



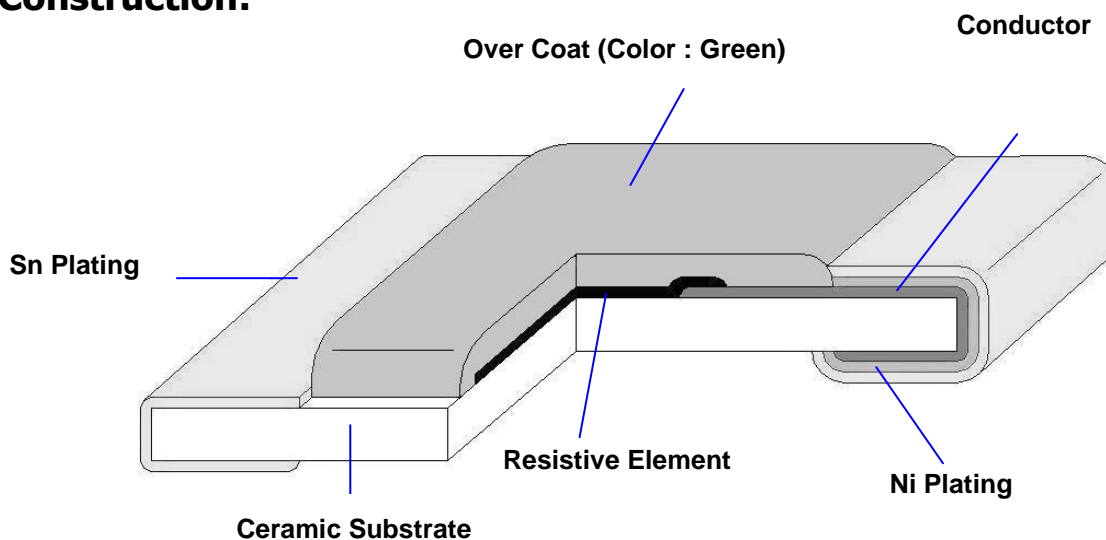
Thick Film Trimmable Chip Resistors (Lead-Free for RT series standard)

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1. Scope :

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

2. Construction:



3. Type Designation:

<u>RT</u>	<u>10</u>	<u>P</u>	<u>TN</u>	<u>103</u>
Product Code	Size	Tolerance	Packaging	Nominal Resistance
RT : Trimmable Chip Resistor	Power Rating			

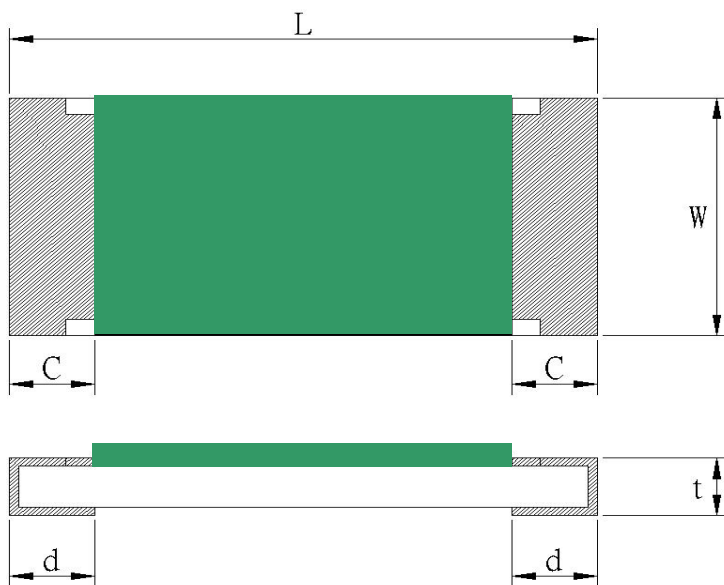
04-0402(1005) 06-0603(1608) 10-0805(2012) 12-1206(3216) 13-1210(3226)	1/16W 1/10W 1/8W 1/4W 1/3W	K-±10% M-±20% N-±30% P:0~-30%	T-Paper Tape +N: Lead-Free Special L : 06 – 2mm pitch paper Tape	3 digits, e.g., : (E-24) 103 = 10kΩ 0 = 0Ω 4 digits, e.g., : (E-96) 1540 = 154Ω 43R2 = 43.2Ω
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4. Dimensions :



UNIT: mm

Type	L	W	C	d	t
RT04	1.00 ^{+0.1} _{-0.05}	0.50±0.05	0.20±0.10	0.25±0.10	0.35±0.05
RT06	1.60±0.10	0.80±0.10	0.30±0.20	0.30 ^{+0.2} _{-0.1}	0.45±0.10
RT10	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
RT12	3.10±0.10	1.55±0.10	0.50±0.30	0.40±0.20	0.60±0.10
RT13	3.10±0.10	2.55±0.10	0.50±0.30	0.40±0.20	0.60±0.10



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5. Ratings & Characteristics :

Type	Power Rating at 70°C	Max. Working Voltage	Max. Over- Load Voltage	T.C.R (PPM/°C)	Resistance Range(Ω)			
					K(±10%)	M(±20%)	N(±30%)	P(0~-30%)
RT04	1/16W	50V	100V	±200	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ	10Ω-1MΩ on quest : 0805 : 3 MΩ
RT06	1/10W	50V	100V					
RT10	1/8W	150V	300V					
RT12	1/4W	200V	400V					
RT13	1/3W	200V	400V					

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°C , power rating shall be derated in accordance with figure 1.

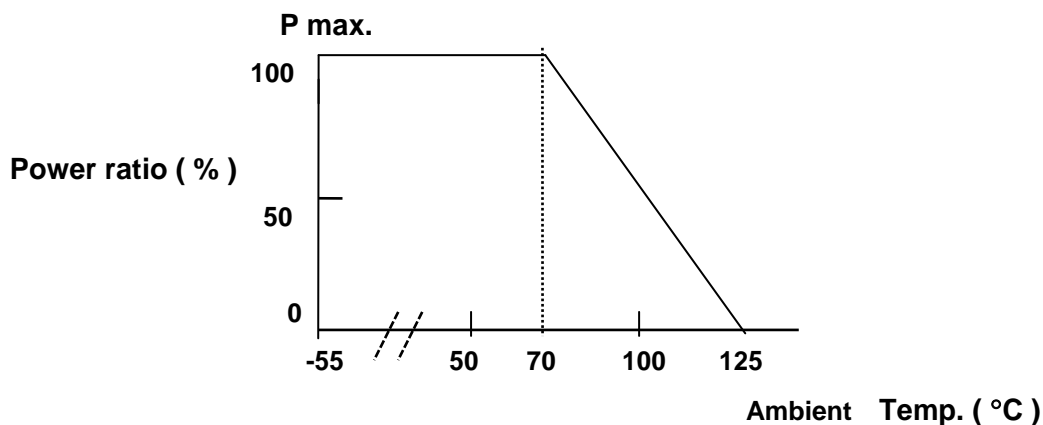


Figure 1

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)



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E.G. : What is RT06PTN102 the rated voltage ?

RT06PTN102 P(Rated power):1/10W ; R:102 = 1KΩ = 1000Ω

$$E = \sqrt{0.1(W) * 1000(\Omega)} = 10 (V)$$

6.Reliability Tests:

Test Items	Reference standard	Condition of Test	Test Limits ΔR
Temperature Coefficient of Resistance	IEC60115-1-4.8 JIS-C5201-4.8	-55~ +125 °C	±200 ppm/°C
Short Time Overload	IEC60115-1-4.13 JIS-C5201-4.13	2.5 X rated voltage for 5 sec	±(1% + 0.05Ω) 0402 size : ±(2% + 0.1Ω)
Intermittent Overload	IEC60115-1-4.39 JIS-C5201-4.39	3.0 X rated voltage or Max Overloading voltage ,1sec "ON" , 25sec "OFF" , 10000 cycles (Remarks : 0402 2.5 X RCWV *)	± (5.0% + 0.1Ω)
Load Life	IEC60115-1-4.25.1 JIS-C5201-4.25.1	1000 hours at rated voltage, 70°C , 1.5hours "ON" , 0.5hour "OFF"	±(3.0%+0.1Ω)
Rapid Change of Temperature	IEC60115-1-4.24 JIS-C5201-4.24	-55°C (30 min.) / +155 °C(30 min.) 5 cycles	±(1.0%+0.05Ω)
Solderability	IEC60115-1-4.19 JIS-C5201-4.19	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.
Robustness of Termination (Bending)	IEC60115-1-4.17 JIS-C5201-4.17	3mm deflection	±(1.0%+0.05Ω)
Dielectric Withstanding Voltage (Voltage Proof)	IEC60115-1-4.33 JIS-C5201-4.33	Applying voltage : 0402 & 0603 : 300V The other 500V for a minute .	No abnormalities such as flashover, burning dielectric breakdown shall appear.
Insulation Resistance	IEC60115-1-4.7 JIS-C5201-4.7	Applying voltage 100V for 1 minute.	≥ 1GΩ
Resistance to Dry Heat	IEC60115-1-4.6 JIS-C5201-4.6	125±5°C for 96±4Hrs	±(2.0%+0.1Ω)
Resistance to Solder Heat	IEC60115-1-4.23.2 JIS-C5201-4.23.2	270 ±5°C solder , 10 ±1 sec dwell .	±(1.0%+0.05Ω)

Note* : RCWV : Rated continuous working voltage .



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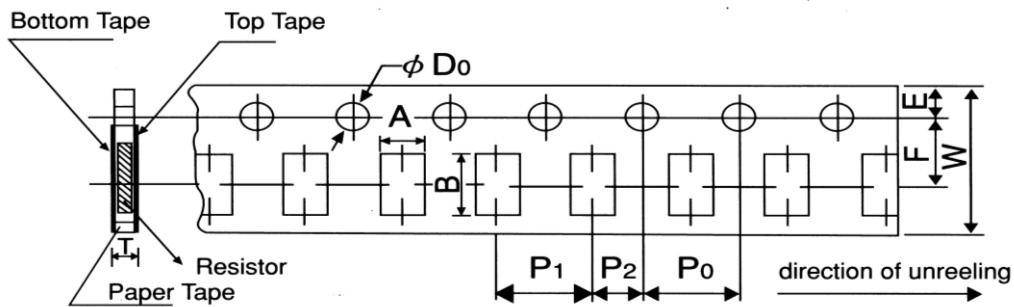
7. Marking

7.1 No Marking

8. Taping & Reel :

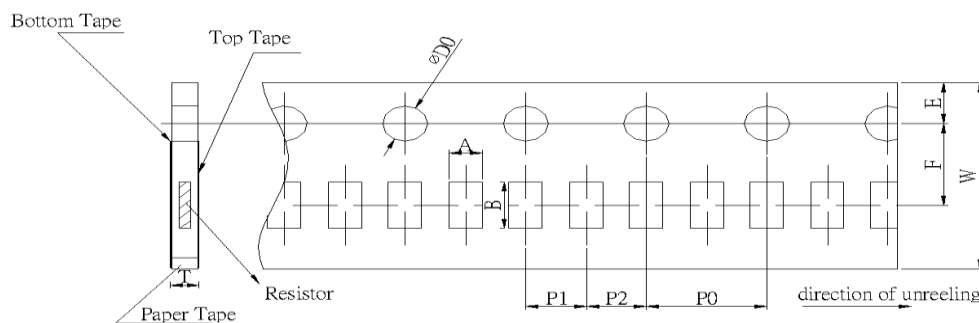
8.1 Taping Dimensions

8.1.1 4 mm pitch paper:



Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	D ₀	T
Paper	RT06	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±0.05	4.0±0.1	φ 1.5 +0.1 -0	0.64±0.1
	RT10	1.6±0.15	2.4±0.2								0.84±0.1
	RT12	2.0±0.15	3.6±0.2								
	RT13	2.8±0.2	3.6±0.2								

8.1.2 2 mm pitch paper :



Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	D ₀	T
Paper	RT04	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 -0	0.45±0.1
	RT06	1.1±0.1	1.9±0.1				2.0±0.1	2.0±0.1			0.64±0.1



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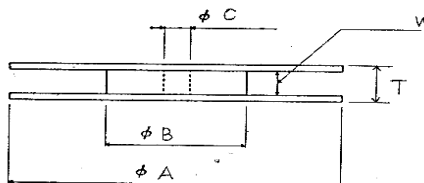
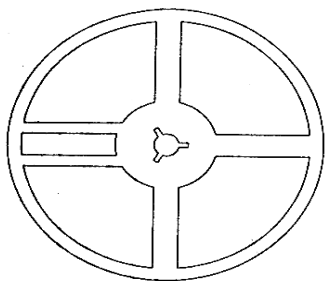
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8.1.4 Packaging quantity:

UNIT: mm

Package		Paper Tape	
		4 mm pitch	2 mm pitch
Type	Size	178mm/R	178mm/R
RT	04		10000
RT	06	5000	10000
RT	10	5000	
RT	12	5000	
RT	13	5000	

8.2 Reel Specifications:



UNIT: mm

Type	ϕA	ϕB	ϕC	W	T
RT /04 / 06 RT10 /12 /13	178.0 ± 2.0	60.0 ± 1.0	13.0 ± 1.0	9.0 ± 1.0	11.5 ± 1.0

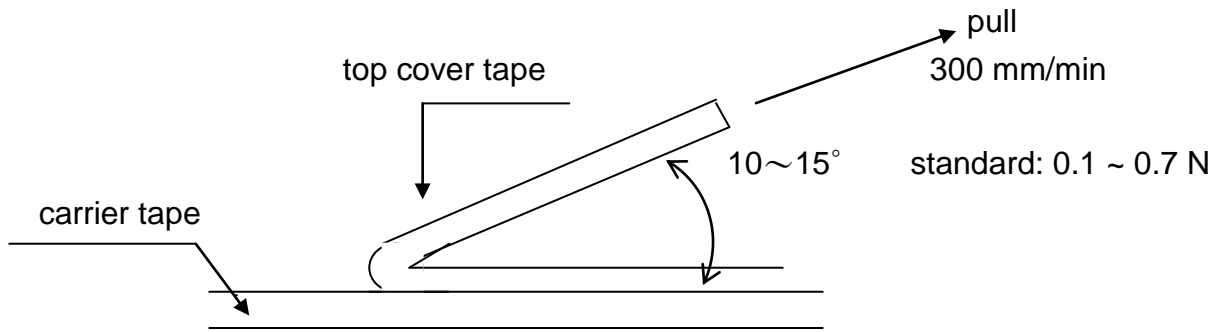


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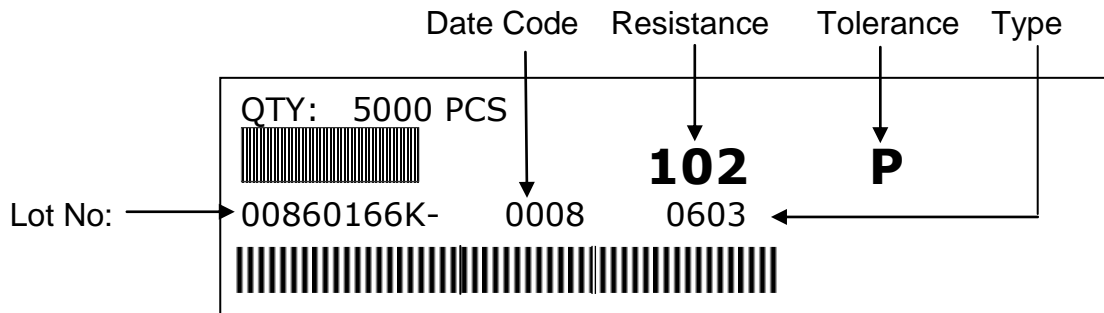
8.3. Peel –off force :

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.



9. Label :

9.1 Manufacture Label :



9.2 Customer Label (By customer request):

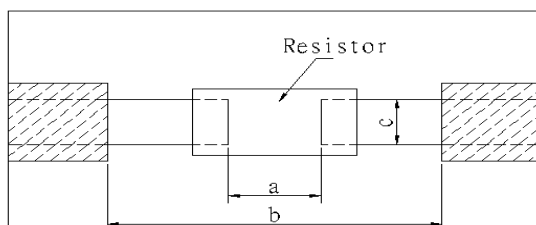




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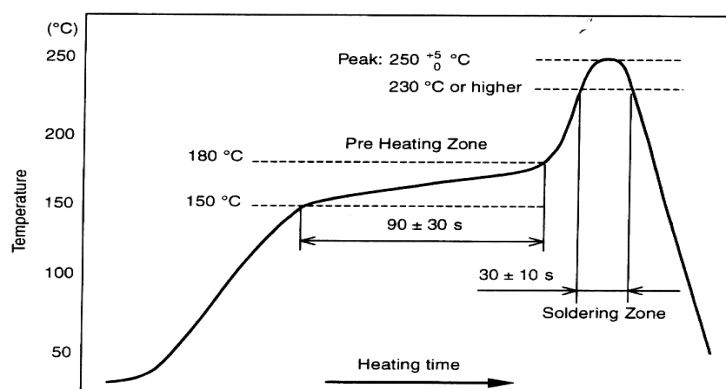
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10. Recommended land patterns :



Type	Size	Land pattern	Dimension (mm)		
			a	b	c
RT	04 (0402)		0.50~0.6	1.4~1.6	0.6~0.7
RT	06 (0603)		0.7~0.9	2.0~2.2	0.8~1.0
RT	10 (0805)		1.0~1.4	3.2~3.8	1.2~1.4
RT	12 (1206)		2.0~2.4	4.4~5.0	1.5~1.8
RT	13 (1210)		2.0~2.4	4.4~5.0	2.4~3.5

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



Peak : $250 \begin{matrix} +5 \\ -0 \end{matrix} ^\circ\text{C}$, 5 sec

Pre – heat Zone : 150 to 180 °C , 90±30 sec

Soldering Zone : 230°C or higher , 30±10 sec

12. Storage Conditions:

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

13. Shelf Life:

2 years from manufacturing date.



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14. 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.

15. Application Notes:

15.1 Trimming shall be performed by laser machine. (For reference only)

a) Recommend condition:

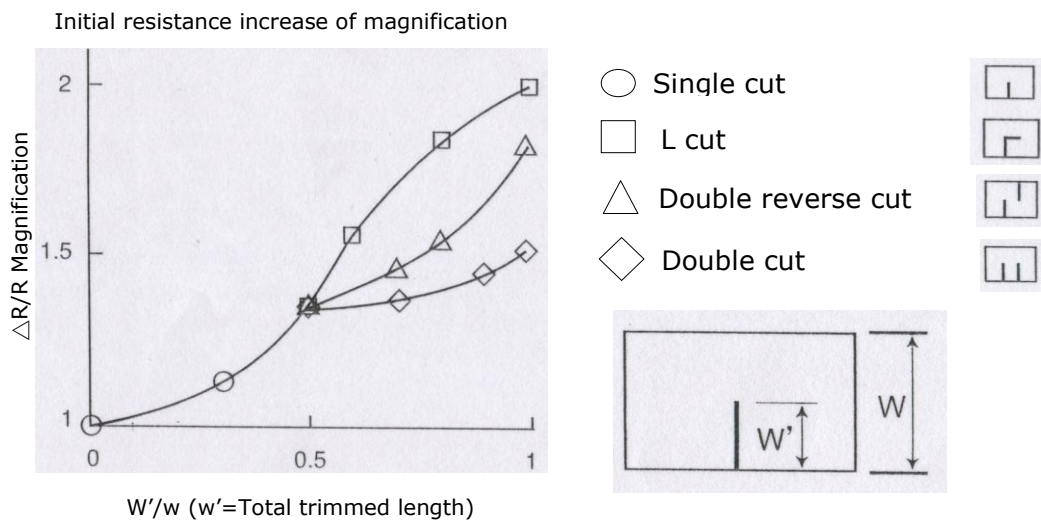
Speed	Q-Rate	Power
80mm±20	10~12 KHz	3.0~4.5KW

b) Inadequate laser trim power can cause poor electrical characteristic e.g., wide distributions and overload instability.

c) For different equipment types, please test & set up suitably trimming condition.

d) To avoid too long trimming length that will result poor power rating.

e) Resistance rising rate



15.2 After Trimming, In order to avoid humidity, dusty, corrosive gas result failure of resistor. It is necessary that choosing suitable sealing glue to cover whole resistor surface.



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Revise record

Date	Content	Owner
Nov.26 2008	Adding recommend condition of laser.	Vincent
April.20 .2011	Reliability test : Reference standard from JIS-5202 change to IEC60115 &JIS-C5201	Kate