



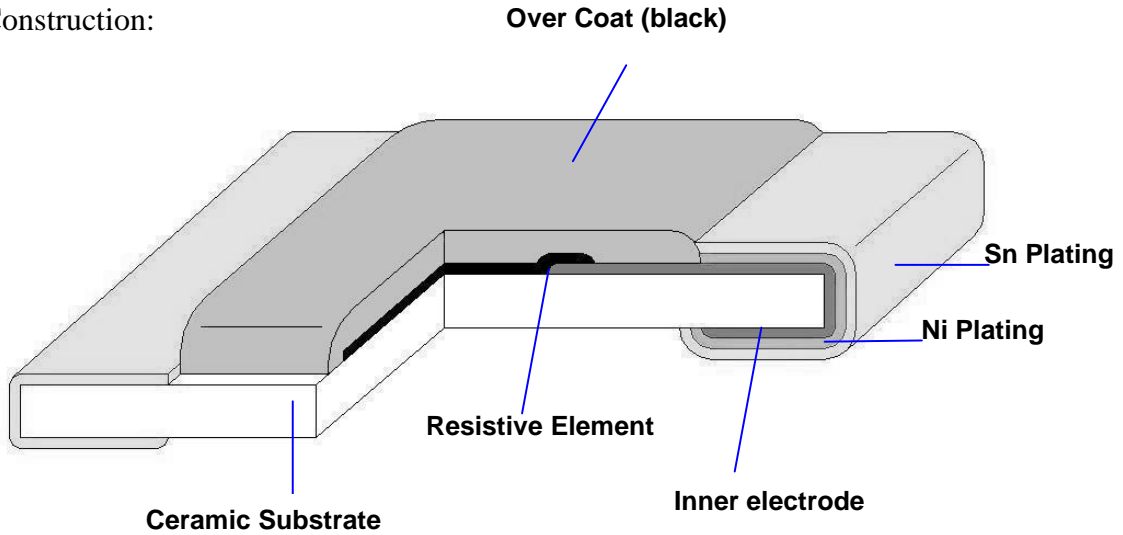
**Thin Film Chip Resistors
RBM series Standard
(Halogen –Free)
AEC-Q200 qualified**

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1. Scope:

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

2. Construction:



3. Type Designation:

RBM 25 D T P 1001

Product Code Size Tolerance Packaging TCR Nominal Resistance

RBM: Thin Film Power Rating / / / / Resistance

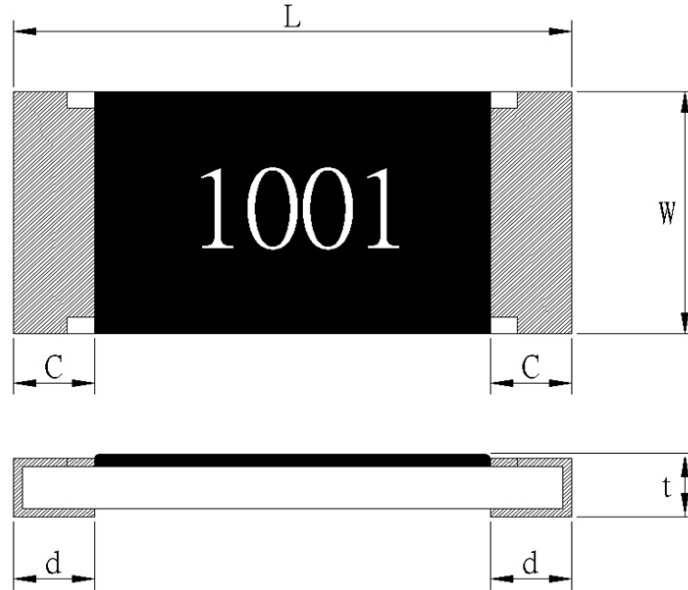
10-0805(2012) 0.3W 12-1206(3216) 0.4W 25-2512(6432) 1W	A- ±0.05% B- ±0.10% D- ±0.50% F- ±1.00%	T- Paper Tape E-Emboss Plastic	M- ±15 ppm P- ±25 ppm S- ±50 ppm	e.g., 1001=1kΩ
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4. Dimensions:



UNIT: mm

Type	L	W	C	d	t
RBM10	2.00 ±0.10	1.25 ±0.10	0.40 ±0.20	0.40 ±0.20	0.50 ±0.10
RBM12	3.10 ±0.10	1.55 ±0.10	0.50 ±0.30	0.40 ±0.20	0.55 ±0.10
RBM25	6.30 ±0.20	3.20 ±0.20	0.60 ±0.30	0.50 ±0.25	0.60 ±0.10



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5. Ratings & Characteristics

Type	Power Rating at 70°C	Rated Voltage	Max. Working Voltage	Max. Over- Load Voltage	T.C.R (PPM/°C)	Resistance Range	Resistance tolerance (%)
RBM10	0.3W	Refer 5.2	150V	200V	±15	1Ω~221KΩ	± 0.05/0.1/0.5
					±25	221K~511KΩ	±0.5/1.0
RBM12	0.4 W	Refer 5.2	200V	300V	±50		
					±15	1Ω~221KΩ	± 0.05/0.1/0.5
RBM25	1 W	Refer 5.2	350V	500V	±25	221K~511KΩ	±0.5/1.0
					±50		

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 according to figure 1.

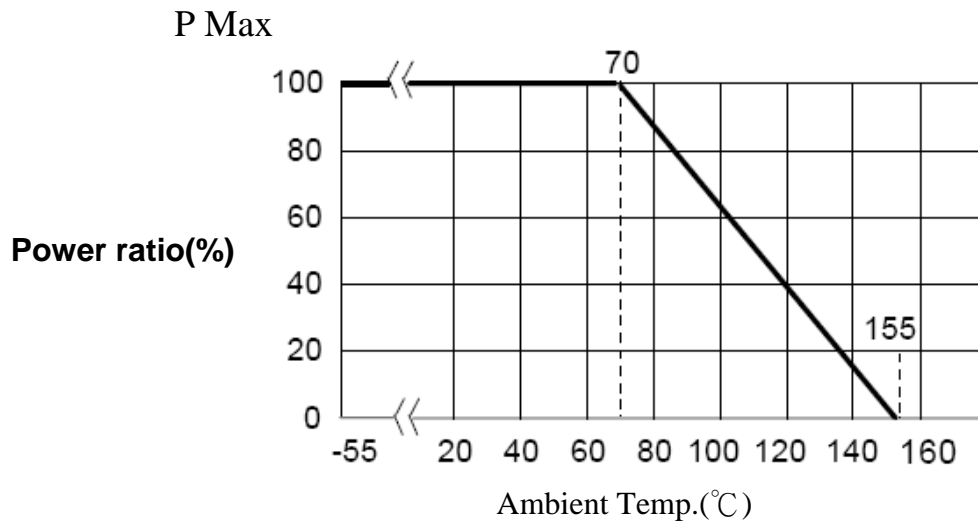


Figure 1.

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)



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6. Reliability Tests:

Test Items	Reference standard	Condition of Test	Test Limits	
			RBM10:1Ω – 221KΩ RBM12:1Ω – 221KΩ RBM25:1Ω – 221KΩ	RBM10: 221KΩ – 511KΩ RBM12:221KΩ – 511KΩ RBM25: 221KΩ – 511KΩ
Temperature Coefficient of Resistance	IEC60115-1 4.8	+25/-55/+25/+125 °C	Refer 5.0	
Endurance at 70 °C:	EN60 115-1-4.25.1	$V = \sqrt{(P_{70} \times R)}$ or $V = V_{max.}$; whichever is the less severe; 1.5 h on; 0.5 h off; 70 °C; 1000 h 70 °C; 8000 h	1000 h: ± (0.25 % R + 10 mΩ) 8000 h: ± (0.3 % R + 10 mΩ)	1000 h: ± (1 % R + 10 mΩ) 8000 h: ± (1 % R + 10 mΩ)
Endurance at upper category temperature	EN60 115-1- 4.25.3	155 °C; 1000 h	± (0.3 % R + 5 mΩ)	± (2 % R + 5 mΩ)
Damp heat, steady state	IEC60068-2-78 (Cab)	(40 ± 2) °C; 56 days; (93 ± 3) % RH	±(0.15 % R+ 10 mΩ)	± (1 % R+ 10 mΩ)
Damp heat, steady state, accelerated	IEC60068-2-67 (Cy)	(85 ± 2)°C ; (85 ± 5) % RH; $V = 0.3 \times \sqrt{(P_{70} \times R)}$ ≤ 100 V and $V = 0.3 \times V_{max.}$; (the smaller value is valid) 1000 h	± (0.25 % R+ 10 mΩ)	± (2 % R+ 10 mΩ)
Climatic sequence: Dry heat Damp heat, cyclic Cold Low air pressure Damp heat, DC load	IEC60068-2-2 (Bb)/30(Db)/1(Ab)/13(M)/3 0(Db)	UCT; 16 h 55 °C; 24 h; ≥90 % RH; 1 cycle LCT; 2 h 8.5 kPa; 2 h; (25 ± 10) °C 55 °C; 24 h; ≥90 % RH; 5 cycles $V = 0.3 \times \sqrt{(P_{70} \times R)}$ or $V_{max.}$; 1 min. *LCT = - 55 °C; *UCT = 155 °C	± (0.15 % R+ 10 mΩ)	± (1 % R+ 10 mΩ)



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Test Items	Reference standard	Condition of Test	Test Limits	
			RBM10:1Ω – 221KΩ RBM12:1Ω – 221KΩ RBM25:1Ω – 221KΩ	RBM10: 221KΩ – 511KΩ RBM12:221KΩ – 511KΩ RBM25: 221KΩ – 511KΩ
Cold	IEC60068-2-1(Ab)	- 55 °C; 2 h	± (0.05 % R + 5 mΩ)	±(0.1 % R+ 5 mΩ)
Rapid change of temperature	IEC60068-2- 14 (Na)	LCT = - 55 °C; UCT = 155 °C 1000 cycles	± (0.25 % R + 10 mΩ)	±(0.5 % R+ 10 mΩ)
Short time overload:	EN60 115-1- 4.13	$V = 2.5 \times \sqrt{(P_{70} \times R)}$ or $V = 2 \times V_{max.}$; whichever is the less severe;5 s	± (0.05 % R + 5 mΩ)	
Periodic electric overload:	EN60 115-1- 4.39	$V = \sqrt{(15 \times P_{70} \times R)}$ or $V = 2 \times V_{max.}$; whichever is the less severe; 0.1 s on; 2.5 s off 1000 cycles	± (1 % R + 5 mΩ)	
Vibration	IEC60068-2- 6 (Fc)	Endurance by sweeping; 10 Hz to 2000 Hz; no resonance; amplitude ≤ 1.5 mm or ≤ 200 m/s ² ; 7.5 h	± (0.05 % R + 5 mΩ)	
Electrostatic discharge (Human Body Model)	EN60 115-1- 4.40	IEC 61340-3-1 (1); 3 pos. + 3 neg. discharges RBM10: 1.5 kV RBM12: 2 kV RBM25: 4 kV	± (0.5 % R + 0.05 mΩ)	± (0.1 % R+ 5 mΩ)
Solderability	IEC60068-2- 58 (Td)	Solder bath method; SnAg3Cu0.5 or SnAg3.5; non-activated flux; (235 ± 3) °C; (2 ± 0.2) s	Good tinning (≥95 % covered); no visible damage	
Single pulse high voltage overload	EN60 115-1- 4.27	Severity no. 4: $V = 10 \times \sqrt{(P_{70} \times R)}$ or $V = 2 \times V_{max.}$; whichever is the less severe; 10 pulses 10 μs/700 μs	± (0.5 % R + 5 mΩ)	



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Test Items	Reference standard	Condition of Test	Test Limits	Test Limits
			RBM10:1Ω – 221KΩ RBM12:1Ω – 221KΩ RBM25:1Ω – 221KΩ	RBM10: 221KΩ – 511KΩ RBM12:221KΩ – 511KΩ RBM25: 221KΩ – 511KΩ
Resistance to soldering Heat	AEC-Q200 Test 15 MIL-STD-202 Method 210 IEC60068-2- 58 (Td)	Reflow (IR/forced gas convection); (260 ± 5) °C; (10 ± 1) s	± (0.02 % R+ 10 mΩ)	±(0.1 % R+ 10 mΩ)
Component solvent resistance	IEC60068-2- 45 (XA)	Isopropyl alcohol; 50 °C;	No visible damage	
Solvent resistance of marking	IEC60068-2- 45 (XA)	Isopropyl alcohol; 50 °C.; toothbrush	Marking legible; no visible damage	
Shear (adhesion)	IEC60068-2- 21 (Ue3)	45 N RBM10: 1mm(width) RBM12: 2mm(width) RBM25: 5mm(width)	No visible damage	
Substrate bending	IEC60068-2- 21 (Ue1)	Depth 2 mm, 3 times	No visible damage, no open circuit in bent position ± (0.05 % R + 5 mΩ) (2)	
Voltage proof	EN60 115-1- 4.7	Max. over- load voltage ; 60 s	No flashover or breakdown	
Flammability	EN60 115-1- 4.35	IEC 60695-11-5 (1), needle flame test; 10 s	No burning after 30 s	

Notes

- I. The quoted IEC standards are also released as EN standards with the same number and identical contents.
- II. Special requirements apply to MICRO-MELF, RBM10:
 - $R < 100\Omega \pm : (0.25 \% R + 10 \text{ m}\Omega)$
 - $100\Omega \leq R \leq 500k\Omega : \pm 0.1 \% R$
 - $500k\Omega < R : \pm 0.25 \% R$



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7. Marking

7.1 $\pm 0.5\%$, $\pm 1\%$ (E96) : RBM10 / RBM12 / RBM25

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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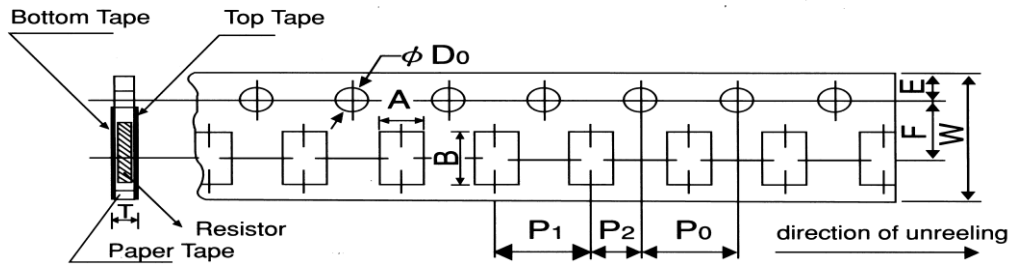
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8. Taping & Reel

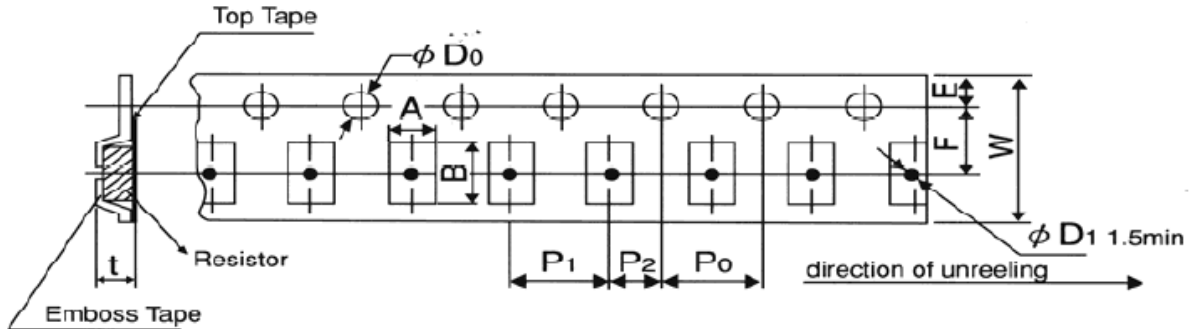
8.1 Taping Dimensions

8.1.1 4 mm pitch paper



Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	D ₀	T
Paper Tape	RBM10	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±0.1	4.0±0.1	Φ _{1.5} +0.1 -0	0.84±0.1
	RBM12	2.0±0.15	3.6±0.2								0.84±0.1

UNIT: mm



Packing	Type	A	B	W	F	E	P ₁	P ₂	P ₀	D ₀	T
Emboss Plastic	RBM25	3.6±0.2	6.9±0.2	12.0±0.2	5.5±0.05	1.75±0.1	4.0±0.1	2.0±0.1	4.0±0.05	Φ _{1.5} +0.1 -0	0.85±0.15

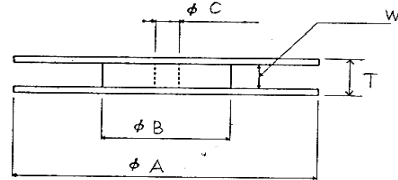
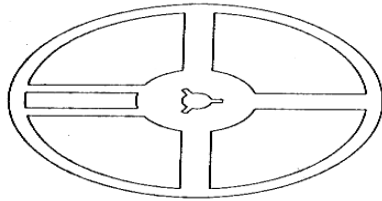
Type Size		Paper Tape	
		4 mm pitch	
		180mm/R	
		Emboss Plastic Tape	
		4 mm pitch	
RBM	10	5000	
RBM	12	5000	
RBM	25	4000	



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8.2 Reel Specifications

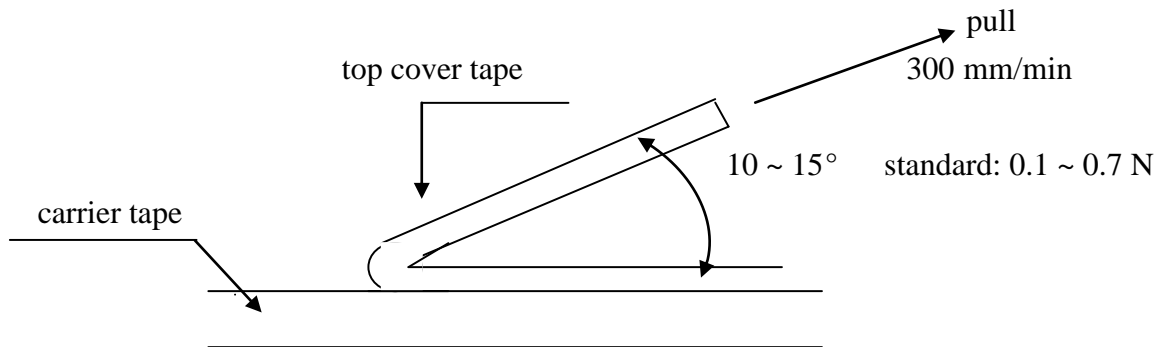


Type	ΦA	ΦB	ΦC	W	T
RBM 10/12	178.0 ±2.0	60.0 ±1.0	13.0 ±1.0	9.0 ±1.0	11.4 ±1.0
RBM 25				13.0 ± 1.0	15.5 ± 1.0

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

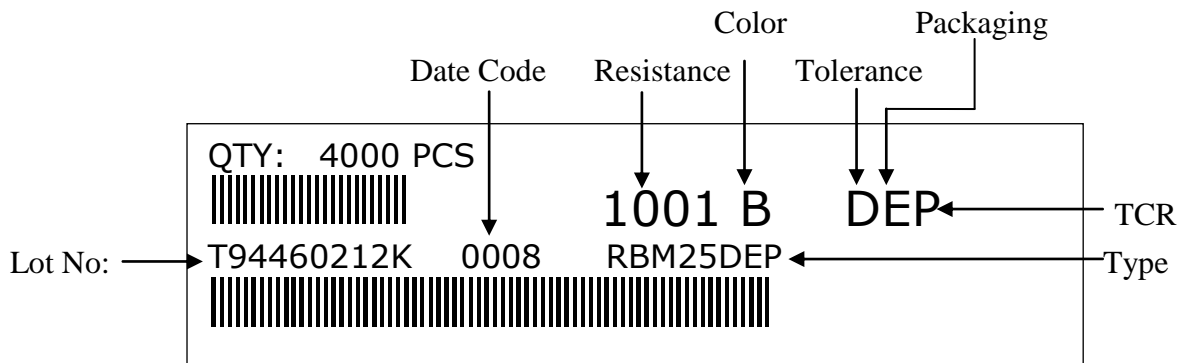


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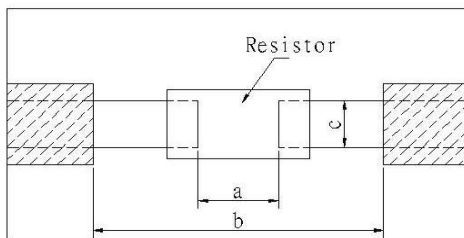
9. Label

9.1 Normal Products:



Manufacture Label

10. Recommended land patterns



Type	Size	Land pattern		
		Dimension (mm)		
		a	b	c
RBM	10 (0805)	1.0 ~ 1.4	3.2 ~ 3.8	1.3 ~ 1.4
RBM	12 (1206)	2.0 ~ 2.4	4.4 ~ 5.0	1.6 ~ 1.8
RBM	25 (2512)	3.6~4.0	7.6~8.6	2.3~3.5

11. 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.

12. Storage Conditions:

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

13. Shelf Life:

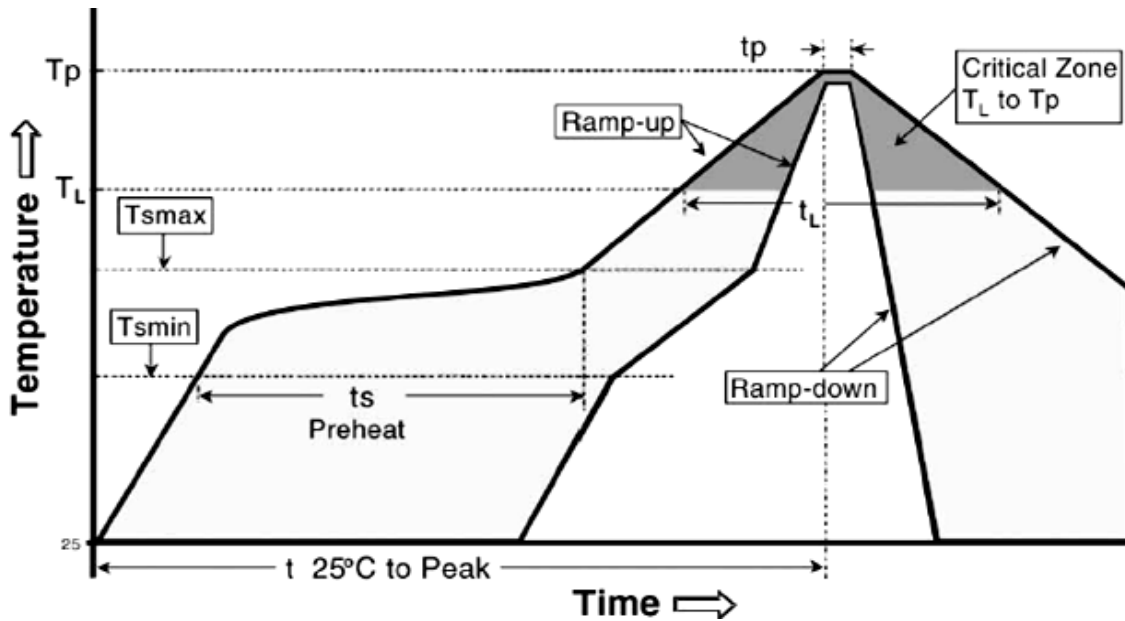
2 years from manufacturing date.



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14. 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}) (ts)	150°C 200°C 60 -150 seconds
Time maintained above : - Temperature (T _L) - Time (T _L)	217°C 60-120 seconds
Peak Temperature (T _p)	MAX:260°C
Time within $\begin{matrix} +0 \\ -5 \end{matrix}$ °C of actual Peak Temperature (t _p) ²	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8minutes max.



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15. Manufacturing Country & City :

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