

### DESCRIPTION

A thermistor is a thermally sensitive resistor whose primary function is to exhibit a change in electrical resistance with a change in body temperature.

NTC thermistor is one in which the zero-power resistance decreases with an increase in temperature.



### FEATURES

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

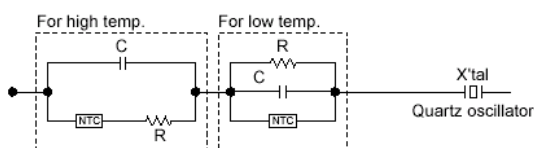
### APPLICATIONS

- Temperature compensation for crystal oscillator ( TCXO ) .
- Temperature compensation for Personal computer.
- Temperature detection for CPU and memory device.
- Temperature detection for battery pack.
- Temperature compensation for contrast of LCD.
- Temperature compensation and sensing of car audio equipments. (CD, MD, Tuner).

### an example

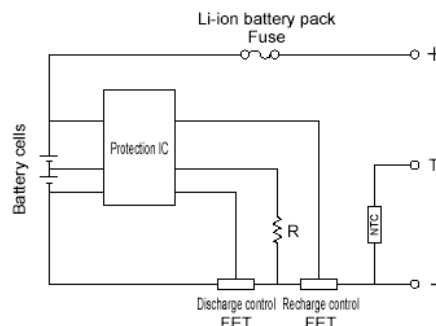
#### ●Temperature compensated crystal oscillator (TCXO)

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



#### ●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

$$R = R_0 \exp B (1/T - 1/T_0) \dots\dots\dots(1)$$

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

R<sub>0</sub> : Resistance in ambient temperature T<sub>0</sub> (K)

B : B-constant of Thermistor

#### 2. B-Constant

As (1) formula

$$B = \ln (R/R_0) / (1/T - 1/T_0) \dots\dots\dots(2)$$

#### 3. Thermal Dissipation Constant

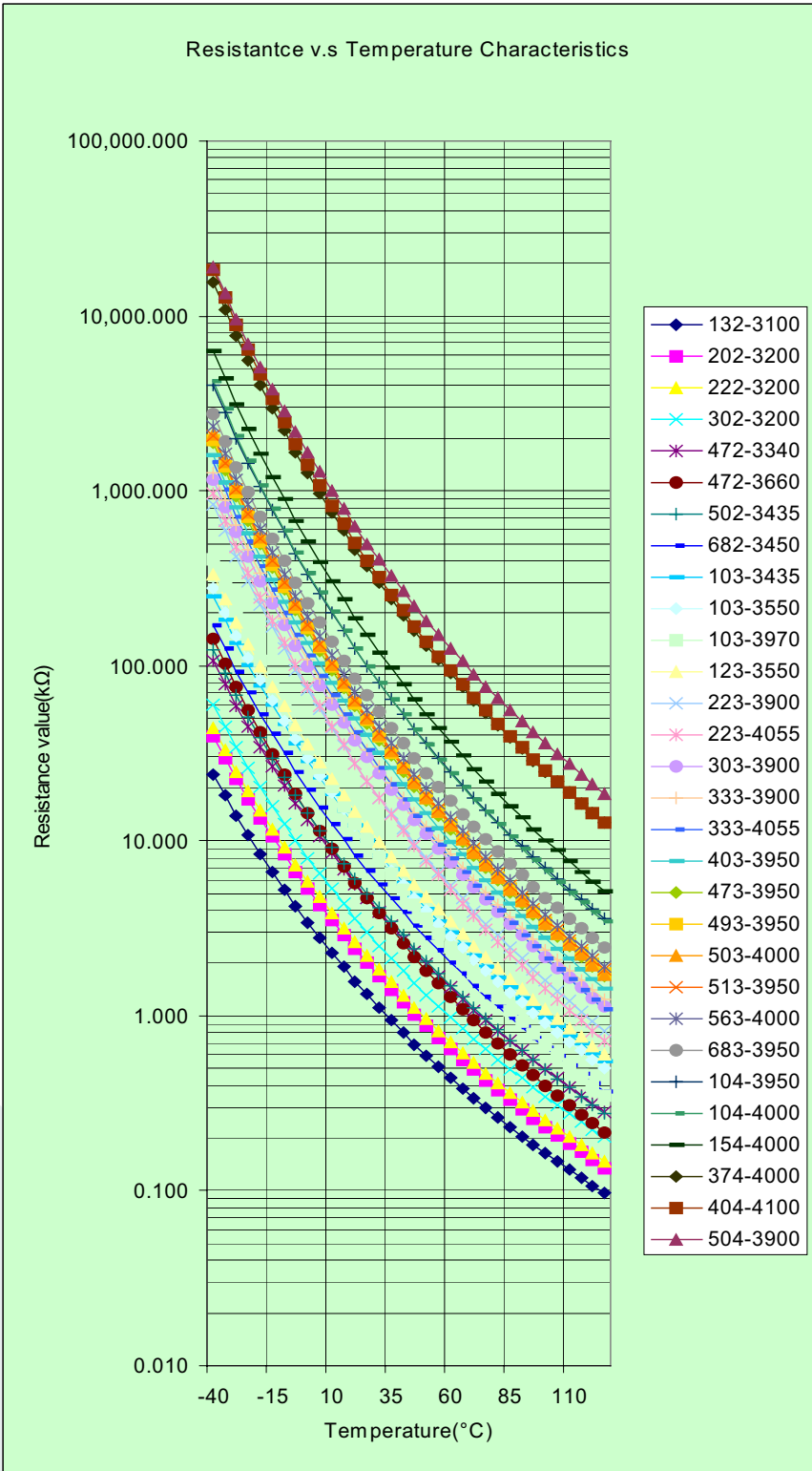
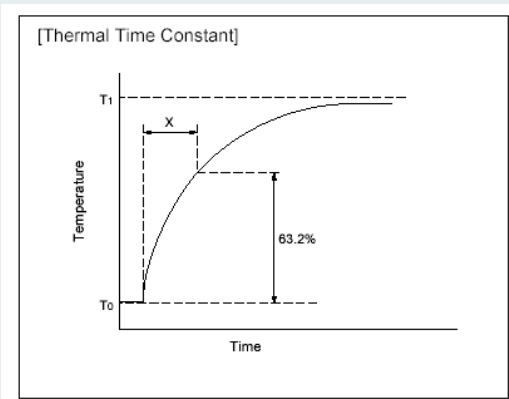
When spend electric power P (mW) in ambient temperature T<sub>1</sub>, if Thermistor's temperature rises T<sub>2</sub>, there is a formula as follows

$$P = C (T_2 - T_1) \dots\dots\dots(3)$$

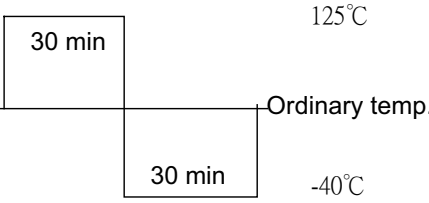
C : Thermal dissipation constant (mW/°C)  
Thermal dissipation constant change by dimensions, measure, measured condition etc.

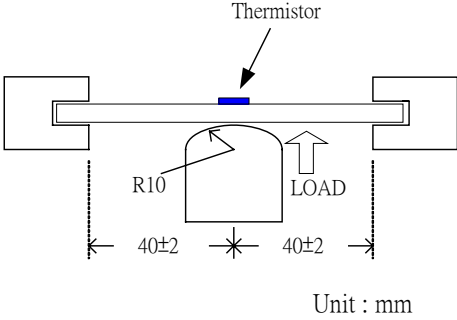
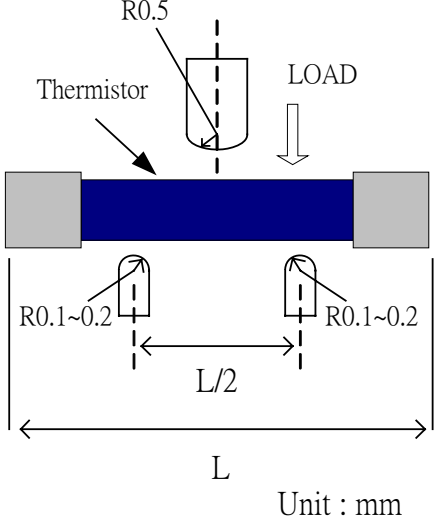
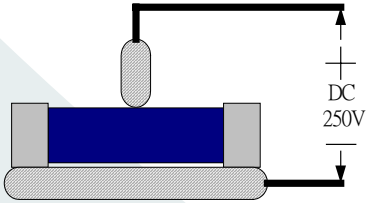
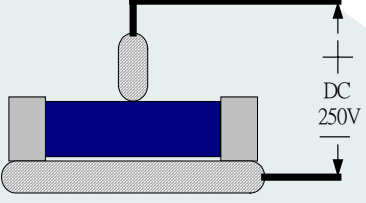
#### 4. Thermal Time Constant

Period in which Thermistor's temperature will change 63.2% of its temperature difference from ambient temperature T<sub>0</sub> (°C) to T<sub>1</sub> (°C).

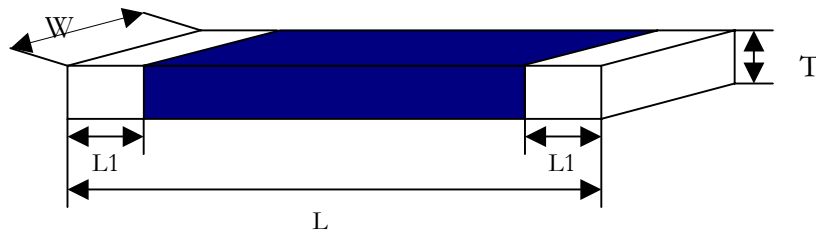


### Reliability Test

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% 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 & 125°C 	MAX. ± 3 %
	Storage in dry heat	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	95 % min. coverage
	Resistance to soldering heat	MIL-R-55342D PARA 4.7.7	Soldering temperature : 260°C Duration of immersion : 10 seconds	MAX. ± 3 %

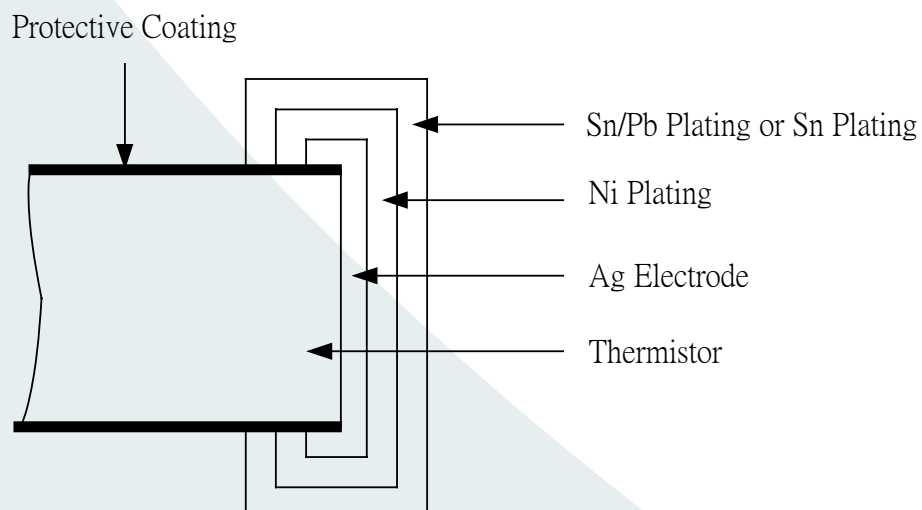
Test Item	Standard	Test Method	$\Delta R_{25} / R_{25}$
Mechanical Performance test	Bending strength	<p>JIS C 5202 6.1.4</p> <p>Pressurizing rod at a rate of 1mm/sec Maintenance time : 5 sec Bending distance : 1 mm (min.)</p>  <p>Unit : mm</p>	Visual : No mechanical damage
	Resistance to flexure of substrate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

### CHIP DIMENSION



ITEM	L(mm)	W(mm)	T(mm)	L1(mm)
<b>1005 (0402)</b>	1.00 ±0.10	0.50 ±0.10	0.60 max	0.15~0.30
<b>1608 (0603)</b>	1.60 ±0.15	0.80 ±0.15	0.95 max	0.20~0.50
<b>2125 (0805)</b>	2.00 ±0.20	1.25 ±0.20	1.20 max	0.20~0.60
<b>3216 (1206)</b>	3.20 ±0.20	1.60 ±0.20	1.40 max	0.25~0.60

### CHIP STRUCTURE



### ORDERING INFORMATION

**EW T □ 05 103 J 3I H**

#### SMD NTC Series Code

TH : Lead (Pb)  
TF : Lead Free

#### Chip Size (mm)

02(0402) – 1.0x0.5x0.6  
03(0603) – 1.6x0.8x0.9  
05(0805) – 2.0x1.2x1.2  
06(1206) – 3.2x1.6x1.4

#### Resistance at 25°C:

101 =  $10 \times 10^1 = 100 \Omega$   
102 =  $10 \times 10^2 = 1000 \Omega$   
103 =  $10 \times 10^3 = 10000 \Omega$

#### Resistance Tolerance :

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

#### B Tolerance :

F : ± 1 %  
G : ± 2 %  
H : ± 3 %

#### B Value :

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

### SPECIFICATION

#### 1005 (0402) SIZE

Part Number	Resistance (25°C) (k Ω)	B-constant (25-85°C) (k)	Maximum Power Rated (25°C) (mW)	Thermal Dissipation Constant (mW/°C)	Operating Temperature Range (°C)
EWT□02103□3I□	10	3435	250	2.5	- 40 ~ 125
EWT□02683□3S□	68	3950			

#### 1608 (0603) SIZE

Part Number	Resistance (25°C) (k Ω)	B-constant (25-85°C) (k)	Maximum Power Rated (25°C) (mW)	Thermal Dissipation Constant (mW/°C)	Operating Temperature Range (°C)
EWT□03132□3B□	1.30	3100	350	3.5	- 40 ~ 125
EWT□03302□3D□	3.00	3200			
EWT□03472□3G□	4.70	3340			
EWT□03682□3I□	6.80	3450			
EWT□03103□3I□	10.0	3435			
EWT□03103□3K□	10.0	3550			
EWT□03103□3T□	10.0	3970			
EWT□03123□3K□	12.0	3550			
EWT□03303□3R□	30.0	3900			
EWT□03333□3R□	33.0	3900			
EWT□03403□3S□	40.0	3950			
EWT□03473□3S□	47.0	3950			

### 1608 (0603) SIZE

Part Number	Resistance (25°C) (k Ω)	B-constant (25-85°C) (k)	Maximum Power Rated (25°C) (mW)	Thermal Dissipation Constant (mW/°C)	Operating Temperature Range (°C)
EWT□03493□3S□	49.0	3950	350	3.5	-40 ~ 125
EWT□03503□3S□	50.0	3950			
EWT□03513□3S□	51.0	3950			
EWT□03683□3S□	68.0	3950			
EWT□03104□3S□	100.0	3950			
EWT□03154□4A□	150.0	4000			
EWT□03374□4A□	370.0	4000			
EWT□03404□4B□	400.0	4100			
EWT□03504□4B□	500.0	4100			

### 2125 (0805) SIZE

Part Number	Resistance (25°C) (k Ω)	B-constant (25-85°C) (k)	Maximum Power Rated (25°C) (mW)	Thermal Dissipation Constant (mW/°C)	Operating Temperature Range (°C)
EWT□05202□3D□	2.00	3200	400	4	-40 ~ 125
EWT□05222□3D□	2.20	3200			
EWT□05472□3I□	4.70	3435			
EWT□05472□3N□	4.70	3660			
EWT□05502□3I□	5.00	3435			
EWT□05103□3I□	10.0	3435			



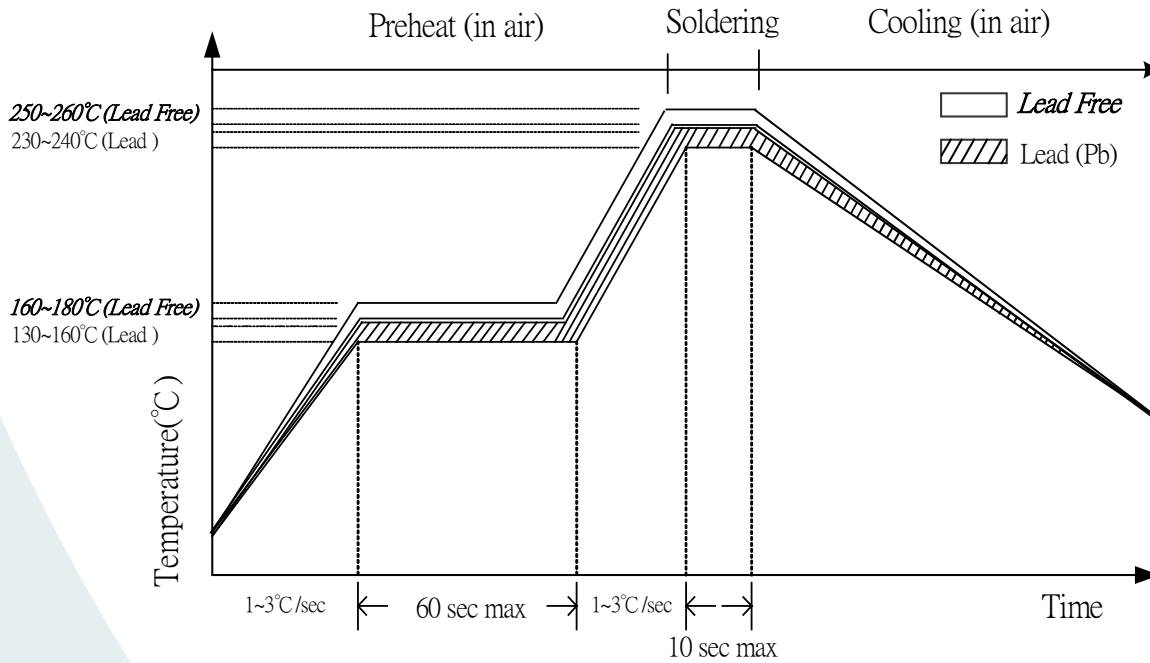
### 2125 (0805) SIZE

Part Number	Resistance (25°C) (k Ω)	B-constant (25-85°C) (k)	Maximum Power Rated (25°C) (mW)	Thermal Dissipation Constant (mW/°C)	Operating Temperature Range (°C)
EWT□05103□3K□	10.0	3550	400	4	-40 ~ 125
EWT□05153□3M□	15.0	3630			
EWT□05223□3R□	22.0	3900			
EWT□05223□4B□	22.0	4055			
EWT□05303□3R□	30.0	3900			
EWT□05333□4B□	33.0	4055			
EWT□05473□4A□	47.0	4000			
EWT□05503□4A□	50.0	4000			
EWT□05563□4A□	56.0	4000			
EWT□05104□4A□	100.0	4000			

### 3216 (1206) SIZE

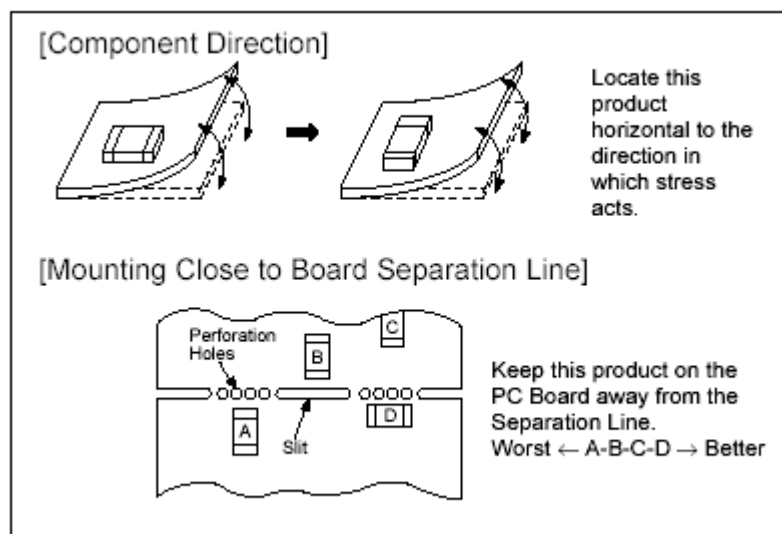
Part Number	Resistance (25°C) (k Ω)	B-constant (25-85°C) (k)	Maximum Power Rated (25°C) (mW)	Thermal Dissipation Constant (mW/°C)	Operating Temperature Range (°C)
EWT□06103□3I□	10.0	3435	450	4.5	-40 ~ 125

### REFLOW SOLDERING PROFILE

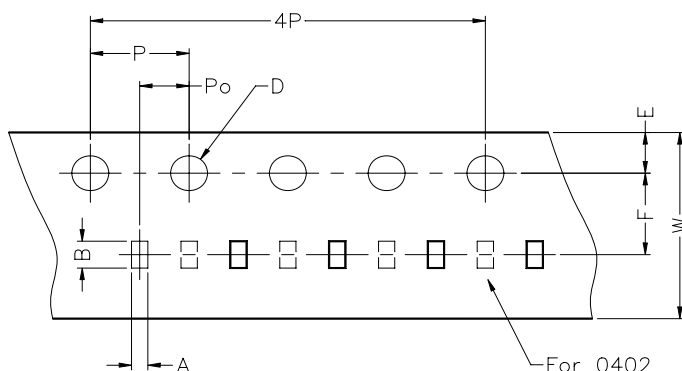


### MOUNTING POSITION

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



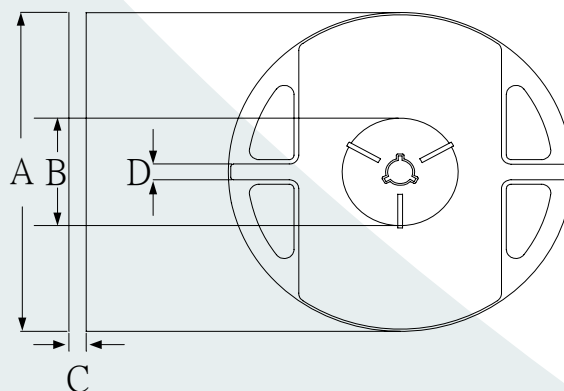
### TAPE DIMENSIONS



Unit : mm

Dimension	1206	0805	0603	0402
A	2.00 ± 0.05	1.50 ± 0.05	1.08 ± 0.05	0.66 ± 0.03
B	3.57 ± 0.05	2.30 ± 0.05	1.85 ± 0.05	1.15 ± 0.03
W	8.00 ± 0.02	8.00 ± 0.05	8.00 ± 0.05	8.00 ± 0.05
D	1.55 ± 0.05	1.50 ± 0.10	1.50 ± 0.10	1.50 ± 0.10
E	1.75 ± 0.10	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.05
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
P	4.00 ± 0.10	4.00 ± 0.05	4.00 ± 0.05	4.00 ± 0.05
P <sub>o</sub>	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05
4P	16.00 ± 0.05	16.00 ± 0.05	16.00 ± 0.05	16.00 ± 0.05

### REEL DIMENSIONS



Unit : mm

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