

NTC Thermistor : TSM-H Series

High Temperature SMD Type NTC Thermistor



■ Features

1. RoHS & Halogen Free (HF) compliant
2. EIA size: 0402, 0603, 0805
3. Highly reliable structure
4. Operating temperature range: -40°C ~ +150°C
5. Wide resistance range
6. Cost effective
7. Agency recognition: UL / cUL



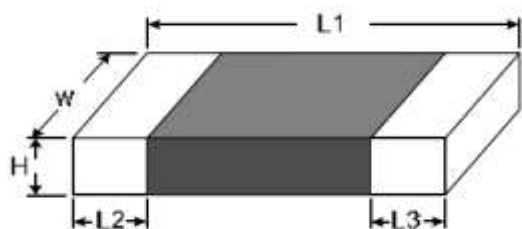
■ Recommended Applications

1. Motherboard, notebook and personal computer device
2. Adapter
3. Power Supply
4. Server

■ Part Number Code

1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16	
Product Type		Size (EIA)		Definition of B Value		Zero Power Resistance at 25°C (R ₂₅)		Tolerance of R ₂₅		B Value		Tolerance of B Value		Optional Suffix		Operating temperature range & Packaging															
TSM		0		A		202		D		338		E		Z		H															
NTC Thermistor		1		B _{25/85}		103		F		34D		±0.75%		RoHS & HF Compliant																	
TSM Series		2		B _{25/50}		473		G		395		1																			
								H		39H		2																			
								J		405		3																			
								K																							

■ Structure and Dimensions



(Unit: mm)

Part No.	Size (EIA)	L1	W	H.	L2 & L3
TSM0	0402	1.00±0.15	0.50±0.10	0.50±0.10	0.20±0.10
TSM1	0603	1.60±0.15	0.80±0.15	0.80±0.15	0.40±0.15
TSM2	0805	2.00±0.20	1.25±0.20	1.00max.	0.40±0.20

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Electrical Characteristics

Part No.	Size (EIA)	Zero Power Resistance at 25°C	Tolerance of R25	B Value		Tolerance of B value	Max. Power Dissipation at 25°C	Dissipation Factor	Thermal Time Constant	Operating Temperature Range	Safety Approvals
		R ₂₅ (KΩ)	(±%)	(K)		(±%)	P _{max} (mW)	δ(mW/°C)	τ(Sec.)	T _L ~T _U (°C)	UL/cUL
TSM0A103□34D*HZ	0402	10	0.5, 1, 2, 3 5, 10	25/85	3435	1, 2, 3	170	Approx. 1.7	Approx. 2.0	-40 ~ +150	√
TSM0B103□338*HZ		10		25/50	3380	0.75, 1, 2, 3					√
TSM0A104□40H*HZ		100	1, 2, 3 5, 10	25/85	4075	1, 2, 3					√
TSM0B104□425*HZ		100		25/50	4250						√
TSM1A202□350*HZ	0603	2	1, 2, 3 5, 10	25/85	3500	1、2、3	210	Approx 2.1	Approx 3.1	-40 ~ +150	√
TSM1A103□34D*HZ		10			3435						√
TSM1A103□39H*HZ		10			3975						√
TSM1A473□39H*HZ		47			3975						√
TSM1A104□410*HZ		100			4100						√
TSM1A154□465*HZ		150			4650						√
TSM1A204□410*HZ		200			4100						√
TSM1A224□410*HZ		220			4100						√
TSM1A474□415*HZ		470			4150						√
TSM1B202□34H*HZ		2		25/50	3475						√
TSM1B103□338*HZ		10			3380						√
TSM1B473□395*HZ		47			3950						√
TSM1B104□405*HZ		100			4050						√
TSM1B154□460*HZ		150			4600						√
TSM1B204□410*HZ		200			4100						√
TSM1B224□410*HZ		220			4100						√
TSM1B474□410*HZ		470			4100						√
TSM2A103□34D*HZ	0805	10	1、2、3 5、10	25/85	3435	1、2、3	240	Approx. 2.4	Approx. 5.4	-40 ~ +150	√
TSM2B103□345*HZ		10		25/50	3450						√
TSM2B103□350*HZ		10	3500		√						

Note 1: □ = Tolerance of R₂₅
* = Tolerance of B value

Note 2: UL&cUL File No. E138827

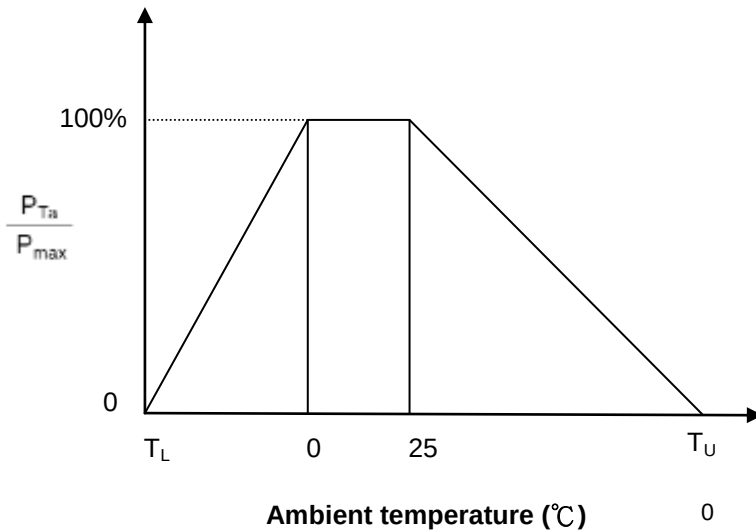
Note 3: Special specifications are available upon request

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■ Max. Power Dissipation Derating Curve



T_U : Maximum operating temperature ($^{\circ}\text{C}$)

T_L : Minimum operating temperature ($^{\circ}\text{C}$)

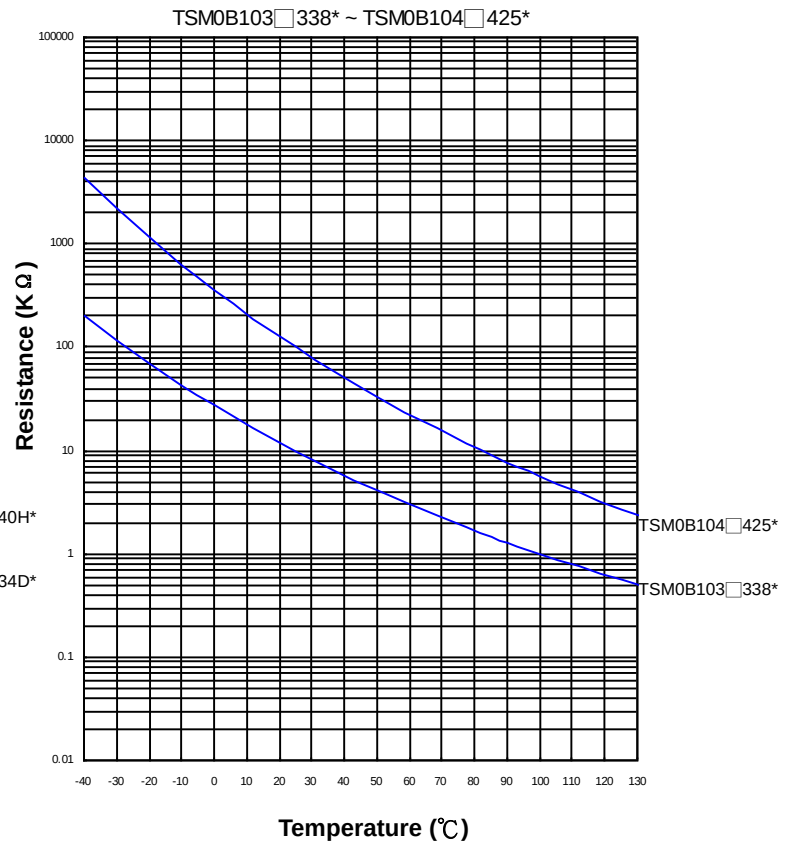
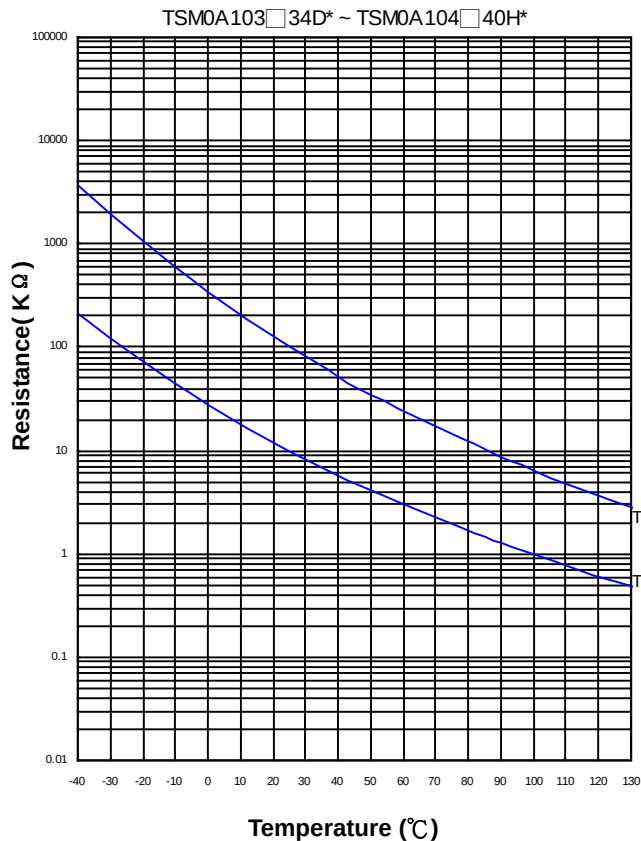
For example:

Ambient temperature (T_a) = 55 $^{\circ}\text{C}$

Maximum operating temperature (T_U) = 150 $^{\circ}\text{C}$

$P_{Ta} = (T_U - T_a) / (T_U - 25) \times P_{max} = 76\% P_{max}$

■ R-T Characteristic Curves



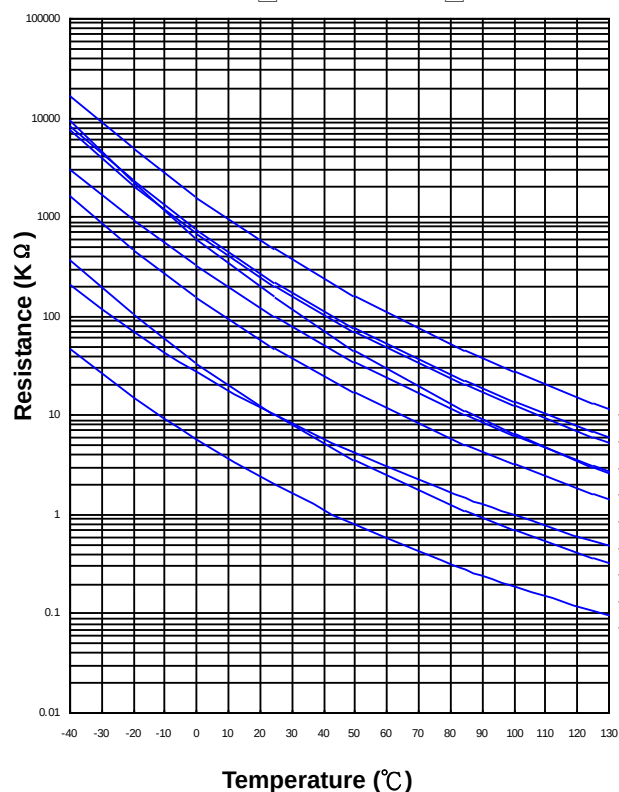
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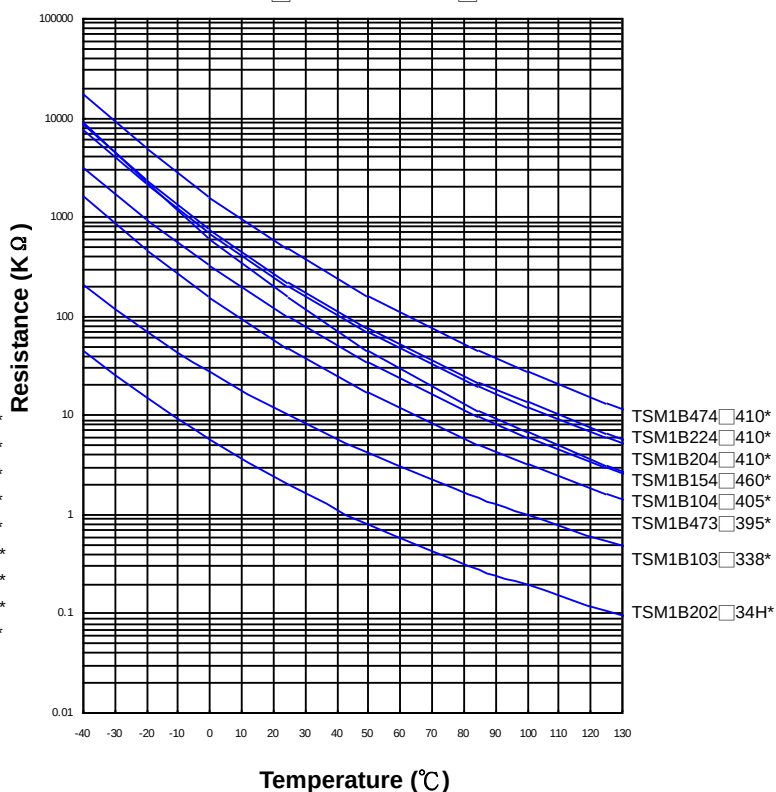


R-T Characteristic Curves

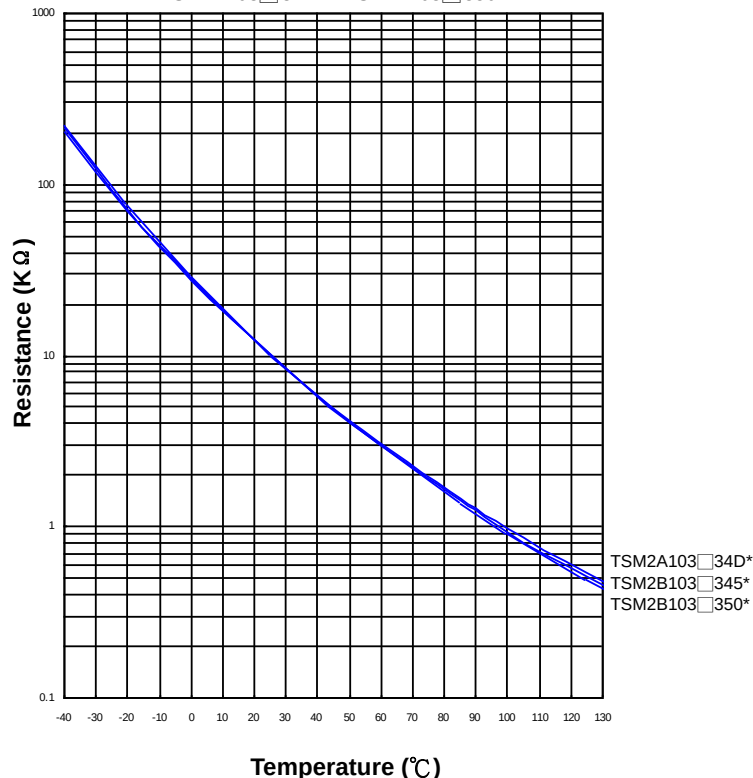
TSM1A202□350* ~ TSM1A474□415*



TSM1B202□34H* ~ TSM1B474□410*



TSM2A103□34D* ~ TSM2B103□350*

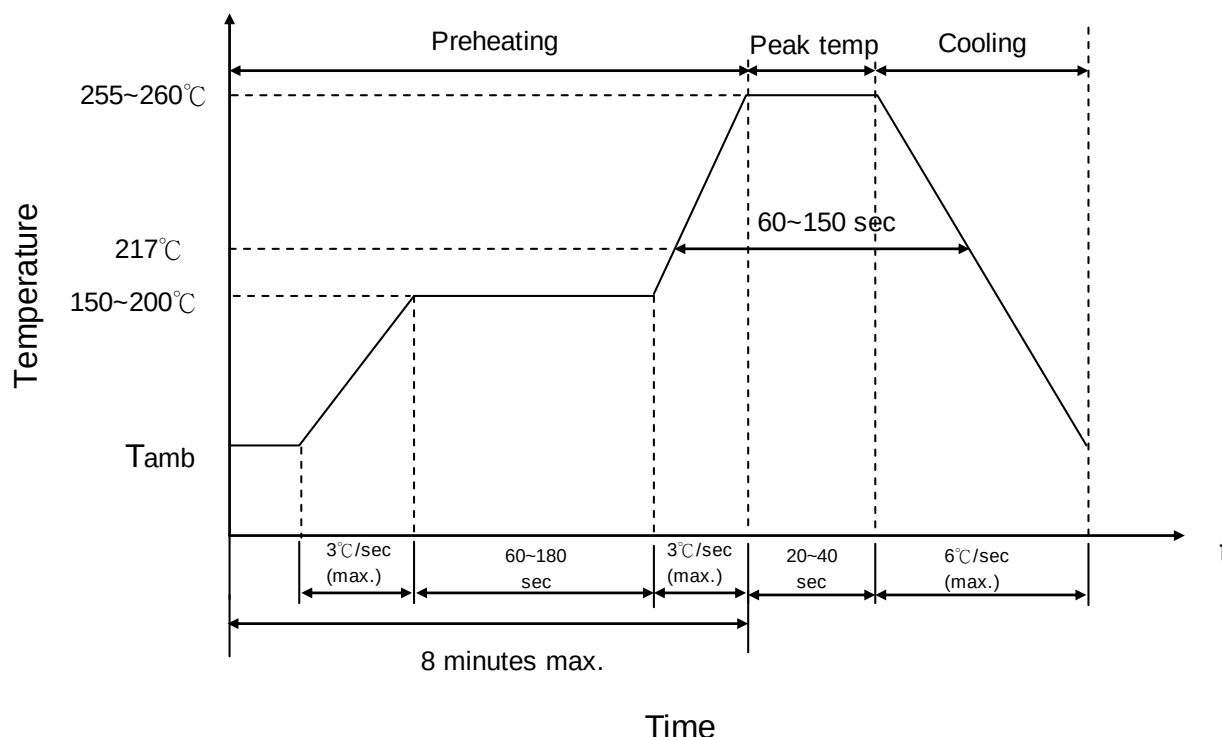


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- Soldering Recommendation
 - IR-Reflow Soldering Profile



- Recommended Reworking Conditions with Soldering Iron

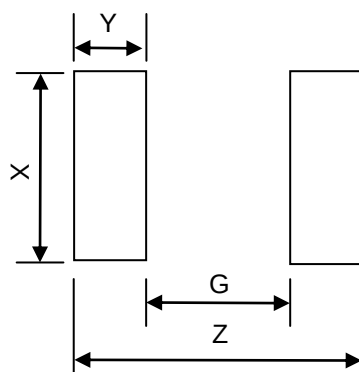
Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 sec. (max.)
Diameter of Soldering Iron-tip	Φ3mm (max.)
Caution: Please do not touch the component surface with soldering iron directly to avoid its damage.	

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■ Recommended Soldering Pad Dimensions



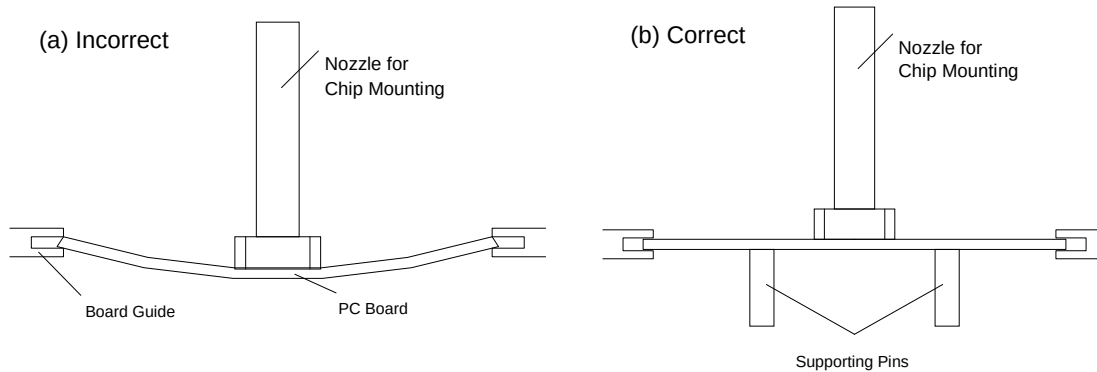
Size (EIA)	Z (mm)	G (mm)	X (mm)	Y (mm)
0402	1.7	0.5	0.6	0.6
0603	2.8	0.8	1.0	1.0
0805	3.4	1.0	1.4	1.2

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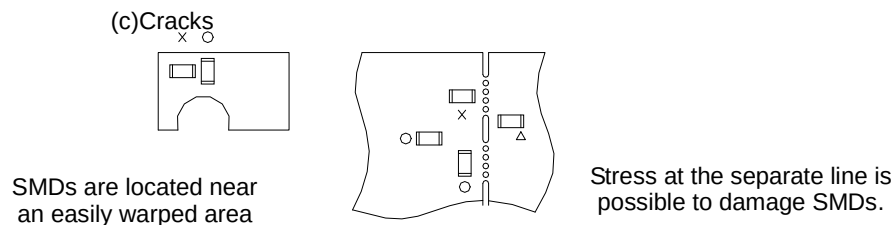
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■ Notice of Soldering and Mounting on PC Board

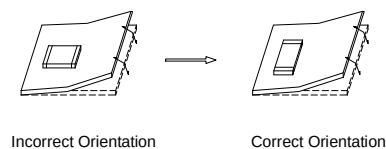


For mounting SMDs on a PC board, supporting pin is suggested for use (refer to figure b) to avoid cracks caused by external stress (refer to figure a).



If circuit bending is needed for PC board design, please refer to figure (c) for mounting positions to avoid cracks caused by stress imposed on the product. O means better, Δ is acceptable, and X is worst.

(d) Component Orientation



Locate SMDs horizontally to the direction that stress acts

During circuit bending, please locate SMDs horizontally to the direction in which stress act to avoid its cracks (refer to figure d).

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■ Reliability

Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp : 2mm Speed < 0.5mm/sec. Duration: 10 sec. on PCB 	No visible damage ΔR ₂₅ /R ₂₅ ≤ 5 %															
Solderability	IEC 60068-2-58	245 ± 5℃ , 3 ± 0.3 sec.	At least 95% of terminal electrode is covered by new solder															
Resistance to Soldering Heat	IEC 60068-2-58	260 ± 5℃ , 10 ± 1 sec.	No visible damage ΔR ₂₅ /R ₂₅ ≤ 3 %															
High Temperature Storage	IEC 60068-2-2	150 ± 5℃ , 1000 ± 24 hrs	No visible damage Δ R ₂₅ /R ₂₅ ≤ 5 %															
Damp Heat, Steady State	IEC 60068-2-78	40 ± 2℃ , 90~95% RH , 1000 ± 24 hrs	No visible damage ΔR ₂₅ /R ₂₅ ≤ 3 %															
Rapid Change of Temperature	IEC 60068-2-14	The conditions shown below shall be repeated 5 cycles on PCB. <table><tr><th>Step</th><th>Temperature (℃)</th><th>Period (minutes)</th></tr><tr><td>1</td><td>-40 ± 5</td><td>30 ± 3</td></tr><tr><td>2</td><td>Room temperature</td><td>5 ± 3</td></tr><tr><td>3</td><td>150 ± 5</td><td>30 ± 3</td></tr><tr><td>4</td><td>Room temperature</td><td>5 ± 3</td></tr></table>	Step	Temperature (℃)	Period (minutes)	1	-40 ± 5	30 ± 3	2	Room temperature	5 ± 3	3	150 ± 5	30 ± 3	4	Room temperature	5 ± 3	No visible damage ΔR ₂₅ /R ₂₅ ≤ 3 %
Step	Temperature (℃)	Period (minutes)																
1	-40 ± 5	30 ± 3																
2	Room temperature	5 ± 3																
3	150 ± 5	30 ± 3																
4	Room temperature	5 ± 3																
Max. Power Dissipation	IEC 60539-1 4.26.3	25 ± 5℃ , Pmax. , 1000 ± 24 hrs	No visible damage ΔR ₂₅ /R ₂₅ ≤ 5 %															

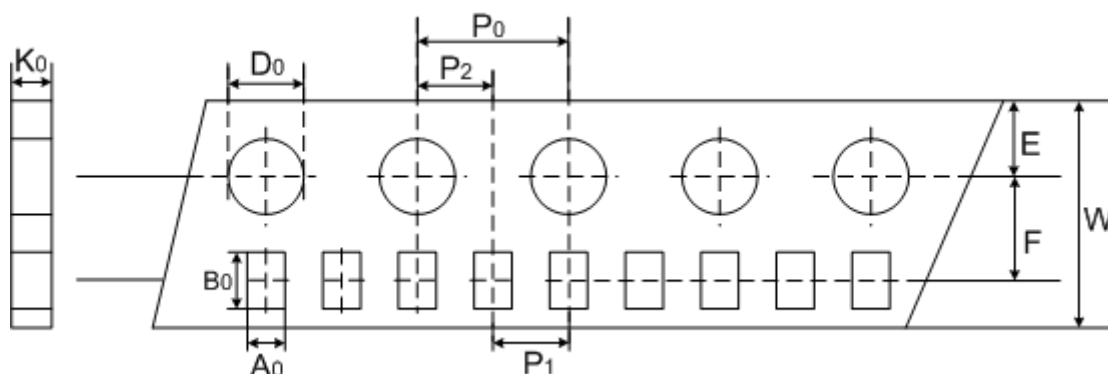
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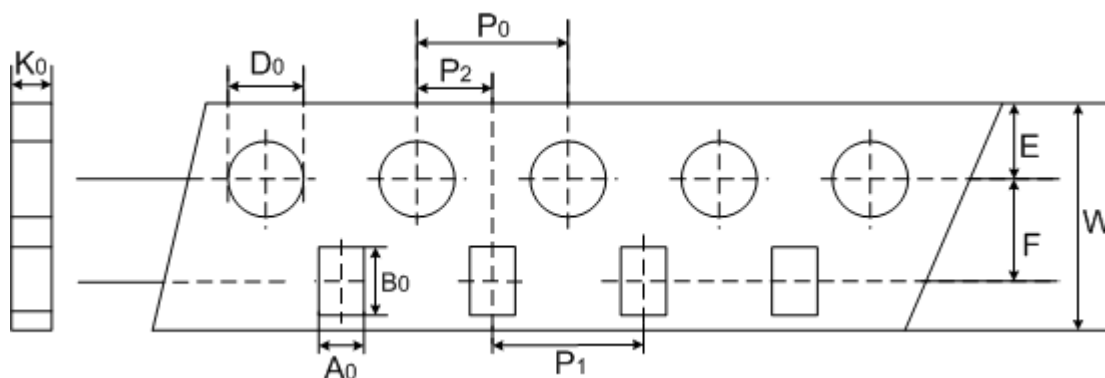
■ Packaging

● Taping Specification



(Unit: mm)

Index Size	A ₀	B ₀	W	E	F	P ₁	P ₂	P ₀	D ₀	K ₀
0402	±0.05	±0.12	±0.2	±0.1	±0.05	±0.1	±0.05	±0.1	±0.1	±0.1



(Unit: mm)

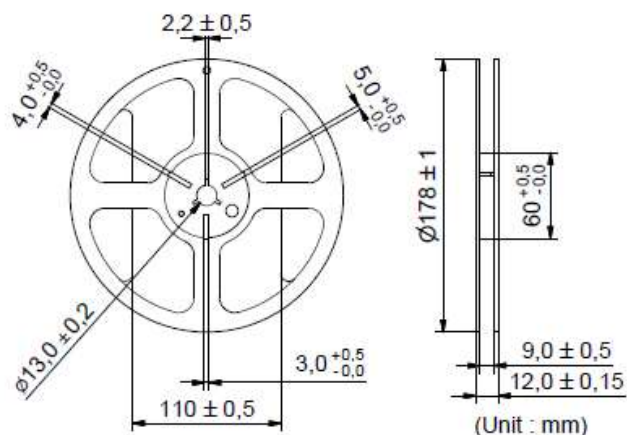
Index Size	A ₀	B ₀	W	E	F	P ₁	P ₂	P ₀	D ₀	K ₀
0603	±0.2	±0.2	±0.2	±0.1	±0.05	±0.1	±0.05	±0.1	±0.1	±0.1
0805	1.5	2.3	8	1.75	3.5	4	2	4	1.55	1.0

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■ Quantity



Size (EIA)	Quantity (pcs/reel)
0402	10,000
0603	4,000
0805	3,500

■ Warehouse Storage Conditions of Products

■ Storage Conditions :

1. Storage Temperature: $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
2. Relative Humidity: $\leq 75\% \text{RH}$
3. Keep away from corrosive atmosphere and sunlight.

■ Period of Storage : 1 year