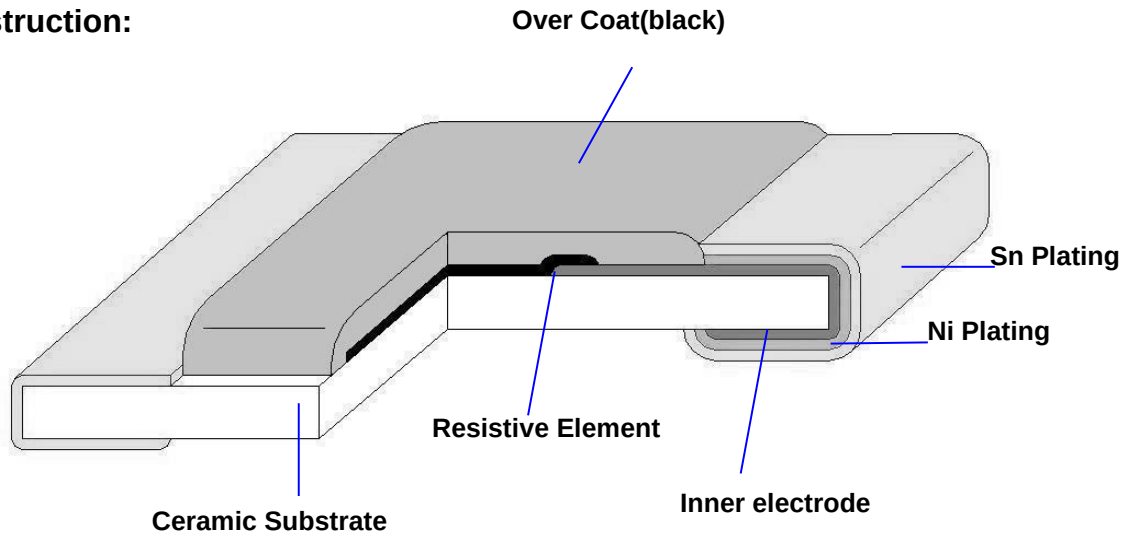
1. Scope:

This specification applies for the RB series of thin film chip resistors made by TA-I.

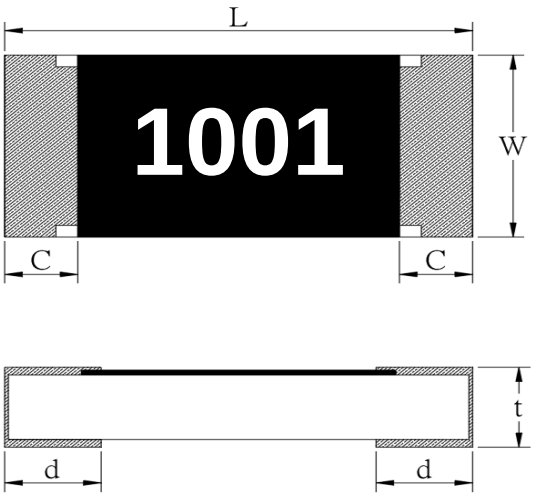
2. Construction:



3. Type Designation:

RB	06	B	T	P	1001
Product Code RB : Thin Film	Size Power Rating	Tolerance	Packaging	TCR	Nominal Resistance
04-0402(1005) 1/16W 06-0603(1608) 1/10W 10-0805(2012) 1/8W 12-1206(3216) 1/4W	A - ±0.05% B - ±0.10% C - ±0.25% D - ±0.50% F - ±1.00%	T- Paper Tape	J- ±5 ppm/°C k- ±10 ppm/°C M- ±15ppm/°C P- ±25 ppm/°C S- ±50 ppm/°C R- ±100 ppm/°C		e.g., 1001=1kΩ

4. Dimensions:



Type	L	W	C	d	t
RB04	1.00 ± 0.05	0.50 ±0.05	0.20 ±0.10	0.25 ±0.10	0.35 ±0.05
RB06	1.60 ±0.10	0.80 ±0.10	0.30 ±0.20	0.30 $^{+\ 0.20}_{-\ 0.10}$	0.45 ±0.10
RB10	2.00 ±0.10	1.25 ±0.10	0.40 ±0.20	0.40 ±0.20	0.50 ±0.10
RB12	3.20 ±0.15	1.55 ±0.15	0.50 ±0.30	0.40 ±0.20	0.55 ±0.10

UNIT: mm

5. Standard Ratings & Characteristics

Type	Power Rating at 70℃	Rated Voltage	Max. Working Voltage	Max. Over-Load Voltage	T.C.R (PPM/℃)	Resistance Range(Ω) & Resistance Tolerance (%)				
						± 0.05%	± 0.1%	± 0.25%	± 0.5%	± 1%
RB04	1/16 W	Refer 5.2	50V	100V	±5	100~10K	100~10K	100~10K	100~10K	100~10K
					±10	100~180K	10~180K	10~180K	10~180K	10~180K
					±15	100~180K	10~180K	10~180K	10~180K	10~180K
					±25	100~180K	10~180K	10~180K	4.7~180K	4.7~180K
					±50	100~180K	10~180K	10~180K	4.7~180K	4.7~180K
					±100	100~180K	10~180K	10~180K	4.7~180K	4.7~180K
RB06	1/10 W	Refer 5.2	75V	150V	±5	100~10K	100~10K	100~10K	100~10K	100~10K
					±10	100Ω~511K	4.7Ω~511K	4.7Ω~511K	4.7Ω~511K	4.7Ω~511K
					±15	100Ω~511K	4.7Ω~511K	4.7Ω~511K	4.7Ω~511K	4.7Ω~511K
					±25	100Ω~511K	4.7Ω~511K	4.7Ω~511K	1Ω~511K	1Ω~511K
					±50	100Ω~511K	4.7Ω~511K	4.7Ω~511K	1Ω~511K	1Ω~511K
					±100	100Ω~511K	4.7Ω~511K	4.7Ω~511K	1Ω~511K	1Ω~511K
RB10	1/8 W	Refer 5.2	150V	300V	±5	100~10K	100~10K	100~10K	100~10K	100~10K
					±10	100~900K	10~900K	10~900K	10~900K	10~900K
					±15	100~900K	10~900K	10~900K	10~900K	10~900K
					±25	100~900K	10~900K	10~900K	1~900K	1~900K
					±50	100~900K	10~900K	10~900K	1~900K	1~900K
					±100	100~900K	10~900K	10~900K	1~900K	1~900K
RB12	1/4 W	Refer 5.2	150V	300V	±5	100~10K	100~10K	100~10K	100~10K	100~10K
					±10	100~1.5M	10~1.5M	10~1.5M	10~1.5M	10~1.5M
					±15	100~1.5M	10~1.5M	10~1.5M	10~1.5M	10~1.5M
					±25	100~1.5M	10~1.5M	10~1.5M	1~1.5M	1~1.5M
					±50	100~1.5M	10~1.5M	10~1.5M	1~1.5M	1~1.5M
					±100	100~1.5M	10~1.5M	10~1.5M	1~1.5M	1~1.5M
Operating Temp (℃): -55℃ ~ +155℃										

Note: Except for the above standardized products, we also provide the customized products.

5.1 Derating Curve:

For resistors operated at ambient temperature over 70℃, power rating shall be derated according to figure 1.

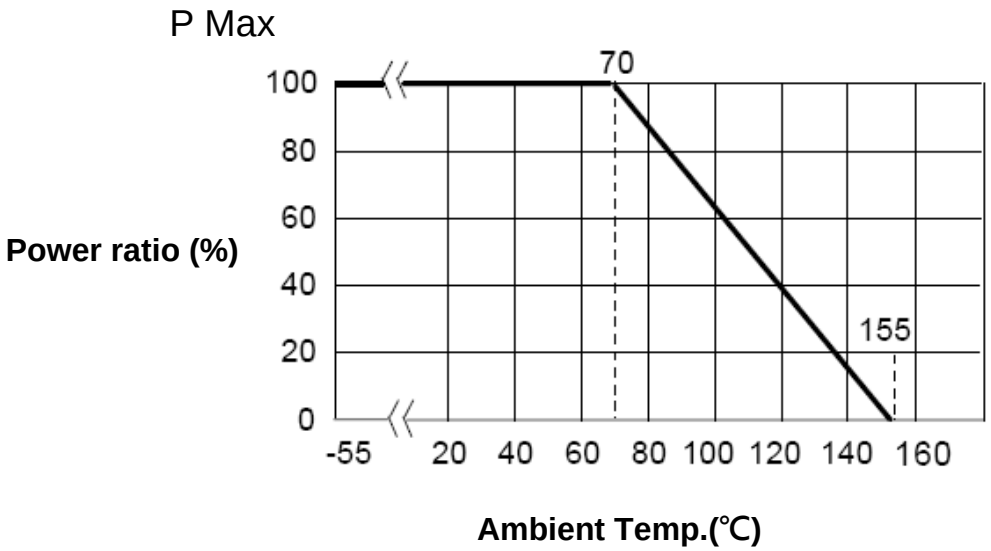


Figure 1.

5.2 Rated Voltage:

The rated voltage is calculated by the following formula:

$$E=\sqrt{P * R}$$

E=Rated Voltage(V)
P=Rated Power(W)
R=Resistance Value(Ω)

6. Reliability Tests:

Test Items	Reference standard	Condition of Test	Test Limits
Temperature Coefficient of Resistance	IEC60115-1-4.8 JIS C5201-1-4.8	+25~+125 ℃	Refer 5.0
Rapid Change of Temp.	IEC60115-1-4.19 JIS C 5201-1-4.19	-55℃(30 min.) / +155℃(30 min.), 300 cycles	±(0.5%+0.05Ω)
Short Time Overload	IEC60115-1-4.13 JIS C5201-1-4.13	2.5 X rated voltage for 5sec	±(0.5%+0.05Ω)
Resistance to Dry Heat	IEC60115-1-4.23.2 JIS C5201-1-4.23.2	155±5℃ for 96±4Hrs	±(0.5% +0.05Ω)
Load Life	IEC60115-1-4.25.1 JIS C5201-1-4.25.1	1000 hours at rated power, 70℃, 1.5hours“ON “, 0.5hour “OFF”	±(0.5% +0.05Ω)
Resistance to Solder Heat	IEC60115-1-4.18 JIS C5201-1-4.18	260 ±5℃ solder, 10 ±1 sec dwell.	≦0.25%: ±(0.25% +0.05Ω) >0.25%: ±(0.5% +0.05Ω)
Bending	IEC60115-1-4.33 JIS C5201-1-4.33	3mm deflection	±(0.5% +0.05Ω)
Dielectric Withstanding Voltage (Voltage Proof)	IEC60115-1-4.7 JIS C5201-1-4.7	Applying voltage: 0402 & 0603: 300V others: 500V for a minute.	No abnormalities such as flashover, burning dielectric breakdown shall appear.
Load Life with Humidity	IEC60115-1-4.24 JIS C5201-1-4.24	40±2℃/90~95% RH for 1000 hours. 1.5 hours “ON “,0.5 hour “OFF (RCWV)”	±(0.5% +0.05Ω)
Insulation Resistance	IEC60115-1-4.6 JIS C5201-1-4.6	Applying voltage 100V for 1 minute.	≧1GΩ
Solderability	IEC60115-1-4.17 JIS C5201-1-4.17	245 ±5℃ 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.

Note*: RCWV: Rated continuous working voltage.

MSL: Moisture Sensitivity Level.

7. Marking

7.1 ±0.1%, ±0.5%, ±1% (E96): RB10 / RB12

Resistance value is expressed by 4 digits, the first three digits represent the significant figures of nominal resistance value inΩ, and the fourth digit represents exponent for base of 10.

E.G: 1000 = 100×10^0 = 100Ω

7.2 ±0.1% , ±0.5% , ±1% (RB06/E96)

When the marking space is too small in such small-sized resistors as RB06, the marking can not made by 4 digits and may be made by two digits combined with one English capital.

Symbol for E96 series nominal resistance value

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	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-1}	10^{-2}	10^{-3}

Ex: 02c=102 $\times10^2$=10.2kΩ

7.3 ±0.1%, ±0.5%, ±1% (RB06/E24)

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

Symbol	E24	Marking	Symbol	E24	Marking	Symbol	E24	Marking
1	12R	120	31	510R	511	61	30K	303
2	16R	160	32	560R	561	62	33K	333
3	18R	180	33	620R	621	63	36K	363
4	22R	220	34	680R	681	64	39K	393
5	24R	240	35	820R	821	65	43K	433
6	27R	270	36	910R	911	66	47K	473
7	30R	300	37	1K2	122	67	51K	513
8	33R	330	38	1K6	162	68	56K	563
9	36R	360	39	1K8	182	69	62K	623
10	39R	390	40	2K2	222	70	68K	683
11	43R	430	41	2K4	242	71	82K	823
12	47R	470	42	2K7	272	72	91K	913
13	51R	510	43	3K0	302	73	120K	124
14	56R	560	44	3K3	332	74	160K	164
15	62R	620	45	3K6	362	75	180K	184
16	68R	680	46	3K9	392	76	220K	224
17	82R	820	47	4K3	432	77	240K	244
18	91R	910	48	4K7	472	78	270K	274
19	120R	121	49	5K1	512	79	300K	304
20	160R	161	50	5K6	562	80	330K	334
21	180R	181	51	6K2	622	81	360K	364
22	220R	221	52	6K8	682	82	390K	394
23	240R	241	53	8K2	822	83	430K	434
24	270R	271	54	9K1	912	84	470K	474
25	300R	301	55	12K	123	85	510K	514
26	330R	331	56	16K	163	86	560K	564
27	360R	361	57	18K	183	87	620K	624
28	390R	391	58	22K	223	88	680K	684
29	430R	431	59	24K	243	89	820K	824
30	470R	471	60	27K	273	90	910K	914

Ex: 0603, 120Ω, 0.1% Marking is 121.

7.4 ±0.1%, ±0.5%, ±1%(E96/3digitals)

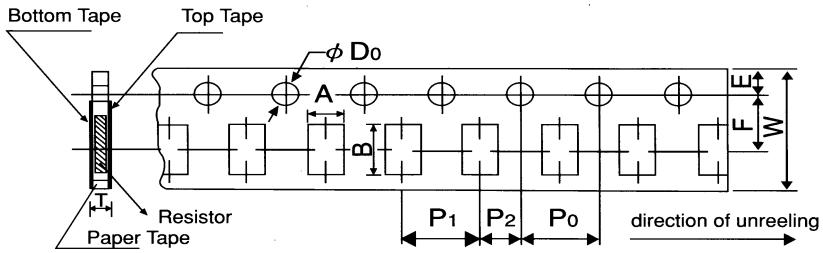
The resistance value by 3 digits is requirement for customer.

7.5 No Marking for RB04

8. Taping & Reel

8.1 Taping Dimensions

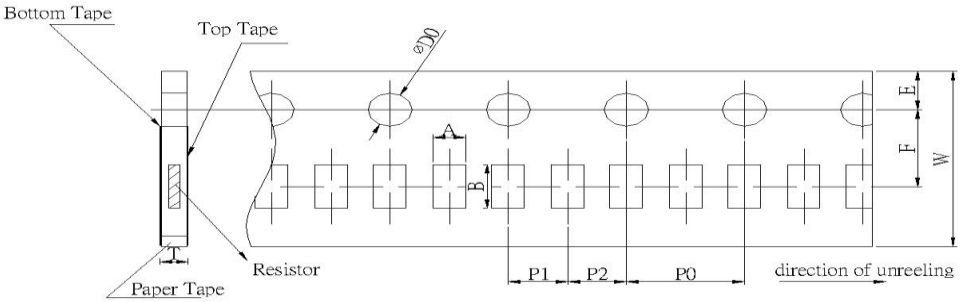
8.1.1 4 mm pitch paper



Packing	Type	A	B	W	F	E	P_1	P_2	P_0	D_0	T
Paper Tape	RB06	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	$\Phi_{1.5}^{+0.1}_{-0}$	0.64±0.1
	RB10	1.6±0.15	2.4±0.2								0.84±0.1
	RB12	2.0±0.15	3.6±0.2								

UNIT: mm

8.1.2 2 mm pitch paper

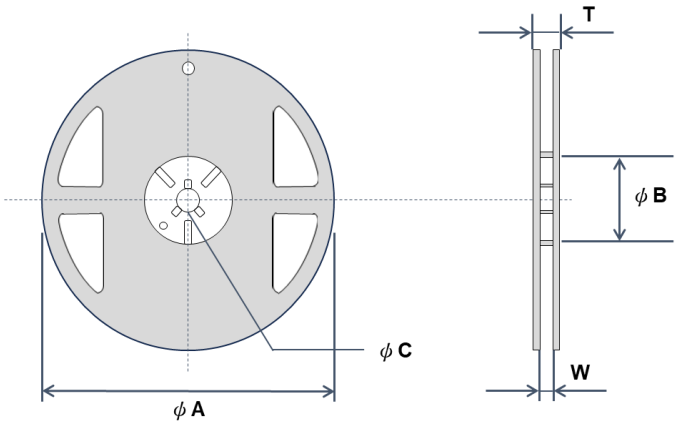


Packing	Type	A	B	W	F	E	P_1	P_2	P_0	D_0	T
Paper	RB04	0.7±0.05	1.2±0.05	8.0±0.2	3.5±0.05	1.75±0.1	2.0±0.1	2.0±0.1	4.0±0.1	$\Phi_{1.5}^{+0.1}_{-0}$	0.45±0.1

UNIT: mm

package / Type	Size	Paper Tape	
		4 mm pitch	2 mm pitch
		180mm/R	180mm/R
RB	04		10000
RB	06	5000	
RB	10	5000	
RB	12	5000	

8.2 Reel Specifications



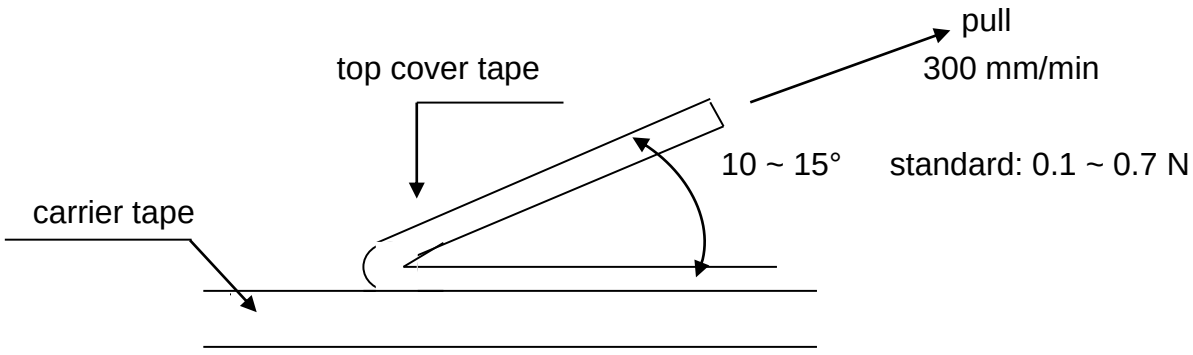
Type	ΦA	ΦB	ΦC	W	T
RB04/06 RB10/12	178.0 ±2.0	60.0 ±1.0	13.0 ±1.0	9.0 ±1.0	11.4 ±1.0

UNIT: mm

8.3 Peel – off force:

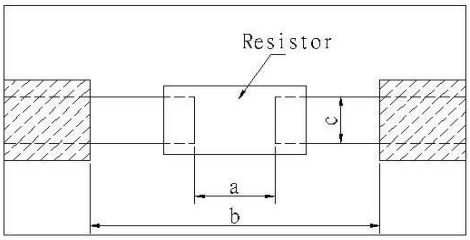
Peel – off force of paper and blister tape is in accordance with “JIS”

that is, 0.1 to 0.7 N at a peel-off speed of 300 mm / minute.



UNIT: mm

9. Recommended land patterns



Land pattern / Type	Size	Dimension (mm) a	b	c
RB	04 (0402)	0.5 ~ 0.6	1.4 ~ 1.6	0.5~ 0.6
RB	06 (0603)	0.7 ~ 0.9	2.0 ~ 2.2	0.9 ~1.0
RB	10 (0805)	1.0 ~ 1.4	3.2 ~ 3.8	1.3 ~1.4
RB	12 (1206)	2.0 ~ 2.4	4.4 ~ 5.0	1.6 ~1.8

10. 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.

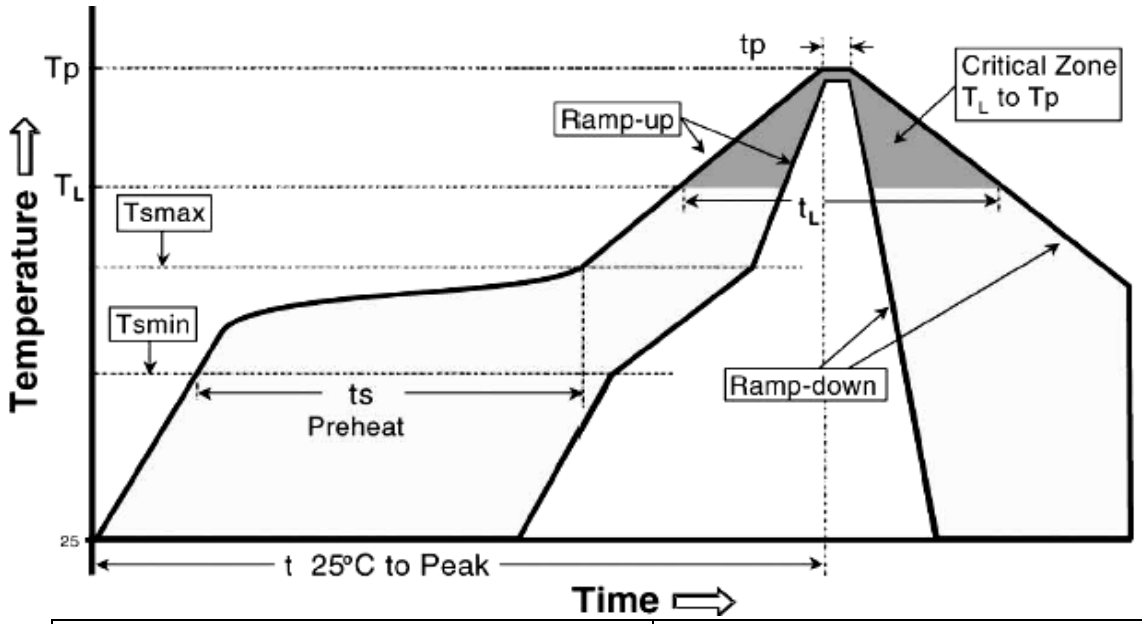
11. Storage Conditions:

Temperature: 5℃~35℃, Humidity:40%~75%

12. Shelf Life:

2 years from manufacturing date.

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



Profile Feature	Lead (Pb)-Free Assembly
Average ramp-up rate (Tsmax to Tp)	3℃ / second max.
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (Ts_{min} to Ts_{max}) (ts)	 150℃ 200℃ 60-120 seconds
Time maintained above: - Temperature (T_L) - Time (T_L)	 217℃ 60-150 seconds
Peak Temperature (Tp)	MAX: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.

14. Manufacturing Country & City:

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