201-1-4.25.1	1000 hours at rated power, at 70°C	±(5.0%+0.5m Ω)
Load Life with Humidity	IEC60115-1-4.24 JIS-C5201-1-4.24	1000 hours at rated power , 40 ± 2°C , 90~95% RH	±(5.0%+0.5m Ω)
Thermal Shock	IEC60115-1-4.19 JIS-C5201-1-4.19	-55°C (15 min. ) / +155 °C (15 min.) 5 cycles	±(1.0%+0.5m Ω)
Resistance to Solder Heat	IEC60115-1-4.18 JIS-C5201-1-4.18	270 ± 5°C solder , 10 ± 1 sec dwell .	±(1.0%+0.5m Ω)
Solder ability	IEC60115-1-4.17 JIS-C5201-1-4.17	245±5°C solder, 2±0.5 sec dwell. Solder : Sn96.5 / Ag3.0 / Cu0.5	At least 95% of surface area of electrode shall be covered with new solder.
Bending Test	IEC60115-1-4.33 JIS-C5201-1-4.33	1mm deflection	±(1.0%+0.5m Ω)
Resistance to Dry Heat	IEC60115-1-4.23.2 JIS-C5201-1-4.23.2	155 ± 5°C for 96 ± 4hrs	±(1.0%+0.5m Ω)



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## 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  $\Omega$ .

eg., 100m $\Omega$ = R100

### 9.2 Type: 0603

#### 9.2.1 E96: 1%

When the marking space is too small in such small-sized resistors as RLH06, the marking cannot be 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
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 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>

e.g., 01Z = 100  $\times$  10<sup>-3</sup> = 100 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: 120m $\Omega$ , 1% marking is 012



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### 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  $\Omega$ .

e.g., 010 = 100 m $\Omega$

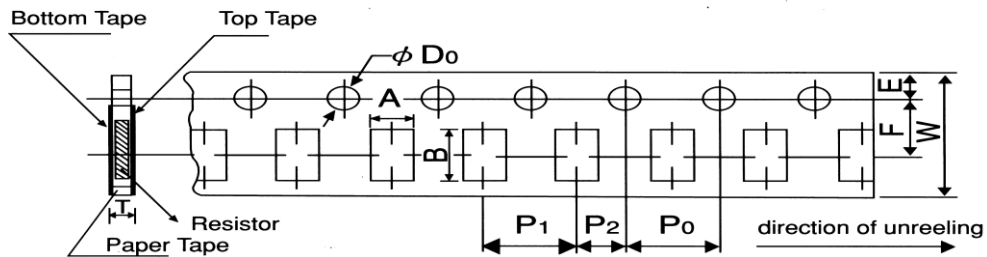
### 9.3 Type : 0402

RLH04 : No Marking

## 10. Taping & Reel

### 10.1 Taping Dimensions

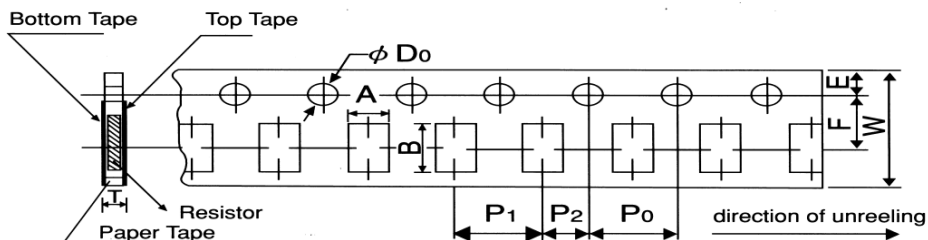
#### 10.1.1 4 mm pitch paper



UNIT: mm

Packing	Type	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	T
Paper Tape	RLH06	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	φ 1.5	0.64 ±0.1
	RLH10	1.6 ±0.15	2.4 ±0.2								+0.1
	RLH12	2.0±0.15	3.6±0.2								-0.1

#### 10.1.2 2 mm pitch paper



UNIT: mm

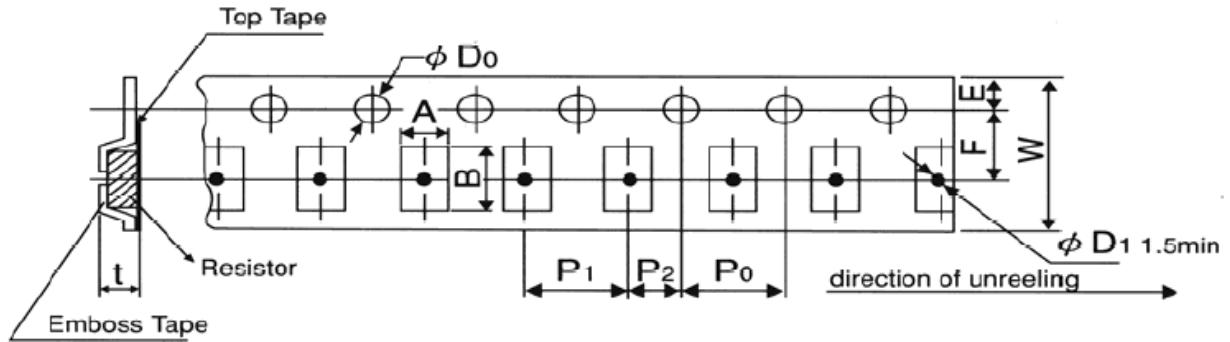
Packing	Type	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	T
Paper Tape	RLH04	0.7±0.05	1.2±0.05	8.0±0.2	3.5±0.05	1.75±0.1	2.0±0.1	2.0 ±0.1	4.0±0.1	φ 1.5	+0.1
	RLH06	1.1 ±0.1	1.9 ±0.1				4.0±0.1				-0



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## 10.1.3 4 mm pitch Emboss



UNIT: mm

Packing	Type	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	T
Emboss	RLH20	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	φ 1.5	0.85±0.15
	RLH25	3.6±0.2	6.9±0.2								

UNIT: pcs

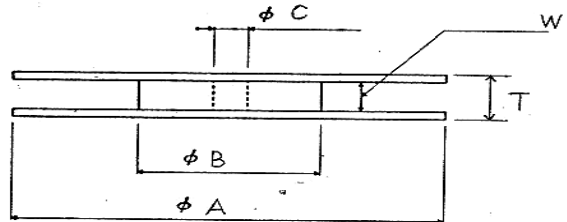
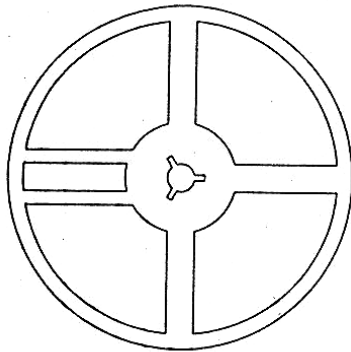
Type Size		Paper Tape		Emboss Plastic Tape 4 mm pitch
		4 mm pitch	2 mm pitch	
		178mm/R	178mm/R	
RLH	04		10000	
RLH	06	5000	10000	
RLH	10	5000		
RLH	12	5000		
RLH	20			4000
RLH	25			4000



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## 10.2 Reel Specifications

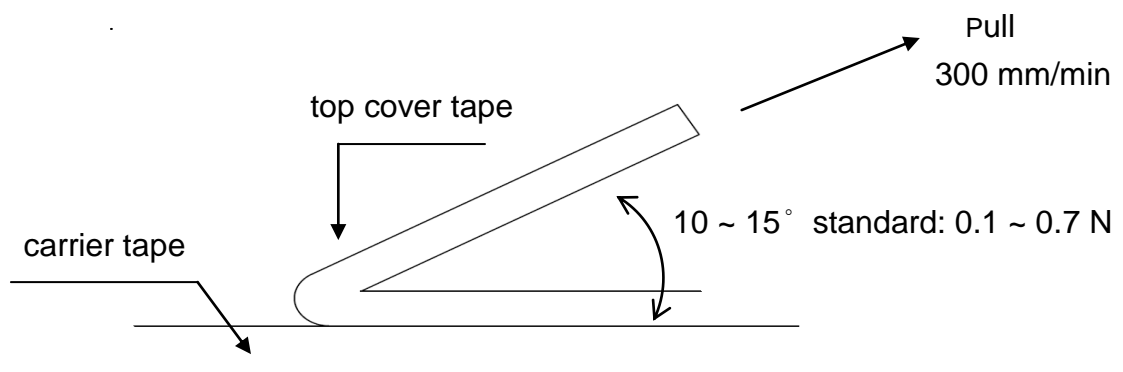


UNIT: mm

Type	$\phi A$	$\phi B$	$\phi C$	W	T
RLH 04 / 06 / 10 / 12	$178.0 \pm 2.0$	$60.0 \pm 1.0$	$13.0 \pm 1.0$	$9.0 \pm 1.0$	$11.5 \pm 1.0$
RLH 20 / 25				$13.0 \pm 1.0$	$15.5 \pm 1.0$

## 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

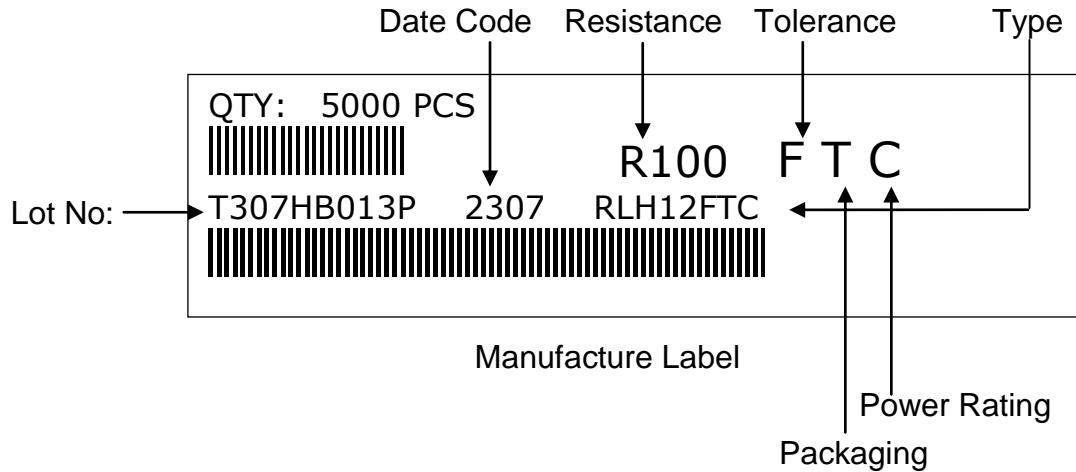


# Alloy Film High Power Low Resistance (Standard) Chip Resistors

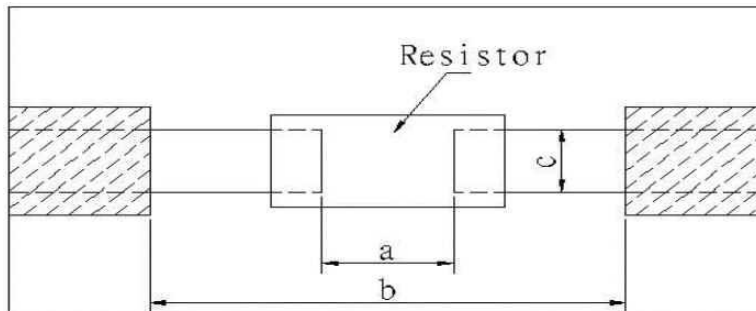
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## 11. Label

### 11.1 Normal Products :



## 12. Recommended land patterns



Type	Size	Land pattern		
		Dimension ( mm )		
		a	b	c
RLH	04 (0402)	0.5~0.6	1.4~1.6	0.4~0.6
	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

## 13. 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.





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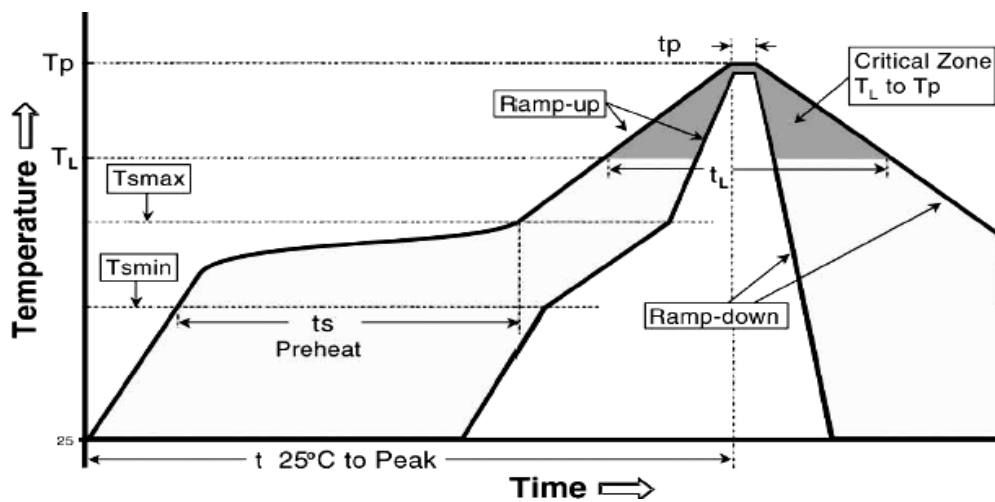
### 14. Storage Conditions:

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

### 15. Shelf Life:

2 years from manufacturing date.

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



Profile Feature	Lead (Pb)-Free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C / second max.
Preheat <ul style="list-style-type: none"> <li>- Temperature Min (T<sub>smin</sub>)</li> <li>- Temperature Max (T<sub>smax</sub>)</li> <li>- Time (T<sub>smin</sub> to T<sub>smax</sub>) (t<sub>s</sub>)</li> </ul>	150°C 200°C 60 -120 seconds
Time maintained above : <ul style="list-style-type: none"> <li>- Temperature (T<sub>L</sub>)</li> <li>- Time (T<sub>L</sub>)</li> </ul>	217°C 60-150 seconds
Peak Temperature (T <sub>p</sub> )	260°C
Time within $\begin{matrix} +0 \\ -5 \end{matrix}$ °C of actual Peak Temperature (t <sub>p</sub> ) <sup>2</sup>	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8minutes max.



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## 17. Manufacturing Country & City :

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

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[MCR01MZPJ125](#) [MCR01MZPJ751](#) [MCR03EZPJ103](#) [MCR03EZPF2004](#) [MCR03EZPJ270](#) [MCR03EZPJ821](#) [MCR10EZPF1102](#)  
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