

# NTC Thermistor: TSM type

## SMD Thermistor for Temperature Sensing



### ■ Features

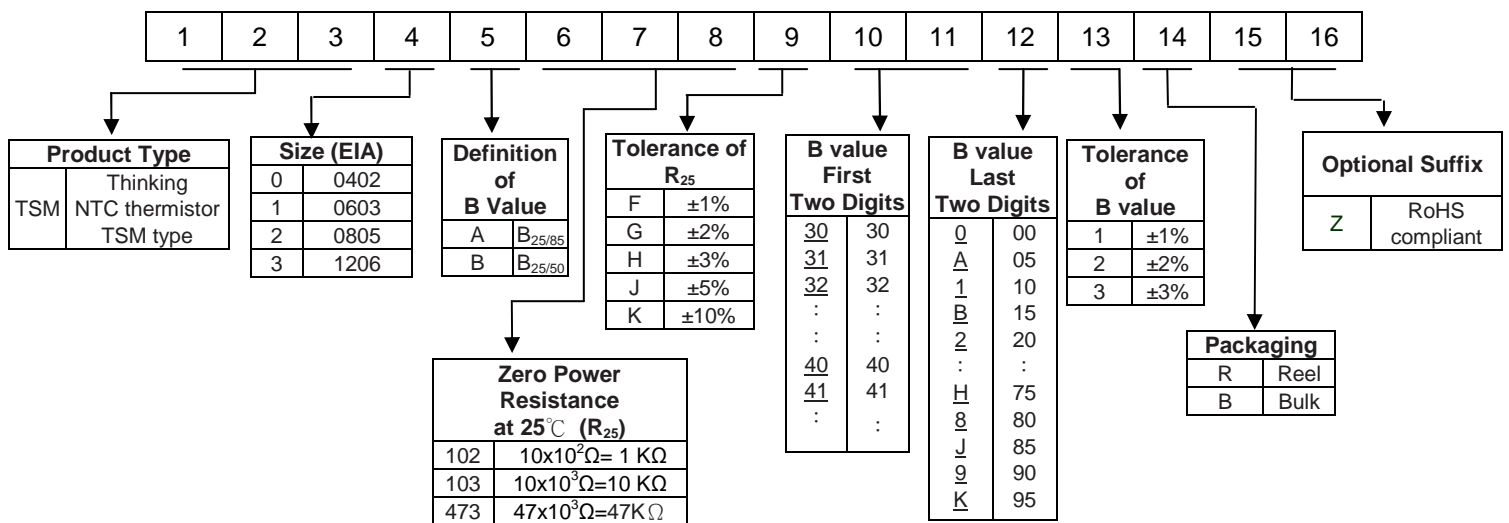
1. RoHS compliant
2. EIA size 0402, 0603, 0805, 1206
3. Highly reliable structure
4. -40 ~ +125°C operating temperature range
5. Wide resistance range
6. Cost effective
7. Agency recognition: UL



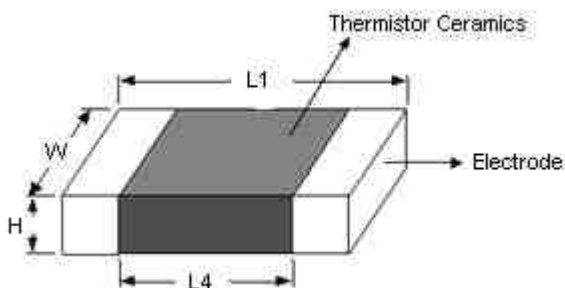
### ■ Recommended Applications

1. Battery pack
2. Mother board/notebook PC
3. Liquid crystal display
4. Cellular phones
5. Bluetooth headset

### ■ Part Number Code



### ■ Structure and Dimensions



(Unit:mm)

Part No.	Size	L1.	W	H max.	L4 min
TSM0	0402	1.00±0.15	0.50±0.10	0.60	0.25
TSM1	0603	1.60±0.15	0.80±0.15	0.95	0.35
TSM2	0805	2.00±0.20	1.25±0.20	1.20	0.50
TSM3	1206	3.20±0.30	1.60±0.20	1.50	1.40

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### Electrical Characteristics

Part No.	Zero Power Resistance at 25°C	Tolerance of R <sub>25</sub>	B Value		Tolerance of B value	Max. Power Rating at 25°C	Dissipation Factor	Thermal Time Constant	Operating Temperature Range	Safety Approvals									
	R <sub>25</sub> (KΩ)	(±%)	(K)		(±%)	P <sub>max</sub> (mW)	δ(mW/°C)	τ(Sec.)	T <sub>L</sub> ~T <sub>U</sub> (°C)	UL									
TSM0A103□34D*	10	1、2、3 5、10	25/85	3435	1、2、3	170	Approx. 1.7	Approx. 2	-40 ~ +125										
TSM0A103□391*	10			3910															
TSM0A223□393*	22			3930															
TSM0A333□393*	33			3930															
TSM0A473□393*	47			3930															
TSM0A503□395*	50			3950															
TSM0A683□405*	68			4050															
TSM0A104□39H*	100			3975															
TSM0A224□405*	220			4050															
TSM0A474□409*	470			4090															
TSM0B474□470*	470			5、10						25/50	4700	2、3							
TSM1A202□340*	2	1、2、3、 5、10	25/85	3400	1、2、3	210	Approx 2.1	Approx 3.1	-40~+125										
TSM1A222□34D*	2.2			3435															
TSM1B222□395*	2.2			3950						2、3									
TSM1A472□34D*	4.7	1、2、3、 5、10	25/85	3435	1、2、3									√					
TSM1A472□367*	4.7			3670								√							
TSM1A502□34D*	5			3435								√							
TSM1A682□34D*	6.8			3435															
TSM1A682□430*	6.8	5、10		4300	2、3														
TSM1A103□34D*	10	1、2、3、 5、10	25/85	3435	1、2、3									√					
TSM1A103□39H*	10			3975								√							
TSM1B103□425*	10			25/50						4250	2、3								
TSM1A123□380*	12			1、2、3、 5、10						25/85	3800	1、2、3							
TSM1A153□395*	15										3950								
TSM1A223□39H*	22										3975								
TSM1A333□39H*	33										3975								
TSM1A473□39H*	47										3975				√				
TSM1A503□39H*	50										3975				√				
TSM1A683□39H*	68										3975								
TSM1A104□405*	100										4050				√				
TSM1B104□425*	100	25/50	4250		2、3														
TSM1A104□436*	100	1、2、3、 5、10	25/85		4360						1、2、3						√		
TSM1A154□406*	150				4060										√				
TSM1A204□410*	200			4100								√							
TSM1A224□410*	220			4100								√							
TSM1A334□415*	330			4150															
TSM1A474□410*	470			4100															
TSM1B474□446*	470			25/50	4460					2、3									
TSM2A102□320*	1			1、2、3、 5、10	25/85					3200		1、2、3	240	Approx 3.2	Approx 5.4	-40~+125	√		
TSM2A472□34D*	4.7									3435									
TSM2A502□34D*	5									3435									
TSM2A682□34D*	6.8									3435									
TSM2A103□34D*	10	3435					√												
TSM2A103□380*	10	3800					√												
TSM2A103□39H*	10	3975					√												
TSM2A153□395*	15	3950																	
TSM2A203□395*	20	3950																	
TSM2A223□380*	22	3800																	
TSM2A223□39H*	22	3975																	
TSM2A303□39H*	30	3975																	
TSM2A473□39H*	47	3975					√												
TSM2A503□39H*	50	3975					√												
TSM2A683□39H*	68	3975																	

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### Electrical Characteristics

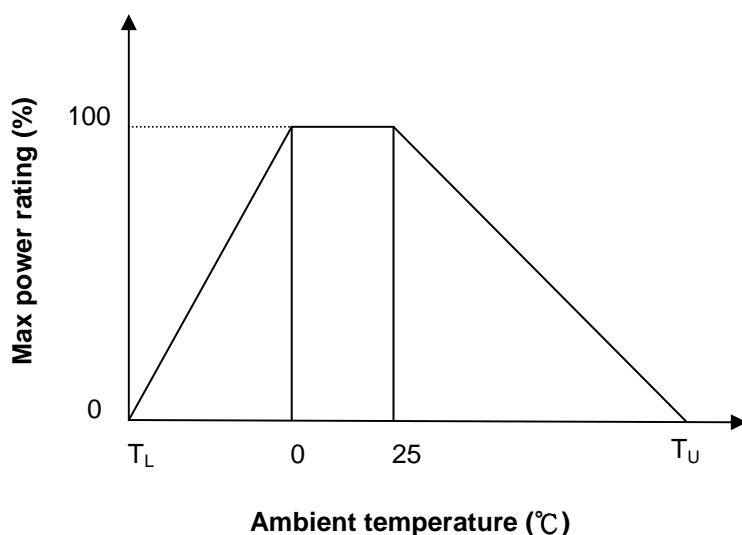
Part No.	Zero Power Resistance at 25°C	Tolerance of R <sub>25</sub>	B Value	Tolerance of B value	Max. Power Rating at 25°C	Dissipation Factor	Thermal Time Constant	Operating Temperature Range	Safety Approvals	
	R <sub>25</sub> (KΩ)	(±%)	(K)	(±%)	P <sub>max</sub> (mW)	δ(mW/°C)	τ(Sec.)	T <sub>L</sub> ~T <sub>U</sub> (°C)	UL	
TSM2A104□405*	100	1、2、3、5、10	25/85	4050	1、2、3	240	Approx 3.2	Approx 5.4	-40~+125	√
TSM2A204□410*	200			4100						√
TSM2A224□410*	220			4100						√
TSM3A472□34D*	4.7	1、2、3、5、10	25/85	3435	1、2、3	320	Approx 3.2	Approx 6.7	-40~+125	
TSM3A502□34D*	5			3435						
TSM3A103□34D*	10			3435						
TSM3A103□39H*	10			3975						
TSM3A223□39H*	22			3975						
TSM3A473□39H*	47			3975						
TSM3A503□39H*	50			3975						
TSM3A683□39H*	68			3975						
TSM3A104□405*	100			4050						
TSM3A204□410*	200			4100						
TSM3A224□410*	220			4100						
TSM3A474□425*	470			4250						

Note 1: □ = Tolerance of R<sub>25</sub>

Note 2: \* = Tolerance of B value

\*Special specification are available upon request

### Power Derating Curve



T<sub>U</sub> : Maximum operating temperature (°C)

T<sub>L</sub> : Minimum operating temperature (°C)

For example : Ambient temperature(T<sub>a</sub>)=55°C

Maximum operating temperature(T<sub>U</sub>)=125°C

$P_{Ta} = (T_U - T_a) / (T_U - 25) \times P_{max} = 70\% P_{max}$

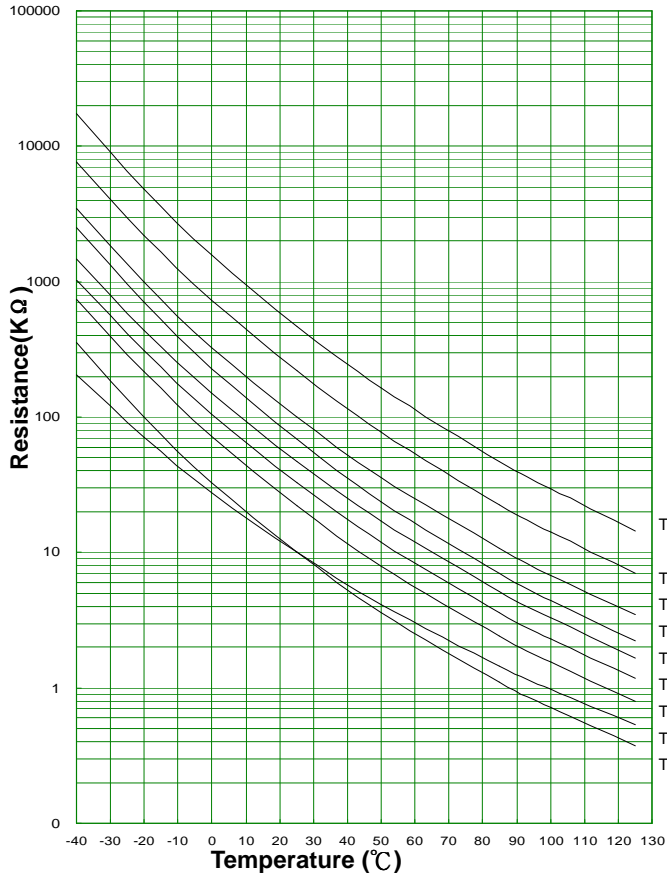
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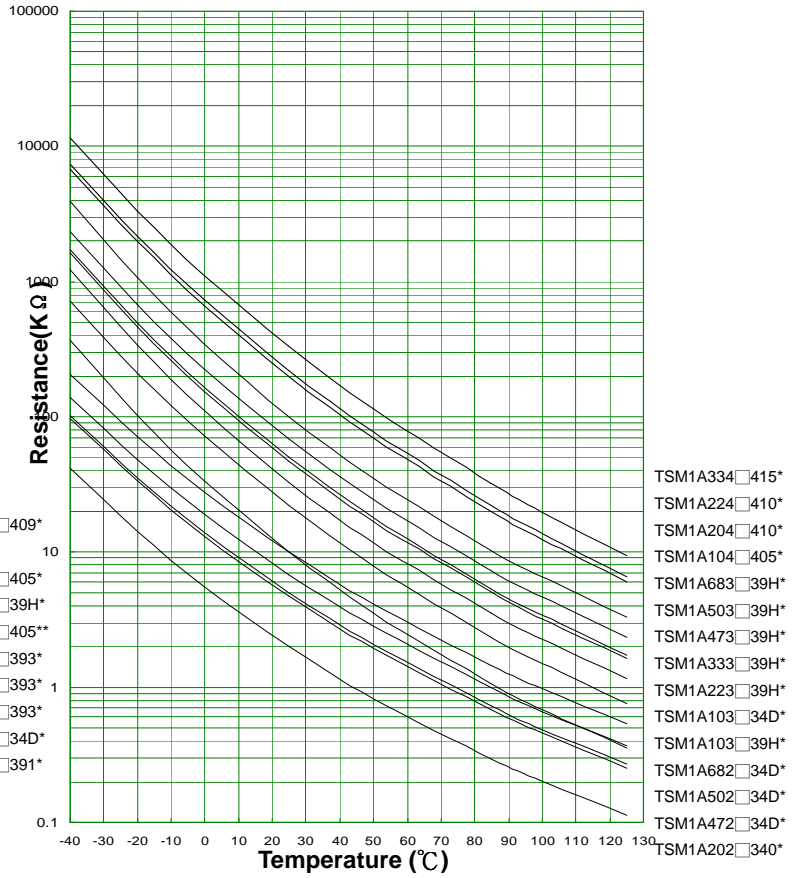


### ■ R-T Characteristic Curves (representative)

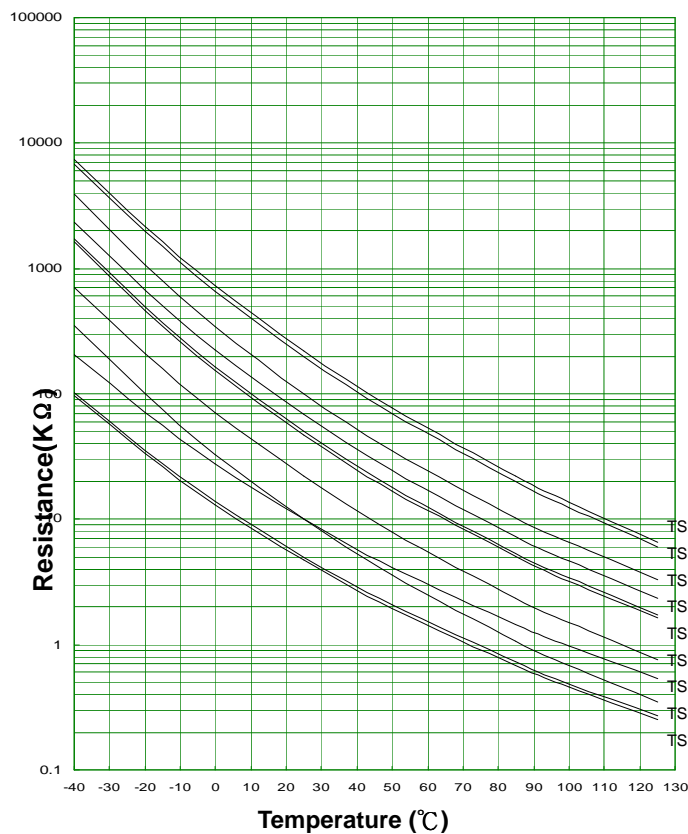
TSM0A103□391\* ~ TSM0A474□409\*



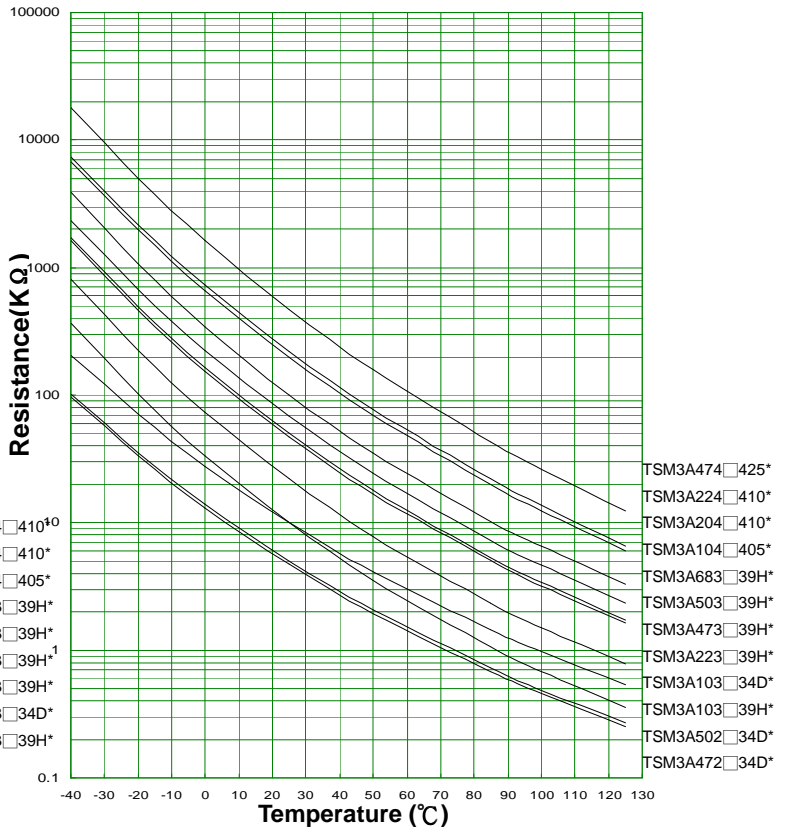
TSM1A202□340\* ~ TSM1A334□415\*



TSM2A472□34D\* ~ TSM2A224□410\*



TSM3A472□34D\* ~ TSM3A474□425\*



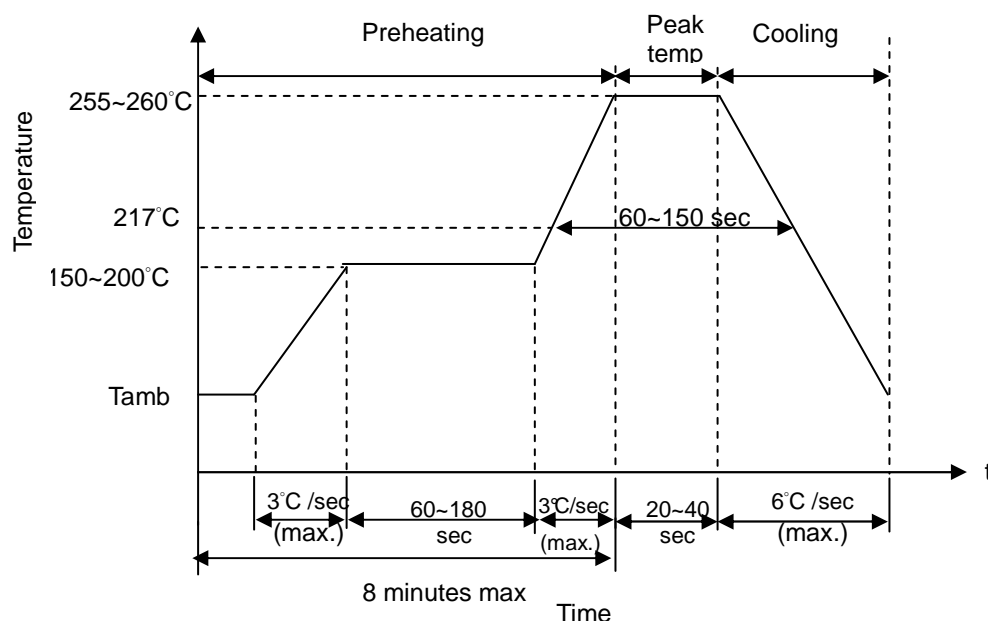
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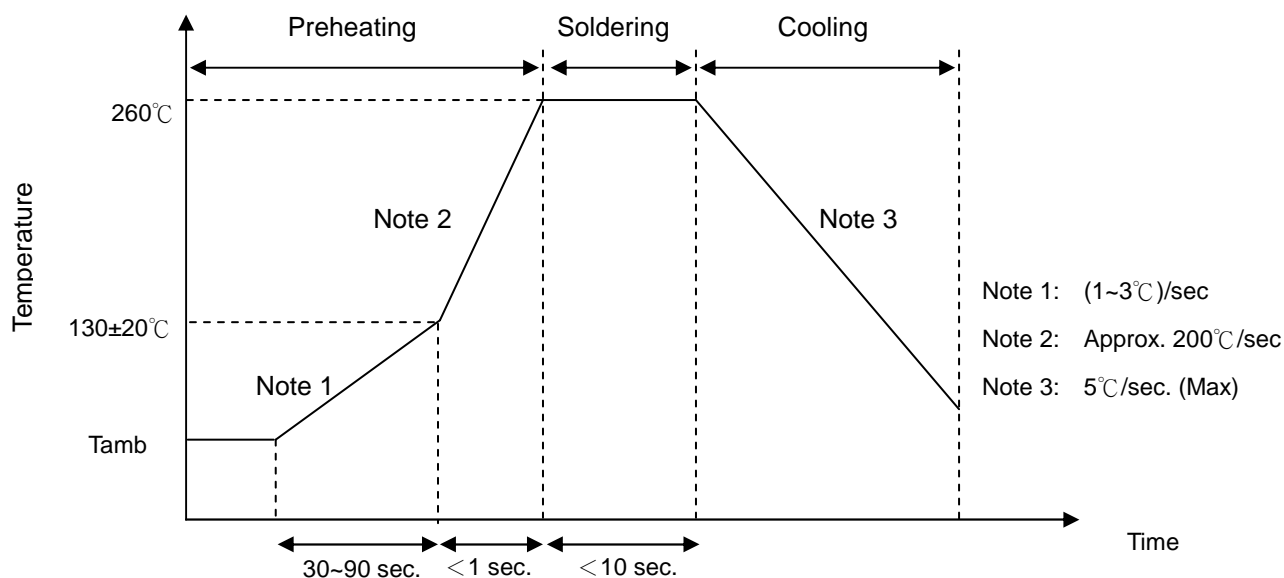


### ■ Soldering Recommendation

#### ● IR-reflow Soldering Profile



#### ● Wave Flow Soldering Profile



#### ● Reworking Conditions with Soldering Iron

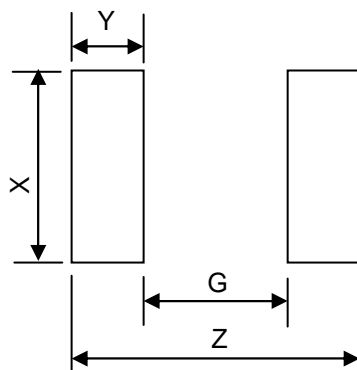
Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 sec (max.)
Diameter of Soldering Iron-tip	Φ3mm (max.)

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### ■ Recommended Soldering Pad Dimensions



Size	Z (mm)	G (mm)	X (mm)	Y (mm)
0402	2.1~2.2	0.4~0.5	0.6~0.7	0.9~1.0
0603	2.7~2.8	0.6~0.7	0.9~1.0	1.0~1.1
0805	3.1~3.2	0.6~0.7	1.4~1.5	1.2~1.3
1206	4.3~4.4	1.2~1.3	1.7~1.8	1.5~1.6

Followed Standard:IPC-SM-782A

### ■ Reliability

Item	Standard	Test conditions / Methods	Specifications															
Solderability	IEC60068-2-20	235 ± 5°C , 2 ± 0.5 sec.	At least 95% of terminal electrode is covered by new solder															
Resistance to Soldering Heat	IEC60068-2-20	260 ± 5°C , 10 ± 1 sec.	No visible damage   ΔR <sub>25</sub> /R <sub>25</sub>   ≤ 3 %															
High Temperature Storage	IEC60068-2-2	125 ± 5°C , 1000 ± 24 hrs	No visible damage   ΔR <sub>25</sub> /R <sub>25</sub>   ≤ 5 %															
Damp Heat, Steady State	IEC60068-2-3	40 ± 2°C , 90~95% RH , 1000 ± 24 hrs	No visible damage   ΔR <sub>25</sub> /R <sub>25</sub>   ≤ 3 %															
Rapid Change of Temperature	IEC60068-2-14	The conditions shown below shall be repeated 5 cycles , on PCB <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <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>125 ± 5</td> <td>30 ± 3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>5 ± 3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-40 ± 5	30 ± 3	2	Room temperature	5 ± 3	3	125 ± 5	30 ± 3	4	Room temperature	5 ± 3	No visible damage   ΔR <sub>25</sub> /R <sub>25</sub>   ≤ 3 %
Step	Temperature (°C)	Period (minutes)																
1	-40 ± 5	30 ± 3																
2	Room temperature	5 ± 3																
3	125 ± 5	30 ± 3																
4	Room temperature	5 ± 3																
Life Test	IEC 60539-1	25 ± 5°C, Pmax. , 1000 ± 24 hrs	No visible damage   ΔR <sub>25</sub> /R <sub>25</sub>   ≤ 5 %															

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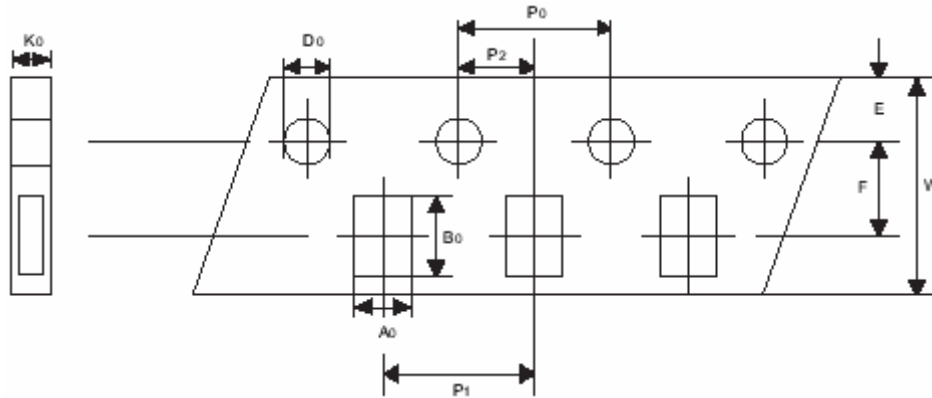
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### Package

#### ● Taping Specification

##### ◆ 0402 & 0603 & 0805 type



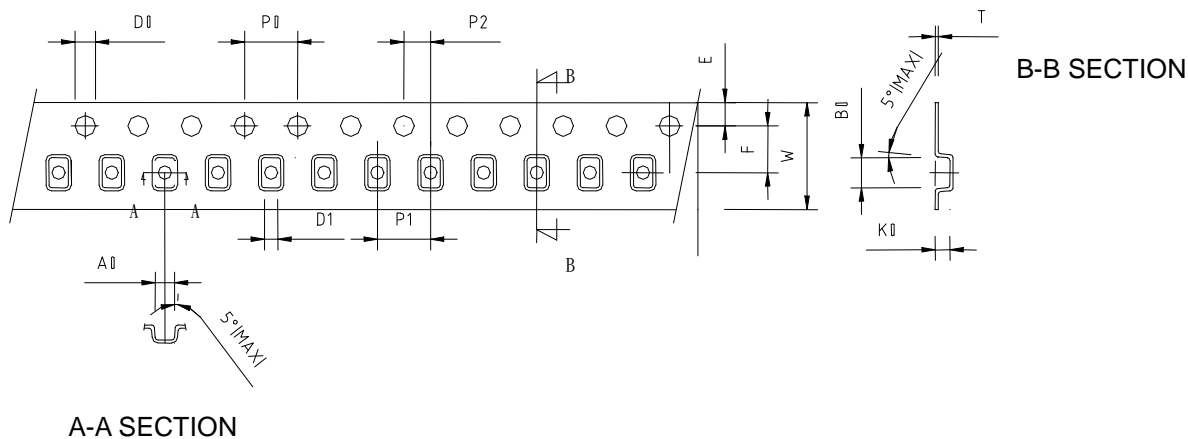
(Unit: mm)

Index Type	A <sub>0</sub>	B <sub>0</sub>	W	E	F	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	K <sub>0</sub>
0402	±0.05	±0.12	±0.2	±0.1	±0.05	±0.1	±0.05	±0.1	±0.1	±0.1

(Unit: mm)

Index Type	A <sub>0</sub>	B <sub>0</sub>	W	E	F	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	K <sub>0</sub>
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	0.95

##### ◆ 1206 type



A-A SECTION

B-B SECTION

(Unit: mm)

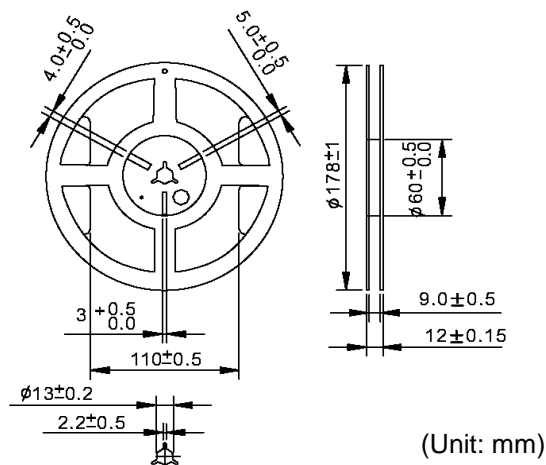
Type	Index	A <sub>0</sub>	B <sub>0</sub>	W	E	F	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D <sub>0</sub>	D <sub>1</sub>	T
1206		±0.2	±0.2	±0.2	±0.1	±0.05	±0.1	±0.05	±0.1	±0.1	±0.1	±0.1

# NTC Thermistor: TSM type

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### ■ Quantity



Type	Quantity (pcs/reel)
0402	10000
0603	4000
0805	3500
1206	2500

### ■ 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