



Anti-Surge Chip Resistors
(Lead-Free for RAS series standard)
Halogen-Free

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1. Scope :

This specification applies for the RAS series of Anti-Surge chip resistors made by TA-I.

2. Construction :



3. Type Designation :

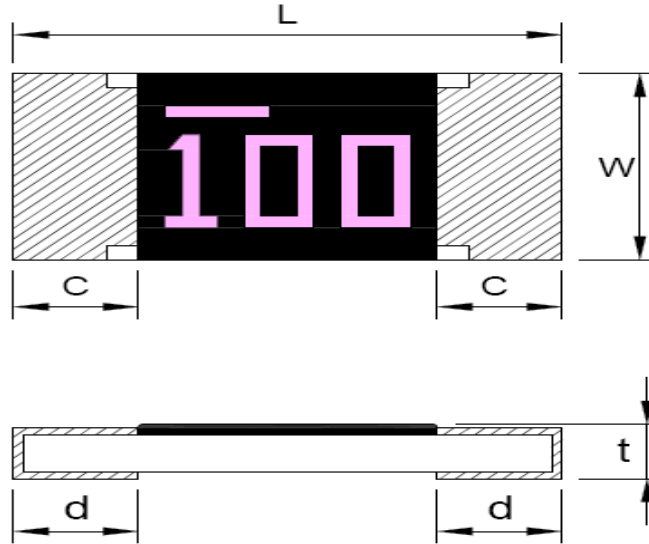
<u>RAS</u>	<u>10</u>	<u>J</u>	<u>TN</u>	<u>100</u>
Product Code	Size	Tolerance	Packaging	Nominal
RAS : Anti-Surge Chip Resistor	Power Rating	Resistance		
10-0805(2012) 1/4W 12-1206(3216) 1/2W 20-2010(5025) 1W	F-±1% J-±5% k-±10%	T-Paper Tape E-Embossed Tape +N : Lead-Free	3 digits, e.g.,: (E-24) 100 = 10Ω 4 digits, e.g., : (E-96) 1000 = 100Ω	



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4. Dimensions :



UNIT: mm

Type	L	W	C	d	t
RAS10	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
RAS12	3.10±0.10	1.55±0.10	0.50±0.30	0.40±0.20	0.55±0.10
RAS20	5.00±0.15	2.50±0.15	0.60±0.30	0.50±0.25	0.60±0.10

5. Ratings & Characteristics :

Type	Power Rating at 70°C	Rating Voltage	Max. Working Voltage	Max. Over-Load Voltage	T.C.R (PPM/°C)	Resistance Range(Ω)		
						F(±1%) E-96	J(±5%) E-24	K(±10%) E-24
RAS10	1/4W	Refer 5.2	150V	300V	±100	1Ω-100KΩ	1Ω-100KΩ	1Ω-100KΩ
RAS12	1/2W	Refer 5.2	200V	400V	±100	1Ω-100KΩ	1Ω-100KΩ	1Ω-100KΩ
RAS20	1W	Refer 5.2	200V	400V	±100	1Ω-100KΩ	1Ω-100KΩ	1Ω-100KΩ

Operating Temp (°C) : -55°C ~ +155°C

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



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5.1. Derating Curve :

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

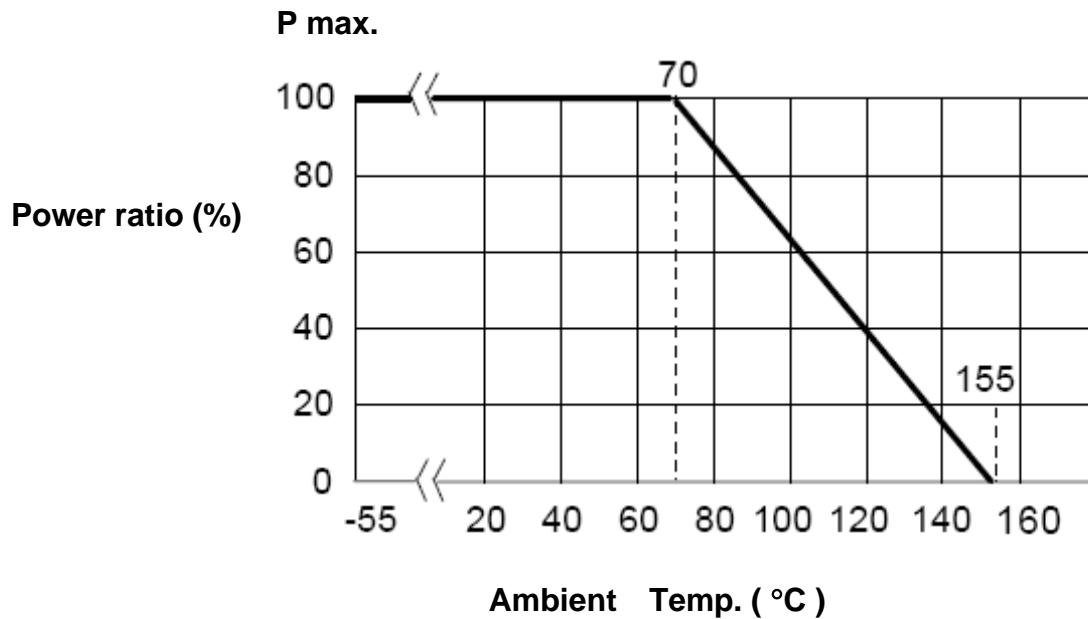


Figure 1

5.2. 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)

E.G. : What is RAS10JTN101 the rated voltage ?
RAS10JTN101 P:1/4W ; R:101 = 100Ω

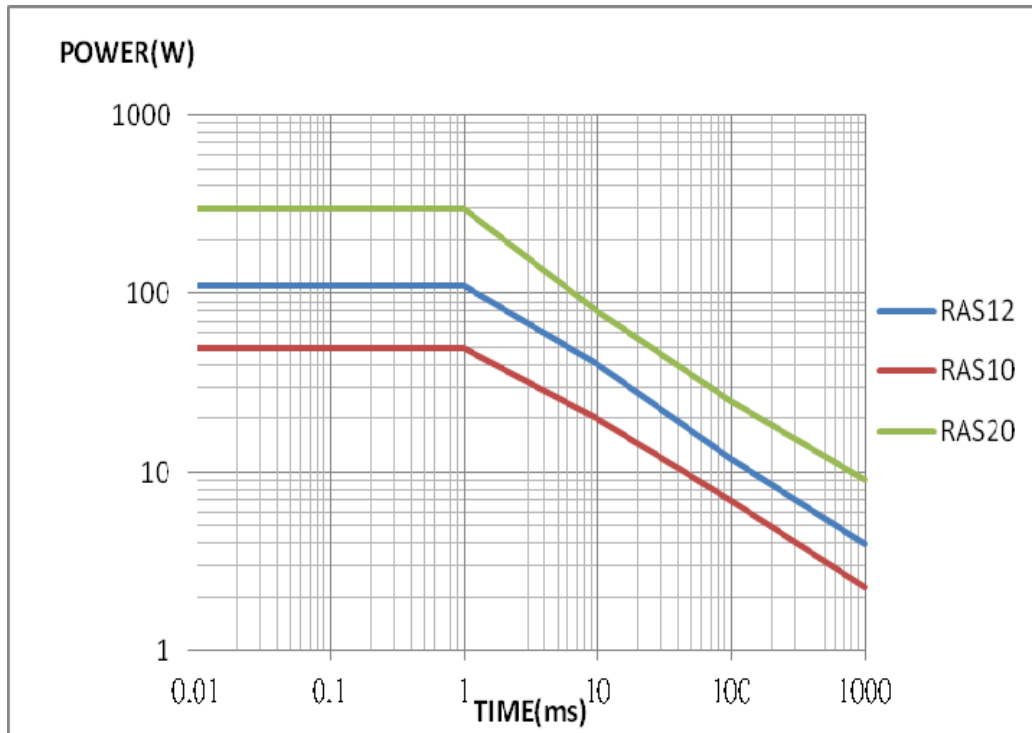
$$E = \sqrt{0.25(W) * 100(\Omega)} = 5(V)$$



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5.3. Single Pulse Limiting Power Curve :



6. Reliability Tests :

Test Items	Reference standard	Condition of Test	Test Limits ΔR
Temperature Coefficient of Resistance	IEC60115-1-4.8 JIS-C5201-1-4.8	-55~ +125 °C	Refer 5.0
Short Time Overload	IEC60115-1-4.13 JIS-C5201-1-4.13	2.5 X rated voltage for 5 sec	$\pm(1.0\% + 0.05\Omega)$
Intermittent Overload	IEC60115-1-4.39 JIS-C5201-1-4.39	2.5X rated voltage or Max Overloading voltage ,1sec "ON" , 25sec "OFF" , 10000 cycles	$\pm(5.0\% + 0.1\Omega)$
Endurance (Load Life)	IEC60115-1-4.25.1 JIS-C5201-1-4.25.1	1000 hours at rated voltage , 70°C , 1.5hours "ON " , 0.5hour "OFF"	$\pm(3.0\%+0.1\Omega)$
Load Life with Humidity	IEC60115-1-4.24 JIS-C5201-1-4.24	1000 hours at rated voltage , 40 \pm 2°C , 90~95% RH 1.5hours "ON " , 0.5hour "OFF"	$\pm(3.0\%+0.1\Omega)$



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Rapid Change of Temperature	IEC60115-1-4.19 JIS-C5201-1-4.19	-55°C (30 min.) / +155 °C(30 min.) 5 cycles	±(1.0%+0.05Ω)
Solderability	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.
Robustness of Termination (Bending)	IEC60115-1-4.33 JIS-C5201-1-4.33	3mm deflection	±(1.0%+0.05Ω)
Dielectric Withstanding Voltage (Voltage Proof)	IEC60115-1-4.7 JIS-C5201-1-4.7	Applying voltage : The 500V for a minute .	No abnormalities such as flashover, burning dielectric breakdown shall appear.
Insulation Resistance	IEC60115-1-4.6 JIS-C5201-1-4.6	Applying voltage 100V for 1 minute.	≥ 1GΩ
Resistance to Dry Heat	IEC60115-1-4.23.2 JIS-C5201-1-4.23.2	155±5°C for 96±4Hrs	±(2.0%+0.1Ω)
Resistance to Solder Heat	IEC60115-1-4.18 JIS-C5201-1-4.18	270 ±5°C solder , 10 ±1 sec dwell .	±(1.0%+0.05Ω)

Note* : RCWV : Rated continuous working voltage .

7. Marking

7.1 ±5% , ±10%(E24) :

Resistance value is expressed by 3 digits, the first two digits represent the significant figures of nominal resistance value in Ω , and the third digit represents exponent for base of 10.

E.G. : , 100 = $10 \times 10^0 = 10 \Omega$



7.2 ±1% (E96) :

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

E.G. : 1000 = $100 \times 10^0 = 100 \Omega$





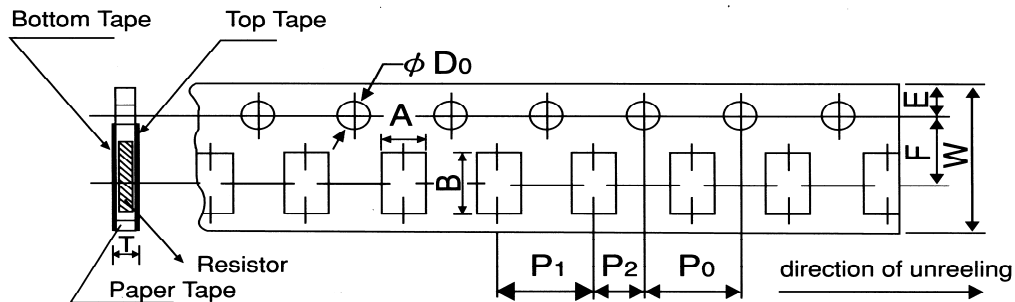
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8. Taping & Reel :

8.1 Taping Dimensions

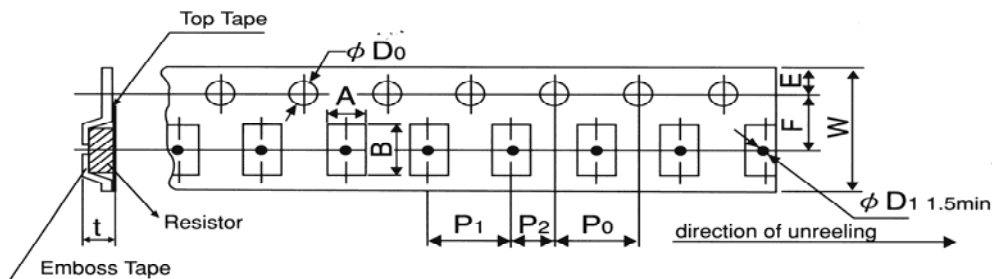
8.1.1 4 mm pitch paper:



Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	D ₀	T
Paper	RAS10	1.6±0.15	2.4±0.2	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	0.84±0.1
	RAS12	2.0±0.15	3.6±0.2								

UNIT: mm

8.1.2 4 mm pitch Emboss :



Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	D ₀	T
Emboss	RAS20	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 +0.1 -0	0.85±0.15

UNIT: mm

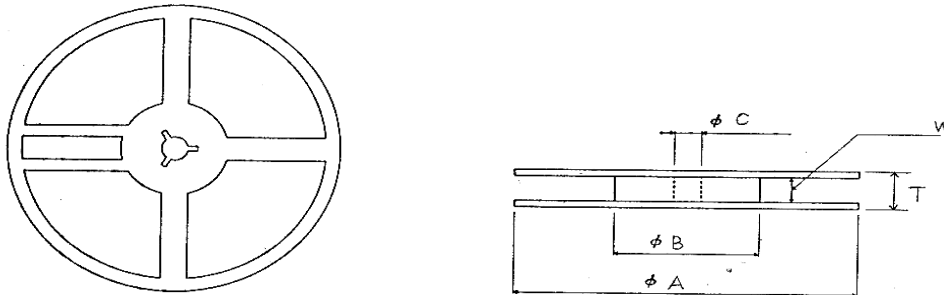
Package Type Size		Paper Tape	Emboss Plastic Tape
		4 mm pitch	4 mm pitch
		178mm/R	178mm/R
RAS	10	5000	
RAS	12	5000	
RAS	20		4000



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8.2 Reel Specifications:

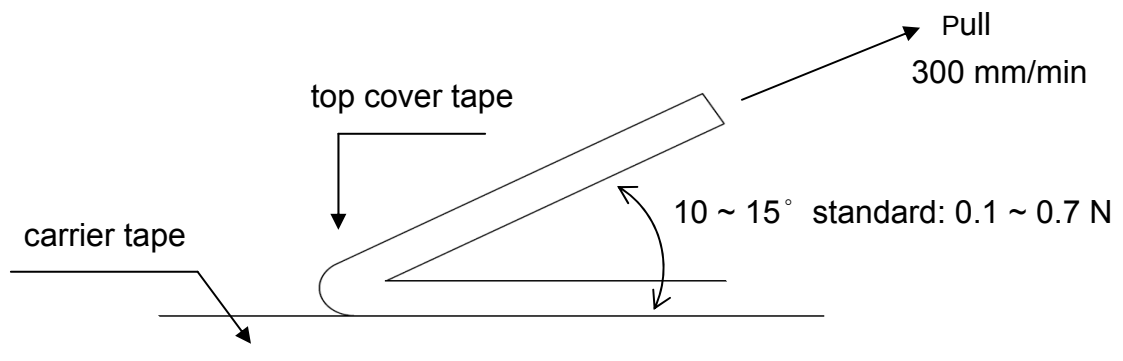


UNIT: mm

Type	ϕA	ϕB	ϕC	W	T
RAS10 / 12	178.0 ± 2.0	60.0 ± 1.0	13.0 ± 1.0	9.0 ± 1.0	11.5 ± 1.0
RAS20				13.0 ± 1.0	15.5 ± 1.0

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.



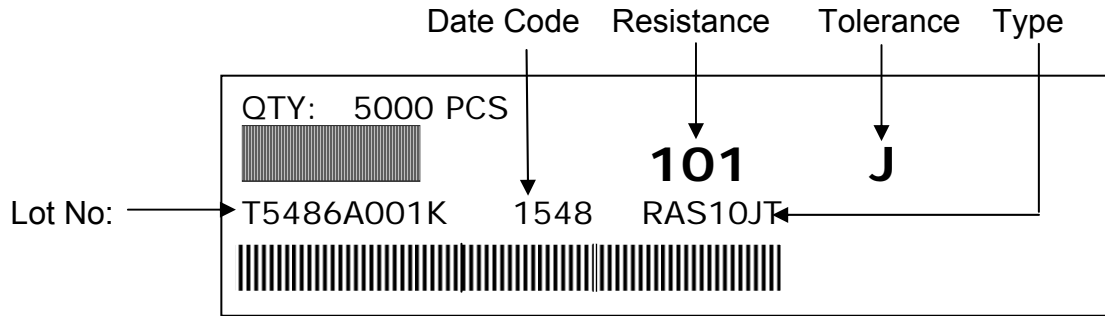


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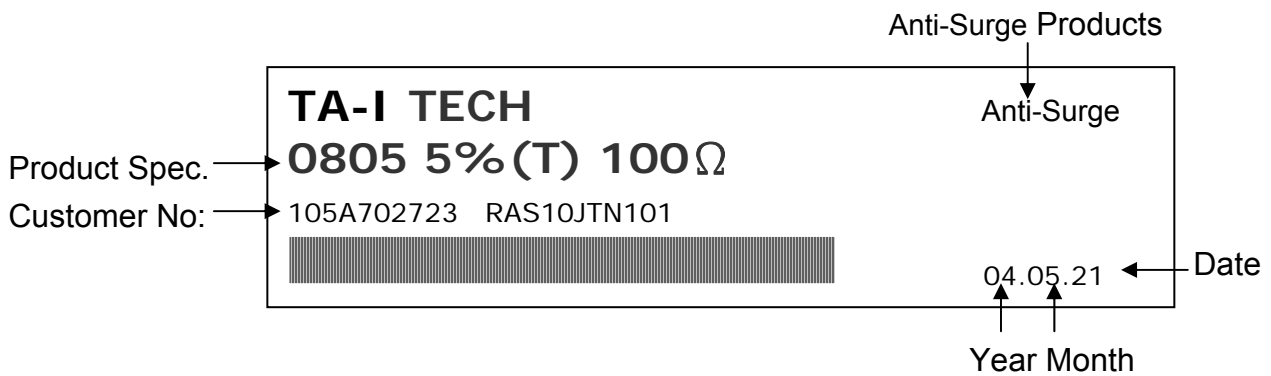
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9. Label :

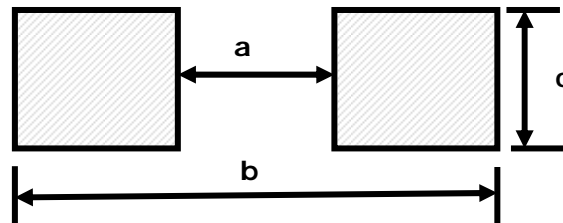
9.1 Manufacture Label :



9.2 Customer Label (By customer request):



10. Recommended land patterns :



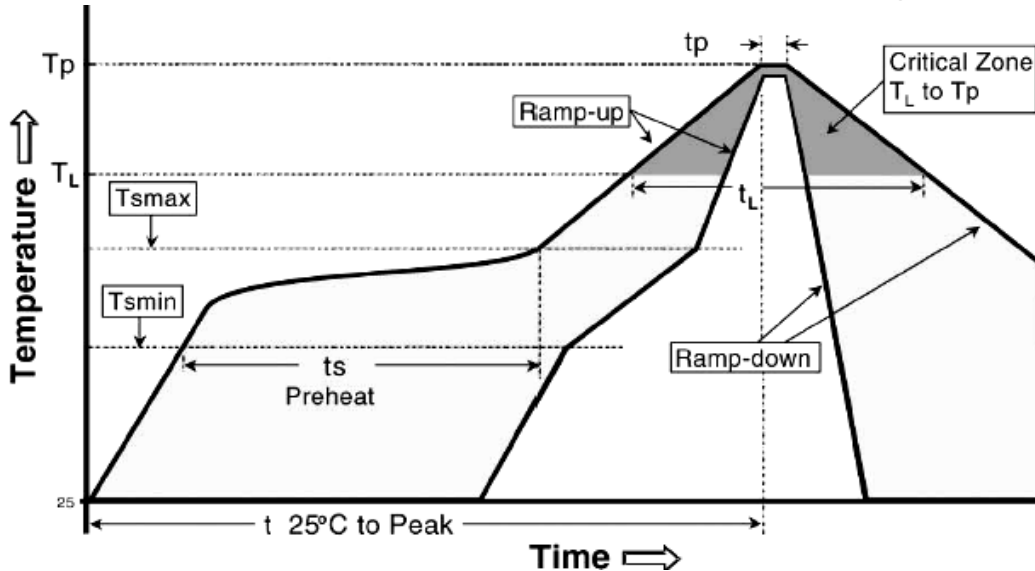
Type	Size	Land pattern		
		Dimension (mm)		
		a	b	c
RAS	10 (0805)	1.0~1.4	3.2~3.8	0.9~1.4
RAS	12 (1206)	2.0~2.4	4.4~5.0	1.2~1.8
RAS	20 (2010)	3.3~3.7	5.7~6.5	2.3~3.5



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



Profile Feature	Lead (Pb)-Free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C / second max.
Preheat - Temperature Min (Tsmmin) - Temperature Max (Tsmmax) - Time (Tsmmin to Tsmmax) (ts)	150°C 200°C 60 -150 seconds
Time maintained above : - Temperature (Tl) - Time (Tl)	217°C 60-120 seconds
Peak Temperature (Tp)	260°C
Time within $\begin{matrix} +0 \\ -5 \end{matrix}$ °C of actual Peak Temperature (tp) ²	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8mimutes max.

Allowed Re-flow times : 3 times

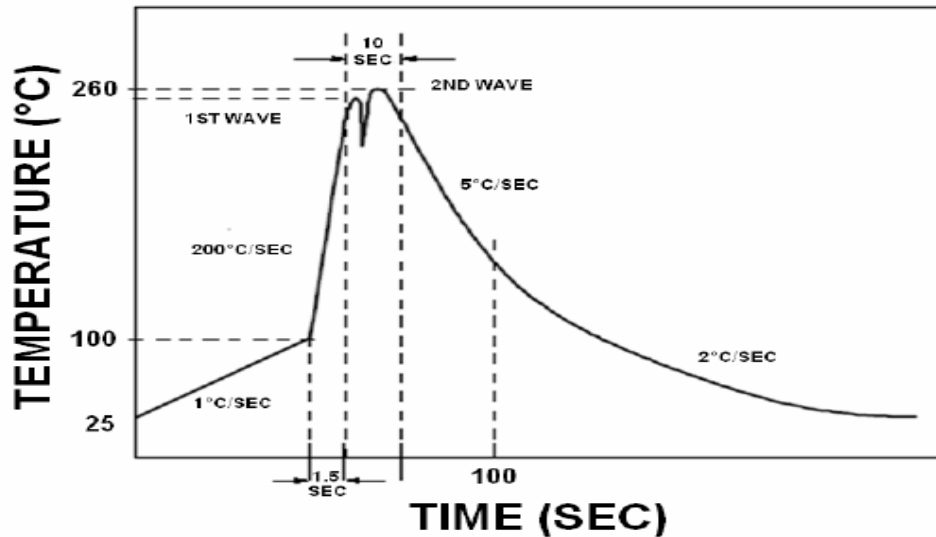
Remark : To avoid discoloration phenomena of chip on terminal electrodes,
 please use N2 Re-flow furnace .



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12. Recommend Wave-Solder profile : (solder : Sn96.5 / Ag3 / Cu0.5)



13. Solder iron conditions:

Bit temperature : $350 \pm 10^{\circ}\text{C}$

Application time of soldering iron : 3 sec

The number of times of work: 1 time

14. Storage Conditions:

Temperature: $5^{\circ}\text{C} \sim 35^{\circ}\text{C}$, Humidity: 40%~75%

15. Shelf Life:

2 years from manufacturing date.

16. 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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17. Manufacturing Country & City :

TA-I TECHNOLOGY CO., LTD. (Taiwan– Tao Yuan)
Tel: 886-3-3246169 Fax : 886-3-3246167

TA-I TECHNOLOGY (SU ZHOU) CO., LTD. (China – Su Zhou)
Tel :86- 512-63457879 Fax : 86-512-63457869

Associated companies :

(1) FORTUNE TASK RESISTOR FACTORY (China – Dongguan)
Tel : 86-769-8339-4790~3 Fax : 86-769-8339-4794

(2) TA-I TECHNOLOGY ELECTRONIC (DONGGUAN) CO., LTD. (China –Dongguan)
Tel : 86-769-8339-4790~3 Fax : 86-769-8339-4794

(3) TAI OHM ELECTRONICS (M) SDN. BHD. (Malaysia –Penang)
Tel :604- 3900480 Fax : 604-3901481

(4) P.T.TAI ELECTRONICS Indonesia (Indonesia – Jakarta)
Tel :62-21-89830123 Fax : 62-21-89830703