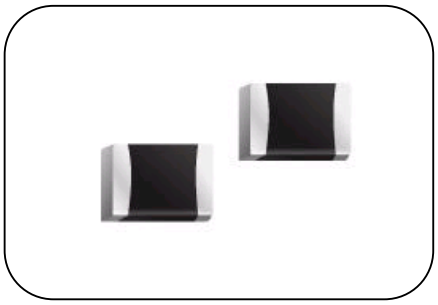
NTC Thermistor： TSM Series

SMD Type NTC Thermistor for Temperature Sensing

■ Features



1. RoHS & Halogen Free (HF) compliant
2. EIA size: 0201, 0402, 0603, 0805
3. Highly reliable structure
4. Operating temperature range: -40 ~ +125 ℃
5. Wide resistance range
6. Cost effective
7. Agency recognition: UL/cUL/TUV

■ Recommended Applications

1. Battery pack
2. Motherboard, notebook and personal computer device
3. Liquid crystal display
4. Cellular phone
5. Bluetooth headset
6. W-Fi module

■ Part Number Code

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Product Type

TSM	THINKING NTC Thermistor TSM Series

Size (EIA)

A	0201
0	0402
1	0603
2	0805

Definition of B Value

A	$B_{25/85}$
B	$B_{25/50}$

Zero Power Resistance at 25℃ (R_{25})

102	$10x10^2\Omega$= 1 KΩ
103	$10x10^3\Omega$=10 KΩ
473	$47x10^3\Omega$=47KΩ

Tolerance of R_{25}

F	±1%
G	±2%
H	±3%
J	±5%
K	±10%

First Two Digits of B Value

30	30
31	31
32	32
:	:
:	:
40	40
41	41
:	:

Last Two Digits of B Value

0	00
A	05
1	10
B	15
2	20
:	:
H	75
8	80
J	85
9	90
K	95

Tolerance of B Value

1	±1%
2	±2%
3	±3%

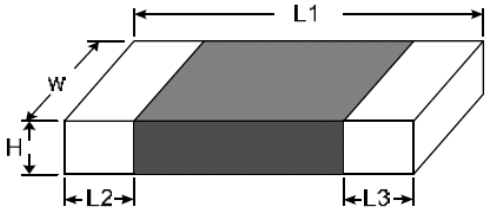
Optional Suffix

Z	RoHS & HF Compliant

Packaging

R	Reel
B	Bulk

■ Structure and Dimensions



(Unit: mm)

Part No.	Size	L1.	W	H max.	L2 & L3
TSMA	0201	0.60±0.05	0.30±0.05	0.35	0.15±0.05
TSM0	0402	1.00±0.15	0.50±0.10	0.60	0.20±0.10
TSM1	0603	1.60±0.15	0.80±0.15	0.95	0.40±0.15
TSM2	0805	2.00±0.20	1.25±0.20	1.20	0.40±0.20

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■ Electrical Characteristics

Part No.	Size	Zero Power Resistance at 25℃	Tolerance of R_{25}	B Value		Tolerance of B value	Max. Power Dissipation at 25℃	Dissipation Factor	Thermal Time Constant	Operating Temperature Range	Safety Approvals	
											UL/ cUL	TUV
		R_{25}(KΩ)	(±%)	(K)		(±%)	P_{max}(mW)	δ(mW/℃)	τ(Sec.)	T_L~T_U(℃)		
TSMAB103□338*	0201	10	1, 2, 3, 5, 10	25/50	3380	1, 2, 3	140	Approx. 1.4	Approx. 1.2	-40 ~ +125	√	√
TSMAB683□425*		68			4250						√	√
TSMAB104□425*		100			4250						√	√
TSM0A103□34D*	0402	10	1, 2, 3, 5, 10	25/85	3435	1, 2, 3	170	Approx. 1.7	Approx. 2.0	-40 ~ +125	√	√
TSM0A103□395*		10			3950						√	√
TSM0A223□395*		22			3950						√	√
TSM0A333□405*		33			4050						√	√
TSM0A683□410*		68			4100						√	√
TSM0A104□405*		100			4050						√	√
TSM0A104□436*		100			4360						√	√
TSM0B103□338*		10		25/50	3380						√	√
TSM0B473□405*		47			4050						√	√
TSM0B104□354*		100			3540						√	√
TSM0B104□480*		100			4800						√	√
TSM0B224□470*		220			4700						√	√
TSM0B474□470*		470	5, 10		4700	3					√	√
TSM1A202□340*	0603	2	1, 2, 3, 5, 10	25/85	3400	1, 2, 3	210	Approx 2.1	Approx 3.1	-40~+125	√	√
TSM1A472□34D*		4.7			3435						√	√
TSM1A472□370*		4.7			3700						√	√
TSM1A502□34D*		5			3435						√	√
TSM1A502□385*		5			3850						√	√
TSM1A682□34D*		6.8			3435						√	√
TSM1A682□395*		6.8			3950						√	√
TSM1A103□34D*		10			3435						√	√
TSM1A103□39H*		10			3975						√	√
TSM1A103□430*		10	5, 10		4300	3					√	√
TSM1A223□392*		22	1, 2, 3, 5, 10		3920	1, 2, 3					√	√
TSM1A473□39H*		47			3975						√	√
TSM1A683□39H*		68			3975						√	√
TSM1A104□405*		100			4050						√	√
TSM1A104□436*		100			4360						√	√
TSM1A154□406*		150			4060						√	√
TSM1A204□410*		200			4100						√	√
TSM1A474□415*		470			4150						√	√
TSM1B221□350*		0.22	5, 10	25/50	3500	3					√	√
TSM1B222□395*		2.2			3950						√	√
TSM1B472□425*		4.7			4250						√	√
TSM1B103□338*		10	1, 2, 3, 5, 10		3380	1, 2, 3					√	√
TSM1B103□420*		10			4200						√	√
TSM1B104□355*		100			3550						√	√
TSM1B224□460*		220			4600						√	√
TSM2A 502□34D*	0805	5	1, 2, 3, 5, 10	25/85	3435	1, 2, 3	240	Approx 2.4	Approx 5.4	-40~+125	√	√
TSM2A103□34D*		10			3435						√	√
TSM2A103□395*		10			3950						√	√
TSM2A473□39H*		47			3975						√	√
TSM2A104□405*		100			4050						√	√
TSM2A684□450*		680	5, 10		4500	3					√	√

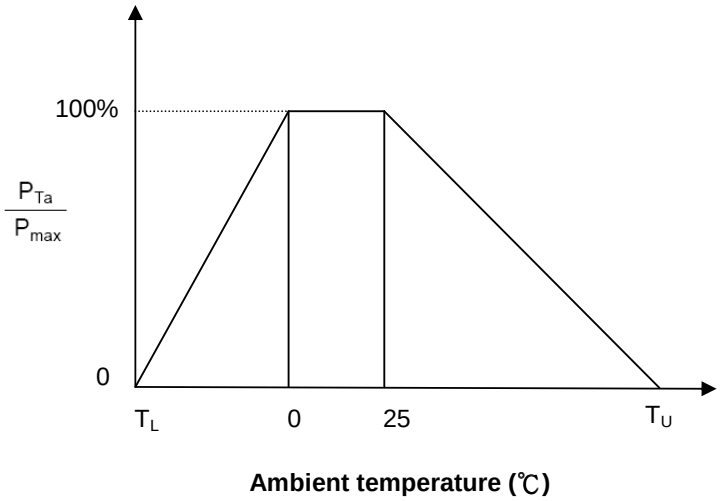
Note 1: □ = Tolerance of R_{25}

Note 2: * = Tolerance of B value

Note 3: UL&cUL File No. E138827 / TUV File No. R 50167657

*Special specifications are available upon request

■ Max. Power Dissipation Derating Curve



T_U：Maximum operating temperature (℃)

T_L：Minimum operating temperature (℃)

For example：

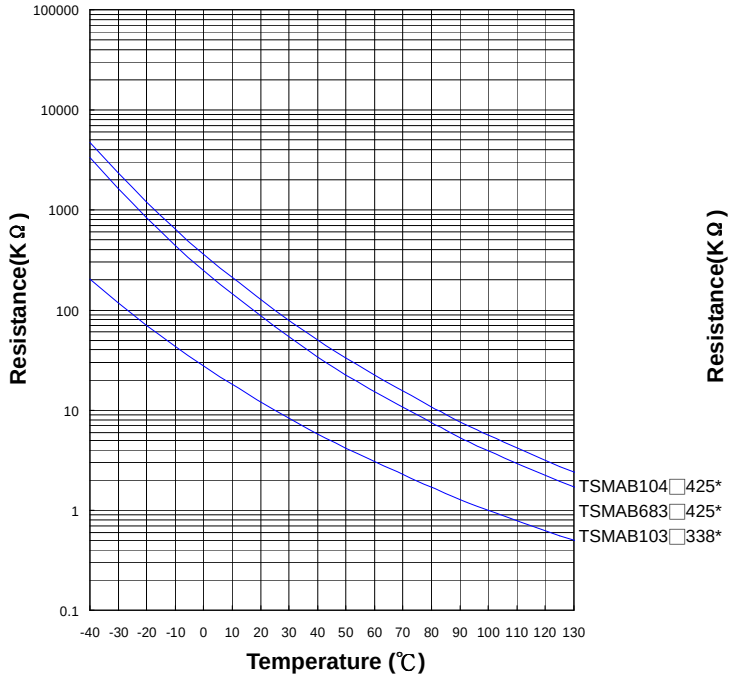
Ambient temperature (Ta)= 55℃

Maximum operating temperature (T_U)＝125℃

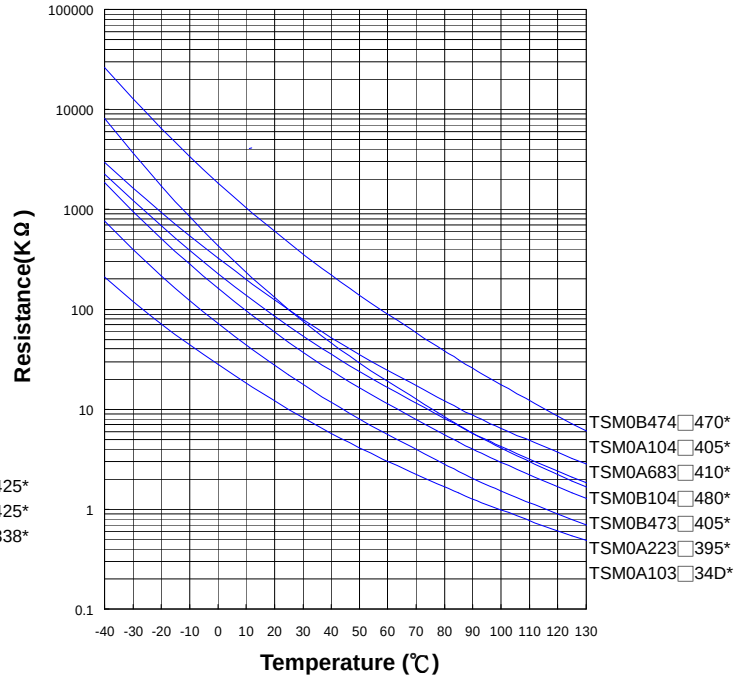
$P_{Ta}=(T_U-Ta)/(T_U-25)\times Pmax$＝70% Pmax

■ R-T Characteristic Curves

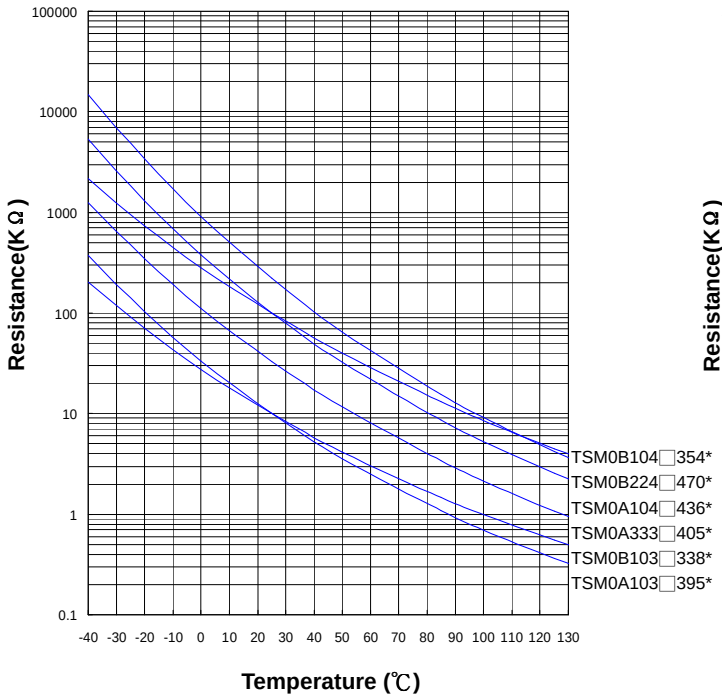
TSMAB103□338* ~ TSMAB104□425*



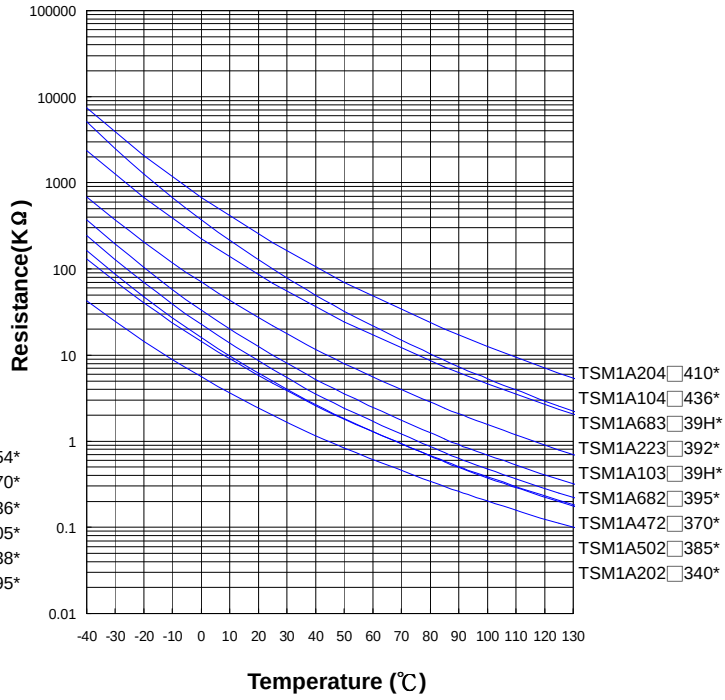
TSM0A103□34D* ~ TSM0B474□470*



TSM0B103□34D* ~ TSM0B224□470*



TSM1A202□340* ~ TSM1A204□410*



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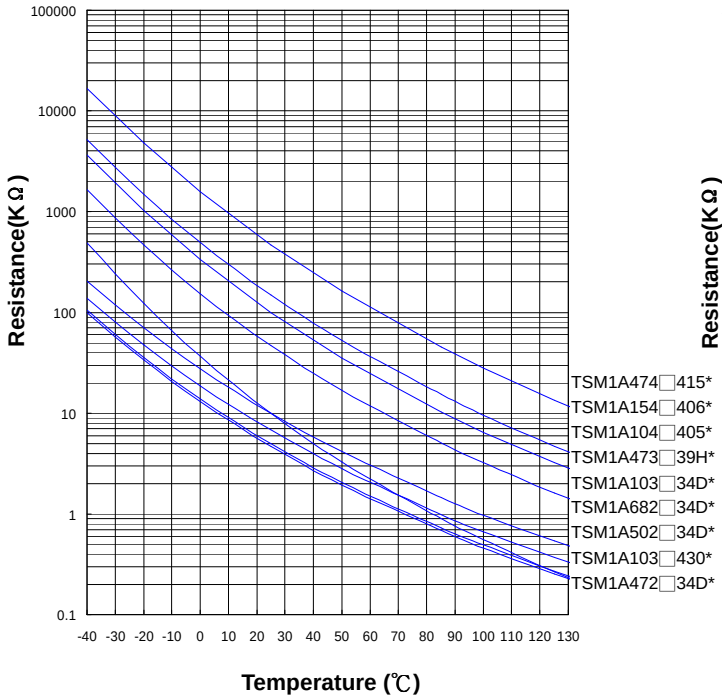
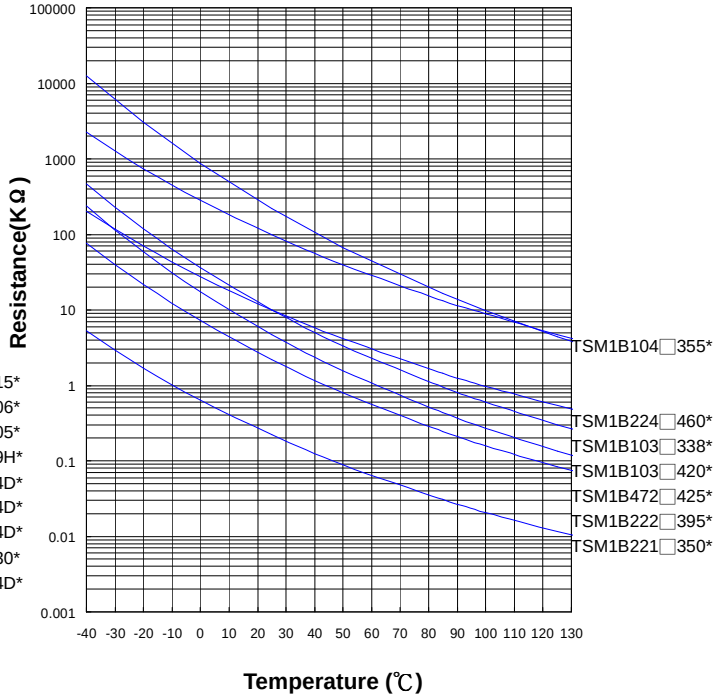
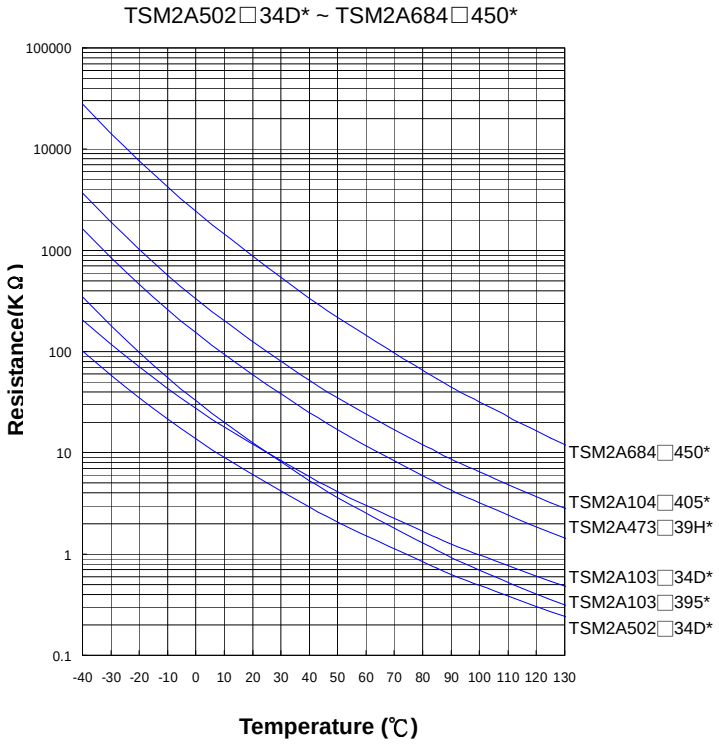
TSM1A472□34D* ~ TSM1A474□415*



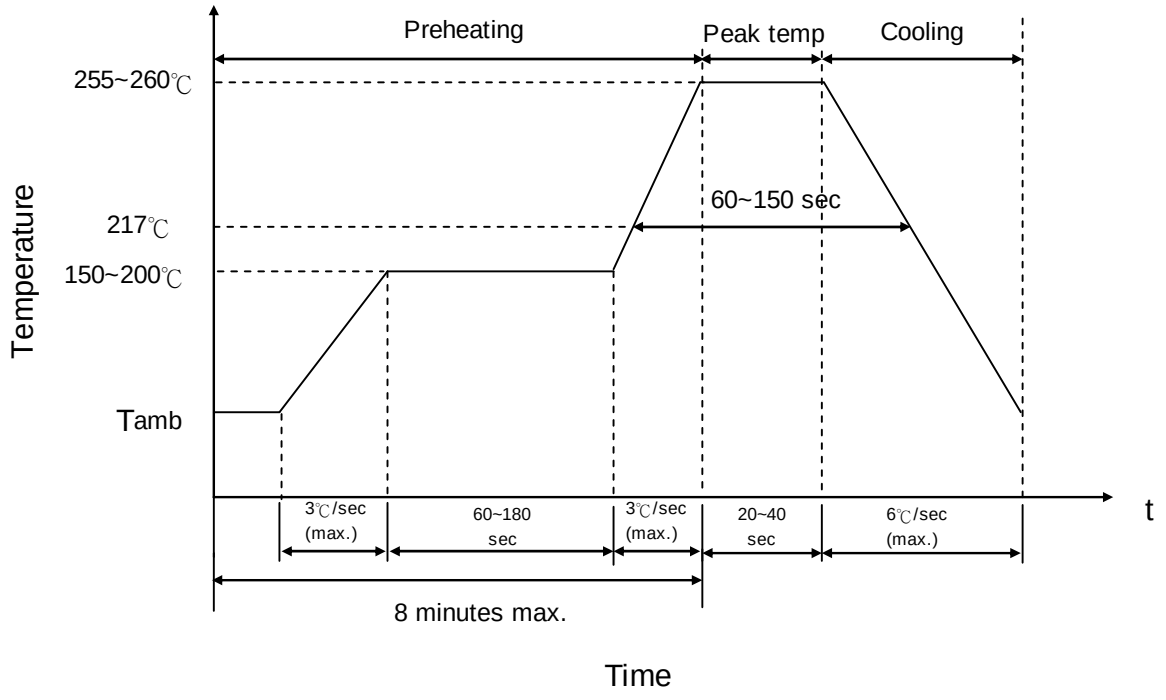
TSM1B221□350* ~ TSM1B224□460*





■ Soldering Recommendation

● IR-reflow Soldering Profile

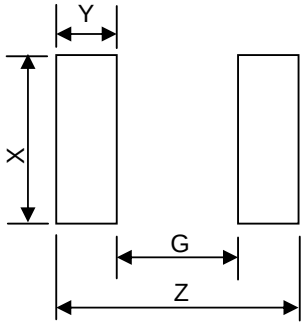


- **Recommended Reworking Conditions with Soldering Iron**

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

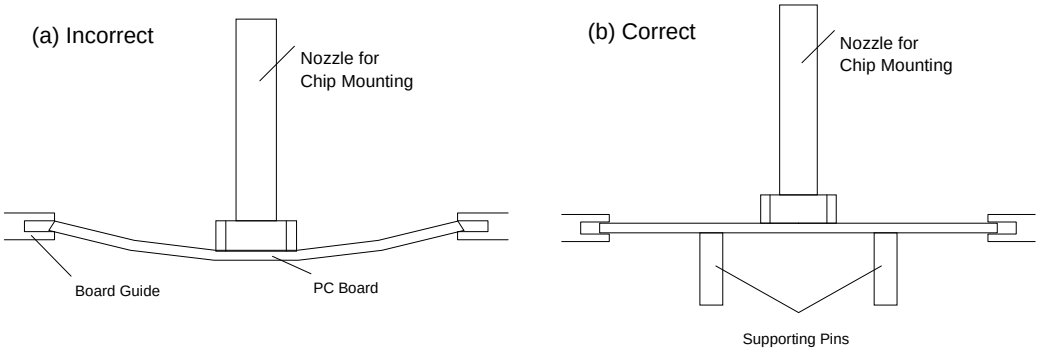
Caution: Do not touch the component surface with soldering iron directly to prevent it from damage.

■ **Recommended Soldering Pad Dimensions**

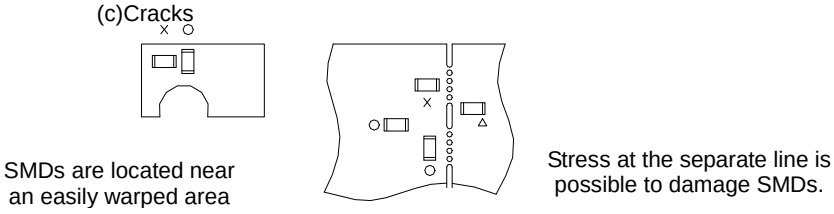


Size	Z (mm)	G (mm)	X (mm)	Y (mm)
0201	0.8	0.3	0.3	0.25
0402	1.7	0.5	0.6	0.6
0603	3.0	1.0	1.0	1.0
0805	3.4	1.0	1.4	1.2

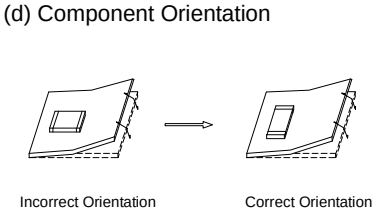
■ Notice of Soldering and Mounting on PC Board



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, △ is acceptable, and X is worst.



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).

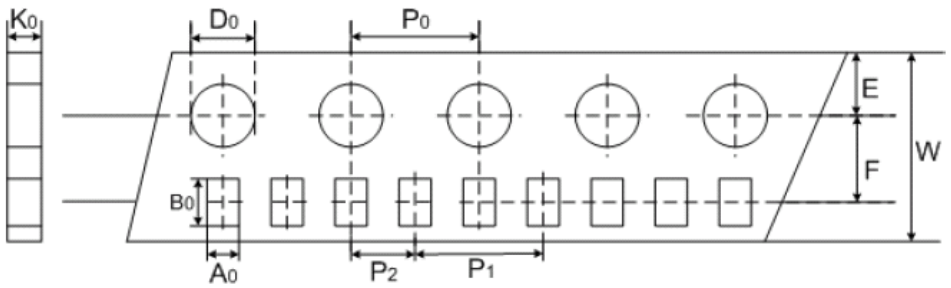
■ Reliability

Item	Standard	Test conditions / Methods	Specifications
Bending Strength	IEC 60068-2-21	Warp : 2mm for 0402,0603 and 0805 1mm for 0201 Speed ＜ 0.5mm/sec. Duration: 10 sec on PCB. 	No visible damage $\lvert \triangle R25/R25 \rvert \leqq 5\ \%$
Solderability	IEC60068-2-58	245 ± 5℃, 3 ± 0.3 sec	At least 95% of terminal electrode is covered by new solder
Resistance to Soldering Heat	IEC60068-2-58	260 ± 5℃, 10 ± 1 sec.	No visible damage $\lvert \triangle R_{25}/R_{25} \rvert \leqq 3\ \%$
High Temperature Storage	IEC60068-2-2	125 ± 5℃, 1000 ± 24 hrs	No visible damage $\lvert \triangle R_{25}/R_{25} \rvert \leqq 5\ \%$
Damp Heat, Steady State	IEC60068-2-3	40 ± 2℃, 90~95% RH , 1000 ± 24 hrs	No visible damage $\lvert \triangle R_{25}/R_{25} \rvert \leqq 3\ \%$
Rapid Change of Temperature	IEC60068-2-14	The conditions shown below shall be repeated 5 cycles on PCB. Step / Temperature (℃) / 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 $\lvert \triangle R_{25}/R_{25} \rvert \leqq 3\ \%$
Max. Power Dissipation	IEC 60539-1	25 ± 5℃, Pmax. , 1000 ± 24 hrs	No visible damage $\lvert \triangle R_{25}/R_{25} \rvert \leqq 5\ \%$

■ Package

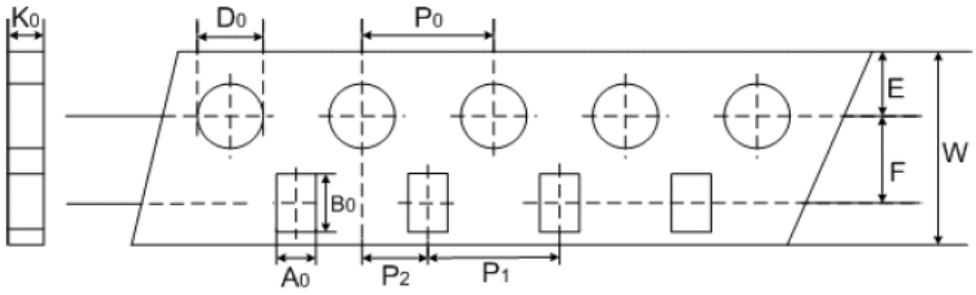
● Taping Specification

◆ 0201& 0402 & 0603 & 0805 type



(Unit: mm)

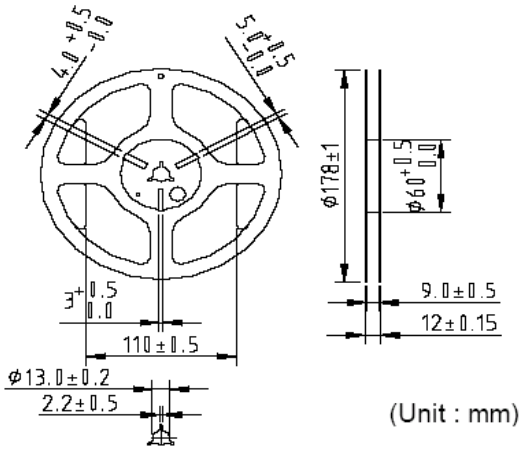
Type \ Index	A_0 ±0.05	B_0 ±0.12	W ±0.2	E ±0.1	F ±0.05	P_1 ±0.1	P_2 ±0.05	P_0 ±0.1	D_0 ±0.1	K_0 ±0.1
0201	0.38	0.68	8	1.75	3.5	4	2	4	1.55	0.38
0402	0.62	1.12	8	1.75	3.5	4	2	4	1.55	0.60



(Unit: mm)

Type \ Index	A_0 ±0.2	B_0 ±0.2	W ±0.2	E ±0.1	F ±0.05	P_1 ±0.1	P_2 ±0.05	P_0 ±0.1	D_0 ±0.1	K_0 ±0.1
0603	1.1	1.9	8	1.75	3.5	4	2	4	1.55	0.95
0805	1.5	2.3	8	1.75	3.5	4	2	4	1.55	0.95

■ Quantity



Type	Quantity (pcs/reel)
0201	15,000
0402	10,000
0603	4,000
0805	3,500

■ Storage Conditions of Products

- Storage Conditions :

  1. Storage Temperature: -10℃~+40℃
  2. Relative Humidity: ≦75%RH
  3. Keep away from corrosive atmosphere and sunlight.

- Period of Storage : 1 year