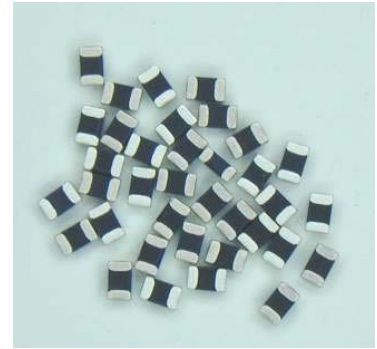




DESCRIPTION

The thermistor is a thermally sensitive resistor whose primary function is to exhibit a change in electrical resistance as the body temperature changed. NTC thermistor is one whose zero-power resistance will decrease when the body temperature increases.



FEATURES

- Multilayer structure allows diverse resistance values in the same B constant.
- Ultra small size, low capacitor, high B value.
- Glass coating performs for long-term reliability.
- Non-polarized for mounting.
- Possibility for Flow/Reflow soldering.

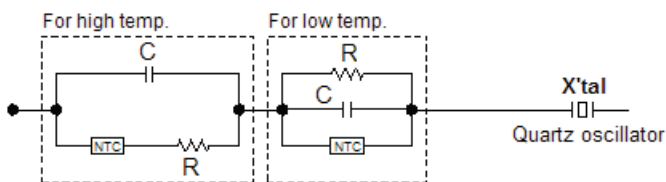
APPLICATIONS

- Temperature compensation for crystal oscillators (TCXO).
- Temperature compensation for personal computers.
- Temperature detection for CPU and memory devices.
- Temperature detection for battery packs.
- Temperature compensation for contrast of LCDs.
- Temperature compensation and sensing of car audio equipments. (CD, MD, tuner).

an example

● Temperature compensated crystal oscillator (TCXO)

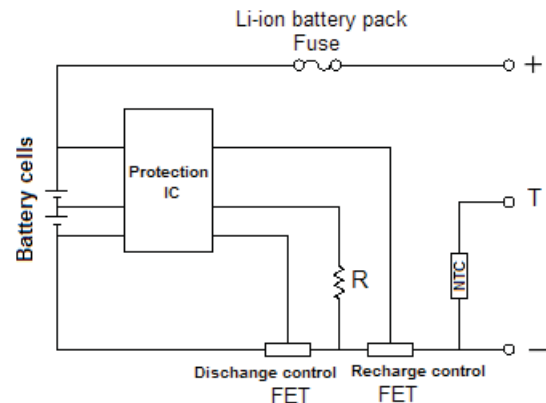
Chip thermistor is used for temperature compensation of TCXO, which is a key device for mobile phones.



Th1 : TC05-2S400J (40Ω, 2750K)
Th2 : TC05-4C302J (3KΩ, 4100K)

● Battery pack

Chip thermistor with high precision is used for the protection circuit inside the battery pack for mobile electronic devices.



BASIC CHARACTERISTICS

1. Zero-power Resistance of Thermistor

$$R = R_0 \exp B (1/T - 1/T_0) \text{ ----- (1)}$$

R : Resistance in ambient temperature T (K)
(K : absolute temperature)

R₀ : Resistance in ambient temperature T₀ (K)

B : B-constant of Thermistor

2. B-Constant

As eq. (1)

$$B = \ln (R/R_0) / (1/T - 1/T_0) \text{ ----- (2)}$$

3. Thermal Dissipation Constant

When it spends electric power P (mW) in ambient temperature T₁ and the thermistor temperature rises T₂, there is a relationship as follows

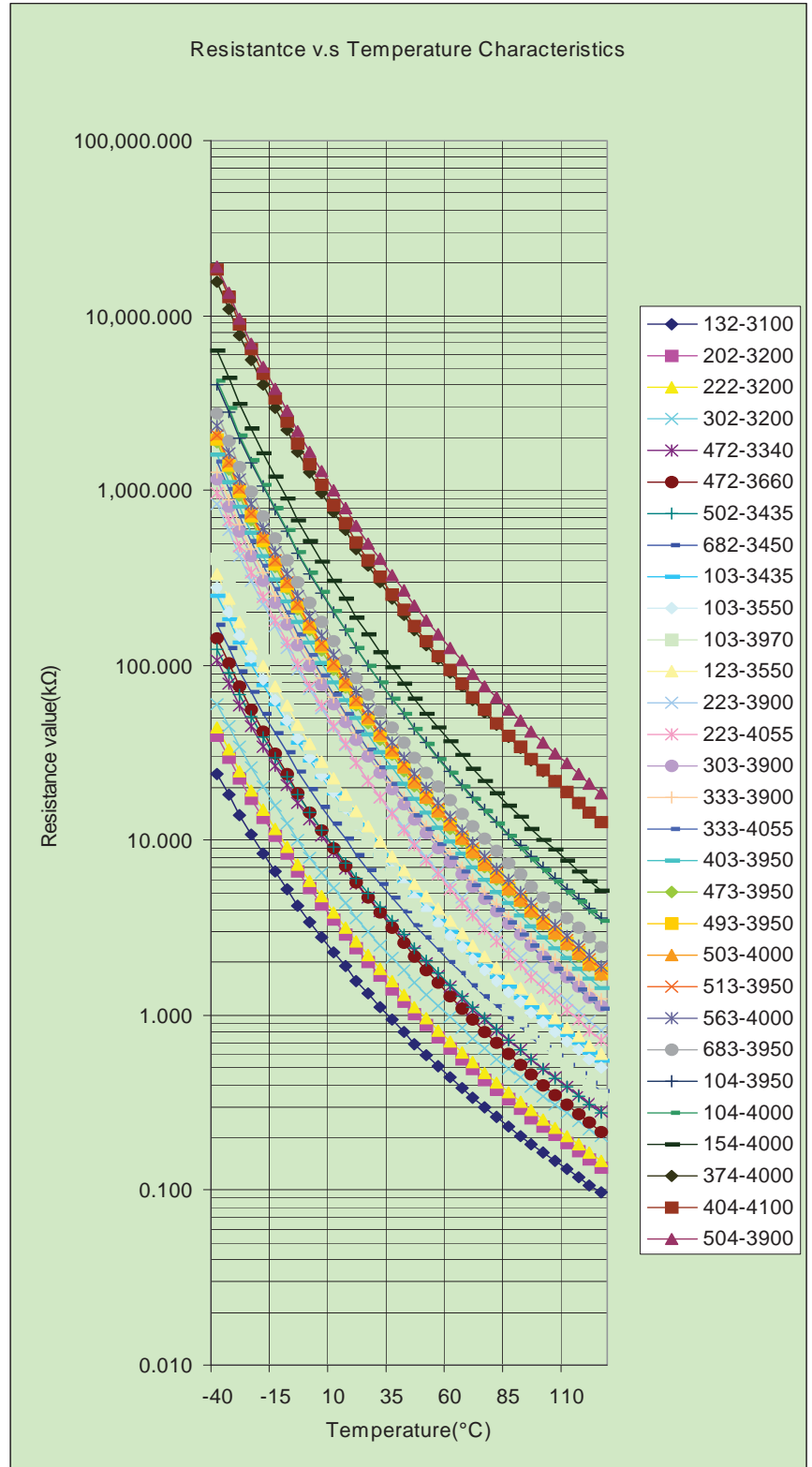
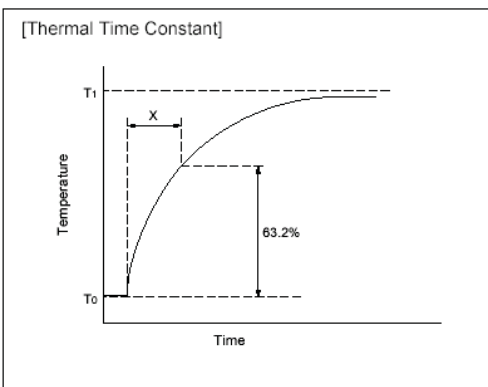
$$P = C (T_2 - T_1) \text{ ----- (3)}$$

C : Thermal dissipation constant (mW/°C)

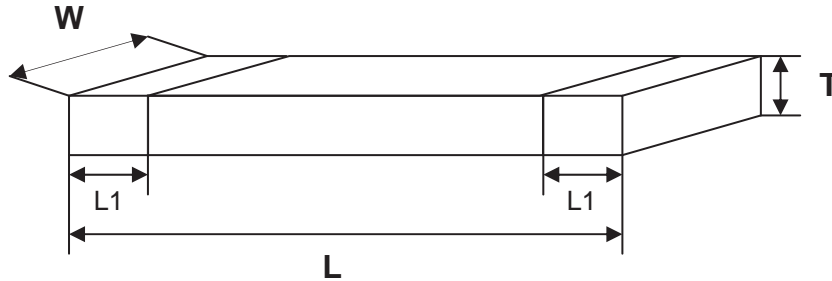
Thermal dissipation constant is changed by dimensions, measure, measured condition, etc.

4. Thermal Time Constant

The Thermal Time Constant for a thermistor is the time required for a thermistor to change its body temperature by 63.2% of a specific temperature span from T₀ (°C) to T₁ (°C).

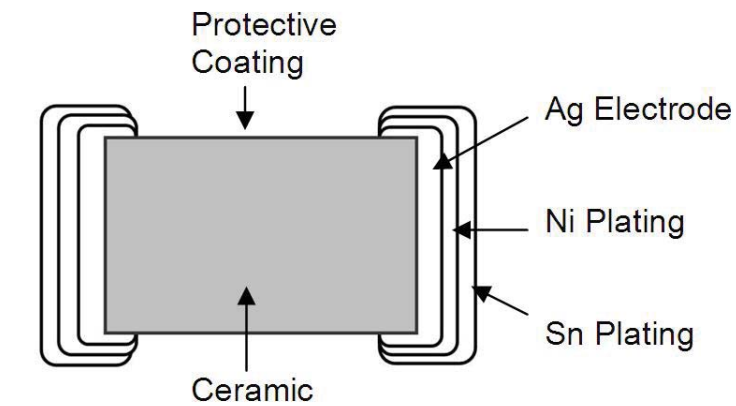


SMD CHIP DIMENSION



ITEM	L (mm)	W (mm)	T (mm)	L1 (mm)
0402 (1005)	1.00 ± 0.10	0.50 ± 0.10	0.40 ± 0.20	0.15 ~ 0.30
0603 (1608)	1.60 ± 0.15	0.80 ± 0.15	0.70 ± 0.25	0.20 ~ 0.50
0805 (2012)	2.00 ± 0.20	1.25 ± 0.20	0.90 ± 0.30	0.20 ~ 0.60
1206 (3216)	3.20 ± 0.20	1.60 ± 0.20	0.90 ± 0.30	0.25 ~ 0.60

SMD CHIP STRUCTURE





ORDERING INFORMATION

EWTF 03 - 103 J 3I - N

SMD NTC Series Code :

EWTF : Lead Free

Chip Size (L x W) :

02 (0402) – 1.0 x 0.5 mm

03 (0603) – 1.6 x 0.8 mm

05 (0805) – 2.0 x 1.25 mm

06 (1206) – 3.2 x 1.6 mm

Resistance at 25°C :

102 = 10 x 10² = 1,000 Ω

103 = 10 x 10³ = 10,000 Ω

104 = 10 x 10⁴ = 100,000 Ω

Resistance Tolerance :

F=±1% ; G=±2% ; H=±3% ; J =±5 % ; K=±10%

B Value (K) :

3I = 3435 (3000 + 435)

1:1000	C:101~150	I:401~450	O:701~750
2:2000	D:151~200	J:451~500	P:751~800
3:3000	E:201~250	K:501~550	Q:801~850
4:4000	F:251~300	L:551~600	R:851~900
A:0~50	G:301~350	M:601~650	S:901~950
B:51~100	H:351~400	N:651~700	T:951~999

Coating Color :

Blank = Blue

N = New Color (Black)



SPECIFICATION

0402 (1005) SIZE

Part Number	Resistance (25°C) (Ω)	B-constant (25°C/85°C) (K)	Maximum Power Rating (mW)	Dissipation Constant (mW/°C)	Operating Temp. Range (°C)
EWTF02-102□4B-N	1,000	4100	250	2.5	- 40 ~ 125
EWTF02-202□4K-N	2,000	4520			
EWTF02-103□3I-N	10,000	3435			
EWTF02-103□3R-N	10,000	3900			
EWTF02-103□4B-N	10,000	4100			
EWTF02-473□4A-N	47,000	4050			
EWTF02-683□4C-N	68,000	4150			
EWTF02-104□4A-N	100,000	4050			
EWTF02-104□4F-N	100,000	4300			
EWTF02-474□4A-N	470,000	4050			

Remark : 1. □ - Resistance Tolerance : F=±1% ; G=±2% ; H=±3% ; J =±5 % ; K=±10%.

2. Maximum Power Rating = Dissipation Constant × (Max. Operation Temperature - 25°C).

※ Please inquire to our sales for other specifications.



0603 (1608) SIZE

Part Number	Resistance (25°C) (Ω)	B-constant (25°C/85°C) (K)	Maximum Power Rating (mW)	Dissipation Constant (mW/°C)	Operating Temp. Range (°C)
EWTF03-102□2S-N	1,000	2950	350	3.5	- 40 ~ 125
EWTF03-202□4C-N	2,000	4150			
EWTF03-332□3F-N	3,300	3300			
EWTF03-472□3G-N	4,700	3340			
EWTF03-502□3G-N	5,000	3340			
EWTF03-682□3I-N	6,800	3435			
EWTF03-103□3I-N	10,000	3435			
EWTF03-103□3K-N	10,000	3550			
EWTF03-103□3T-N	10,000	3970			
EWTF03-223□3R-N	22,000	3900			
EWTF03-473□3S-N	47,000	3950			
EWTF03-473□4A-N	47,000	4050			
EWTF03-503□4A-N	50,000	4000			
EWTF03-104□3S-N	100,000	3950			
EWTF03-104□4A-N	100,000	4050			
EWTF03-104□4H-N	100,000	4400			
EWTF03-154□4L-N	150,000	4600			
EWTF03-204□4B-N	200,000	4055			
EWTF03-224□4B-N	220,000	4055			
EWTF03-334□4B-N	330,000	4100			
EWTF03-474□4B-N	470,000	4100			
EWTF03-564□4B-N	560,000	4100			

Remark : 1. □ - Resistance Tolerance : F=±1% ; G=±2% ; H=±3% ; J =±5 % ; K=±10%.

2. Maximum Power Rating = Dissipation Constant x(Max. Operation Temperature - 25°C).

※ Please inquire to our sales for other specifications.



0805 (2012) SIZE

Part Number	Resistance (25°C) (Ω)	B-constant (25°C/85°C) (K)	Maximum Power Rating (mW)	Dissipation Constant (mW/°C)	Operating Temp. Range (°C)
EWTF05-472□3I-N	4,700	3435	400	4	- 40 ~ 125
EWTF05-502□3I-N	5,000	3435			
EWTF05-103□3I-N	10,000	3435			
EWTF05-103□3K-N	10,000	3550			
EWTF05-103□3T-N	10,000	3970			
EWTF05-223□3R-N	22,000	3900			
EWTF05-473□4A-N	47,000	4000			
EWTF05-503□4A-N	50,000	4000			
EWTF05-104□4A-N	100,000	4000			
EWTF05-204□4B-N	200,000	4100			

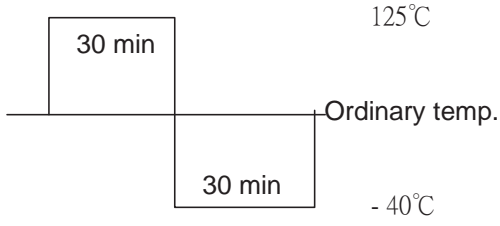
Remark : 1. □ - Resistance Tolerance : F=±1% ; G=±2% ; H=±3% ; J =±5 % ; K=±10%.

2. Maximum Power Rating = Dissipation Constant x(Max. Operation Temperature - 25°C).

※ Please inquire to our sales for other specifications.

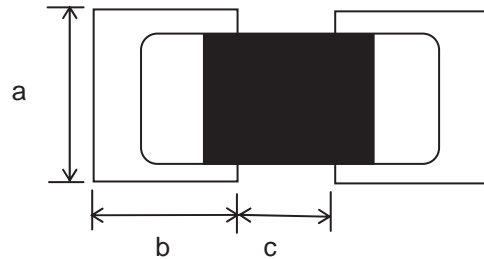


Reliability Test

Test Item		Standard	Test Method	$\Delta R_{25} / R_{25}$
Environmental test	Life	MIL-STD-202F Method 108A	Test temperature : 70 °C. Test duration : 1000 hrs. Load power : 1206 – 6.5 mW , 0805 – 5.0 mW 0603 – 4.5 mW , 0402 – 3.5 mW.	Max. ± 3%
	Humidity	MIL-STD-202F Method 103B	Test temperature : 40 °C. Test humidity : 95 % RH. Test duration : 1000 hrs. Load power : 1206 – 6.5 mW , 0805 – 5.0 mW 0603 – 4.5 mW , 0402 – 3.5 mW.	Max. ± 3%
	Thermal shock	MIL-STD-202F Method 107G	Test cycle : 10 times. Test temperature : - 40 °C and 125 °C. 	Max. ± 3%
	High temp. storage	IEC 68-2-2	Test temperature : 125 °C. Test duration : 1000 hrs.	Max. ± 3%
Mechanical Performance test	Solderability	MIL-STD-202F Method 208 H	Soldering temperature : 235 °C. Duration of immersion : 2 seconds.	Min. 95% coverage
	Resistance to soldering heat	MIL-R-55342D PARA 4.7.7	Soldering temperature : 260 °C. Duration of immersion : 10 seconds.	Max. ± 3%

Test Item		Standard	Test Method	$\Delta R_{25} / R_{25}$
Mechanical Performance test	Bending strength	JIS C 5202 6.1.4	<p>Pressurizing rod at a rate of 1 mm/sec. Bending distance : 1 mm. Maintenance time : 5 seconds.</p> <p>Unit : mm</p>	No visible damage
	Resistance to flexure of substrate	JIS C 5202 6.2.1	<p>Pressurizing force shall be Over 3 Kg.</p> <p>Unit : mm</p>	Min. 3 Kg
Electrical Performance test	Insulation resistance	MIL-STD-202F Method 302	<p>DC 250V For 10 seconds.</p>	Min. 1000MΩ
	Dielectric withstand voltage	MIL-STD-202F Method 301	<p>DC 250V For 10 seconds.</p>	Not Short

RECOMMENDED LAND DIMENSIONS

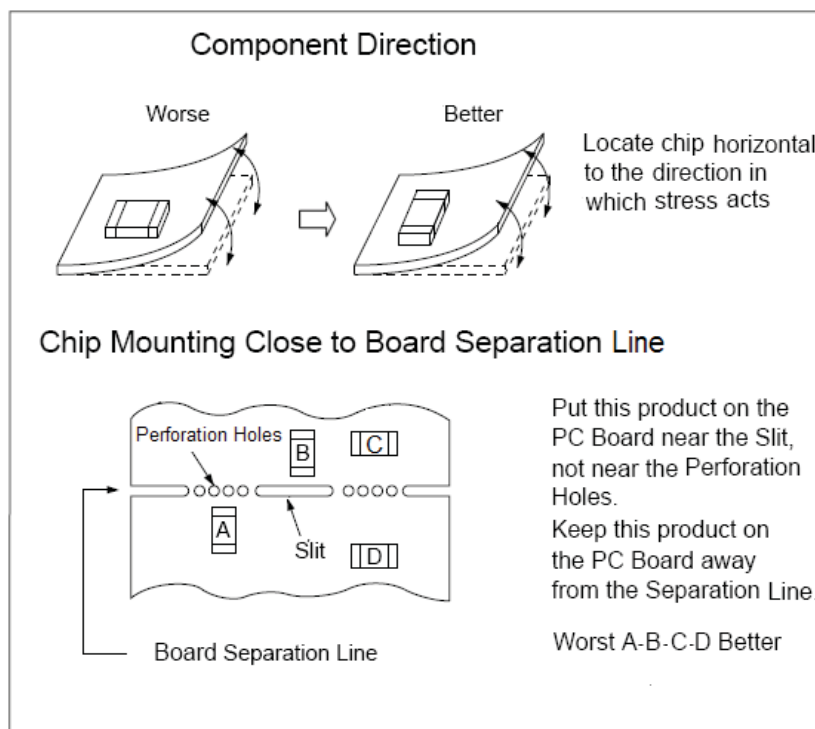


Unit: mm

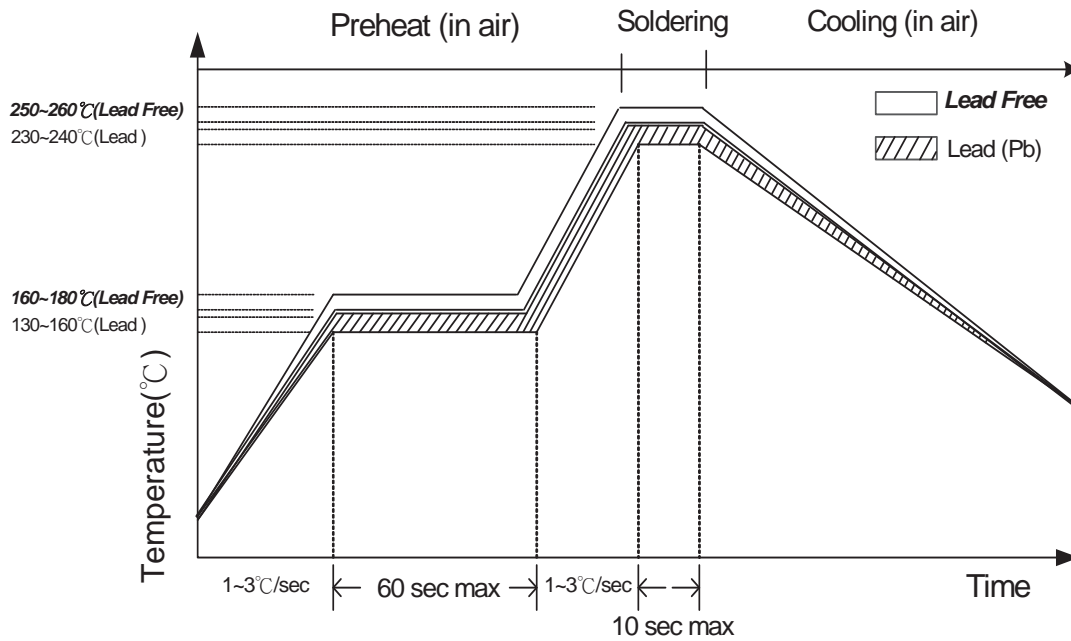
Type	a	b	c
0402 (1005)	0.6 ~ 0.7	0.8 ~ 0.9	0.4 ~ 0.5
0603 (1608)	0.9 ~ 1.0	1.0 ~ 1.1	0.6 ~ 0.7
0805 (2012)	1.4 ~ 1.5	1.2 ~ 1.3	0.7 ~ 0.8
1206 (3216)	1.7 ~ 1.8	1.5 ~ 1.6	1.3 ~ 1.4

MOUNTING POSITION

Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board.



REFLOW SOLDERING PROFILE



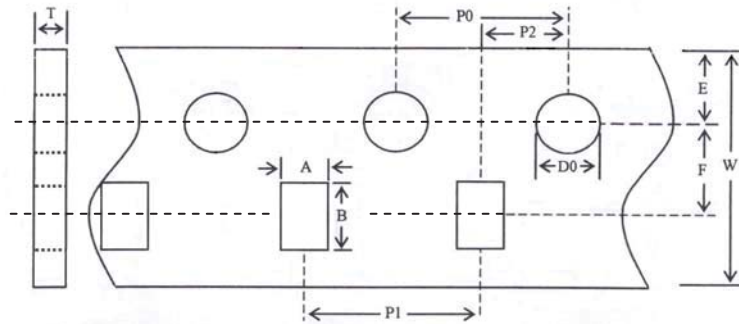
HAND SOLDERING IRON

Item	Condition
Temperature of Soldering Iron-tip	360 °C max.
Diameter of Soldering Iron-tip	Ø 3 mm max.
Soldering Iron Wattage	30 W max.
Soldering Time	5 seconds max.

STORAGE CONDITIONS

1. Storage Temperature : - 10 °C ~ + 40 °C
2. Relative humidity : 30 ~ 75 % RH
3. Thermistor must be kept away from sunshine and stored in a non-corrosive atmosphere.
4. Period of Storage : 1 year

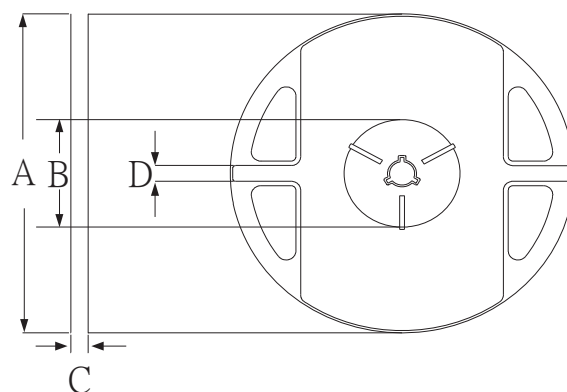
TAPE DIMENSIONS



Unit : mm

Dimension	0402	0603	0805	1206
A	0.65 ± 0.10	1.10 ± 0.10	1.50 ± 0.10	2.00 ± 0.10
B	1.15 ± 0.10	1.90 ± 0.10	2.30 ± 0.10	3.57 ± 0.10
W	8.00 ± 0.20	8.00 ± 0.20	8.00 ± 0.20	8.00 ± 0.20
D0	1.50 ± 0.25	1.50 ± 0.25	1.50 ± 0.25	1.55 ± 0.25
E	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
P0	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P1	2.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P2	2.00 ± 0.10	2.00 ± 0.10	2.00 ± 0.10	2.00 ± 0.10
T	1.10 Max.	1.10 Max.	1.10 Max.	1.10 Max.

REEL DIMENSIONS



Unit : mm

ITEM	A	B	C	D
Dimension	178.0 ± 1.0	60.0 ± 1.0	9.0 ± 0.1	13.0 ± 0.1

ITEM	0402	0603	0805	1206
Qty. / Reel	10000 pcs	4000 pcs	4000 pcs	3000 pcs