

SPECIFICATION FOR APPROVAL

CUSTOMER :

DESCRIPTION : DC CERAMIC DISC CAPACITOR

Prepared	Checked	Approved	Date

## 1.Scope

This specification relates to DC ceramic disc capacitor intended for use in telecommunication and electronic devices.

## 2. Part number

CC4102KY5P102B5LS-LF

CC	4	102	K	Y5P	102	B	5LS	-	LF
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

The part number consists of 10 sections. The meaning in each section is as follows:

(1) Capacitor type code

(2) No of total character 102=1000=4

(3) Rated capacitance

Numerical symbol	Capacitance
102	1000PF
101	100PF
100	10PF
1R0	1PF

(4) Capacitance tolerance

Letter symbol	Capacitance tolerance
C	$\pm 0.25\text{pF}$
D	$\pm 0.5\text{pF}$
J	$\pm 5\%$
K	$\pm 10\%$
M	$\pm 20\%$
Z	+80, -20%

(5) Temperature coefficient or temperature characteristics

Symbol	Temperature coefficient or temperature characteristics
C0H	$0 \pm 60 \times 10^{-6}/^{\circ}\text{C}$
SL	$+100 \text{ to } -1000 \times 10^{-6}/^{\circ}\text{C}$
Y5P	$\pm 10\%$
Y5R,YR	$\pm 15\%$
Y5U,Z5U	+20% to -55%
Y5V,Z5V	+20% to -80%

(6) Rated voltage

Letter symbol	Rated voltage (V)
102	1000
500	50
630	63

(7) Packing

Numerical symbol	
B	Bulk Pack
A	Ammo BoX\

(8) Lead Spacing

Numerical symbol	Lead spacing *
2LS	$2.5 \pm 0.8$
5LS	$5.0 \pm 0.8$
7LS	$7.5 \pm 1.0$
10LS	$10.0 \pm 1.0$

\* For the capacitors in bulk packing only. For taped capacitors the lead spacing conform to figure 2 or figure 3.

(9) –

(9) Lead Free

3. Standard atmospheric condition

3.1 Temperature: 15~35°C

3.2 Relative humidity: 45~75%

3.3 Atmospheric pressure: 86~106kPa (860~1060 mbar)

4. Operating and storage temperature range

4.1 Operating temperature range:

Temperature characteristic	Lowest operating temperature	Highest operating temperature
SL,C0H Y5P, Y5R, Y5U & Y5V	- 25°C	85°C
Z5U, Z5V	10°C	85°C
YR	- 25°C	125°C

4.2 Storage temperature range: -10 to +40°C

5. Characteristics and test methods

5.1 Electrical characteristics and test methods

	Item	Test method	Specification
1	Capacitance & tolerance	The capacitance shall be measured at 20°C with 1 MHz and 1 Vrms (Class I ), 1 kHz and 1 Vrms (class II ), 1 kHz and 0.1 Vrms (for class III).	Refer to individual sheet
2	Quality factor or dissipation factor	The quality factor or dissipation factor shall be measured at the same conditions as above.	$Q \geq 400 + 20Cr$ (for $Cr < 30pF$ ) $Q \geq 1000$ (for $Cr \geq 30pF$ ) Cr- -rated capacitance in unit of pF 2.5% max. (for Y5P, YR, Y5U and Z5U) 3.5% max. (for Y5V and Z5V) 5% max. (for SBBLC Y5V and Y5U) 3.5% max. (for SBBLC Y5P)
3	Insulation resistance	The insulation resistance shall be measured with rated voltage within $60 \pm 5$ seconds of charging.	10000M $\Omega$ min.
4	Voltage proof	The voltage of 300% rated voltage (for rated voltage 50V and 500V), 200% rated voltage (for rated voltage 1000V to 2000V), 175% rated voltage (for rated voltage 3000V), or 150% rated voltage (for DCG or SBBLC) shall be applied between leads for 1 to 5 seconds. The voltage of 250% rated voltage (for 50V capacitors) or 1300V (for 500V, 1kV and over) shall be applied between leads connected together and metal foil wrapped on envelope for 1 to 5 seconds.	No breakdown or flashover

	Item	Test method	Specification																										
5	Temperature characteristic	<p>The capacitor shall be kept for enough time to reach thermal equilibrium at specified temperature of each step in the following table.</p> <p>The capacitance measurement shall be made only at the thermal equilibrium of each step.</p> <table><tr><td>Step</td><td>Temperature</td></tr><tr><td>1</td><td>20±2℃</td></tr><tr><td>2</td><td>-25±2℃</td></tr><tr><td>3</td><td>20±2℃</td></tr><tr><td>4</td><td>85±2℃ (125±2℃ for YR)</td></tr><tr><td>5</td><td>20±2℃</td></tr></table> <p>For temperature characteristic SL the steps 1 and 2 may be omitted.</p> <p>The temperature coefficient and the capacitance drift shall be calculated by the following formulas.</p> <p>Temperature coefficient</p> $= \frac{(C_m - C_o)}{C_o (T - T_o)} \times 10^6 \quad (\text{ppm}/^\circ\text{C})$ <p>Capacitance drift = <math>\frac{C_o - C_1}{C_o}</math> or <math>\frac{C_5 - C_o}{C_o}</math> or <math>\frac{C_5 - C_1}{C_o}</math> (whichever is the greater)</p> <p>Where</p> <p>Co: Capacitance at step 3</p> <p>Cm: Capacitance at step 2 and/or step 4</p> <p>C1,C5: Capacitance at step 1 and step 5</p> <p>To: Measuring temperature at Step 3</p> <p>T: Measuring temperature at step 2 and/or 4</p> <p>Pre-treatment:</p> <p>The capacitor shall be stored at a temperature of 55 ±2℃ and a relative humidity of 20% or less for 16 to 24 hours. And then the capacitor shall be allowed immediately to cool in container using appropriate dryer such as activated carbon, silica gel etc.</p>	Step	Temperature	1	20±2℃	2	-25±2℃	3	20±2℃	4	85±2℃ (125±2℃ for YR)	5	20±2℃	<p>Class I</p> <p>Temperature coefficient: Refer to specification sheet</p> <p>Capacitance drift: Within ±1% or± 0.05pF (Whichever is the greater)</p> <p>Class II&amp;III</p> <table><tr><th>Temperature characteristic</th><th>Permitting capacitance change</th></tr><tr><td>Y5P</td><td>±10%</td></tr><tr><td>YR</td><td>+15% to-30%</td></tr><tr><td>Y5U</td><td>+20% to -55%</td></tr><tr><td>Z5U</td><td>+20% to -55%</td></tr><tr><td>Y5V</td><td>+20% to -80%</td></tr><tr><td>Z5V</td><td>+20% to -80%</td></tr></table>	Temperature characteristic	Permitting capacitance change	Y5P	±10%	YR	+15% to-30%	Y5U	+20% to -55%	Z5U	+20% to -55%	Y5V	+20% to -80%	Z5V	+20% to -80%
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Z5V	+20% to -80%																												

## 5.2 Mechanical characteristics and test methods

	Item	Test method	Specification
1	Robustness of Termination	<p>The capacitor body shall be held in such a manner so that axis of the lead is vertical.</p> <p>The tensile force of 10 N (for Φ0.6mm lead) or 5N (for Φ 0.5mm lead) shall be applied to the lead in a direction of its axis and acting in a direction away from the body of the capacitor for 10±1 seconds.</p>	The capacitor shall be no broken and the lead shall be no loosened or cut off.

	Item	Test method	Specification
2	Bending	<p>The capacitor is held in such a manner so that axis of the lead is vertical. A mass applying a force of 5N (for <math>\Phi 0.6\text{mm}</math> lead) or 2.5N (for <math>\Phi 0.5\text{mm}</math> lead) is then suspended from the end of the lead.</p> <p>The body of the capacitor is then inclined within a period of 2 to 3 seconds, through an angle of approximately <math>90^\circ</math> in the vertical plane and then returned to its initial position over the same period of time. This operation constitutes one bend. The lead shall be subjected to a total of 2 alternating bends in two opposite directions.</p>	The lead shall be no broken.

### 5.3 Endurance characteristics and test methods

	Item	Test method	Specification	
1	Solderability	<p>Solder temperature: <math>235 \pm 5^\circ\text{C}</math></p> <p>Immersion time: <math>2 \pm 0.5</math> seconds</p> <p>Immersion speed: <math>25 \pm 6\text{mm/s}</math></p>	A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed.	
2	Vibration	<p>Frequency range: 10~55Hz</p> <p>Amplitude (total excursion): 1.5mm</p> <p>Speed of frequency change: 10~55~10Hz in about 1 minute</p> <p>Total duration: 6 hours</p> <p>This motion shall be applied for 2 hours in each of three mutually perpendicular directions.</p>	Appearance	No visible damage
			Capacitance change	Within specified tolerance
			Quality factor or dissipation factor	Refer to clause 5.1.2
3	Resistance to soldering heat	<p>Solder temperature and immersion time: <math>260 \pm 5^\circ\text{C}</math>, <math>10 \pm 0.5</math> seconds</p> <p>The immersing depth shall be a position 1.27mm from the seating plane.</p> <p>Post-treatment: The capacitor shall be preserved at the standard atmospheric condition for <math>24 \pm 2</math> hours.</p>	Appearance	No visible damage
			Capacitance change	$\pm 2.5\%$ or $\pm 0.25\text{pF}$ (whichever is the greater, for class I ) $\pm 5\%$ (for Y5P and YR) $\pm 15\%$ (for Y5U and Z5U) $\pm 20\%$ (for Y5V and Z5V)
			Voltage proof (for between leads only)	Refer to clause 5.1.4
4	Solvent resistance	The capacitor shall be immersed into isopropylalcohol for $30 \pm 5$ seconds.	Appearance	<p>No visible damage</p> <p>Legible marking</p>

	Item	Test method	Specification		
5	Temperature cycle	<p>The capacitor shall be placed in the test chamber at temperature of <math>-25 \pm 2^{\circ}\text{C}</math> for 30minutes, then at room temperature for 3minutes, at <math>85 \pm 2^{\circ}\text{C}</math> (<math>125 \pm 2^{\circ}\text{C}</math> for YR) for 30minutes and at room temperature for 3minutes. This operation constitutes one cycle.</p> <p>The capacitor shall be subjected to a total of 5 cycles.</p> <p>Post-treatment: The capacitor shall be preserved at the standard atmospheric condition for <math>24 \pm 2</math> hours.</p>	Appearance	No visible damage Legible marking	
			Capacitance change	$\pm 5\%$ or $\pm 0.5\text{pF}$ (whichever is the greater, for class I ) $\pm 10\%$ (Y5P and YR) $\pm 20\%$ (Y5U and Z5U) $\pm 30\%$ (Y5V and Z5V )	
			Quality factor or dissipation factor	$Q \geq 200 + 10\text{Cr}$ (for $\text{Cr} < 10\text{pF}$ ) $Q \geq 275 + (5/2)\text{Cr}$ (for $10\text{pF} \leq \text{Cr} < 30\text{pF}$ ) $Q \geq 350$ (for $\text{Cr} \geq 30\text{pF}$ ) 5% max. (Y5V & Z5V) 3% max. (Y5P, YR, Y5U & Z5U) 7.5% max (SBBLC)	
			Insulation resistance	$1000\text{M}\Omega$ min. $500\text{M}\Omega$ min. (SBBLC)	
			Voltage proof	For between leads only. Refer to clause 5.1.4	
6	Damp heat	<p>The capacitor shall be stored for <math>500^{+24}</math> hours at a temperature of <math>40 \pm 2^{\circ}\text{C}</math> and a relative humidity of 90 to 95%.</p> <p>Post-treatment: The capacitor shall be preserved for 1 to 2 hours at the standard atmospheric condition.</p>	Appearance	No visible damage	
			Capacitance change	As the same of clause 5.3.5.	
			Q or DF	As the same of clause 5.3.5.	
			Insulation resistance	$2500\text{M}\Omega$ min. (Class I ) $1000\text{M}\Omega$ min (class II ) $500\text{M}\Omega$ min (for class III)	
			Voltage proof	For between leads only. Refer to clause 5.1.4	
7	Endurance	<p>The voltage that is equal to 200% rated voltage (for 50V and 500V capacitors), 150% rated voltage (for 1KV~3KV capacitors), or 125% rated voltage (for DCG or SBBLC) shall be applied continuously to the capacitor at temperature of <math>85 \pm 3^{\circ}\text{C}</math> (<math>125 \pm 3^{\circ}\text{C}</math> for YR) for <math>1000^{+48}</math> hours.</p> <p>Post-treatment: The capacitor shall be preserved at the standard atmospheric condition for <math>24 \pm 2</math> hours.</p>	Appearance	As the same of clause 5.3.5.	
			Capacitance change		
			Quality factor or dissipation factor		
			Insulation resistance		
			Voltage proof		

# LEAD STYLE

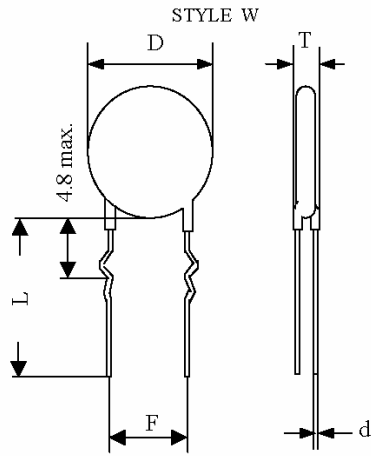


Figure 1-1

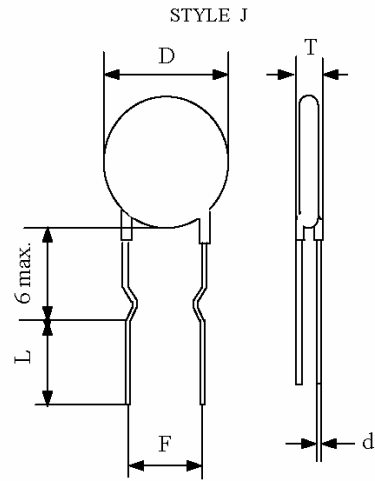


Figure 1-3

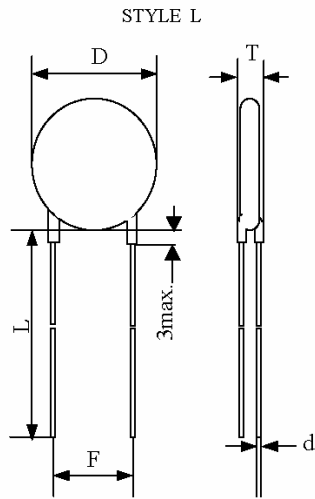


Figure 1-2

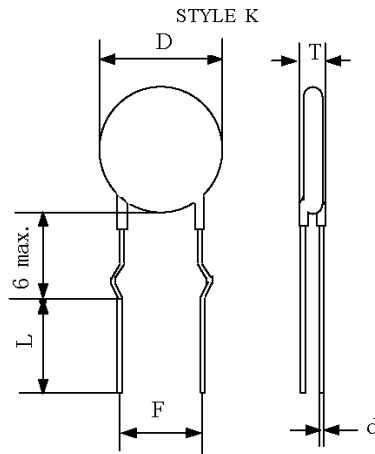


Figure 1-4

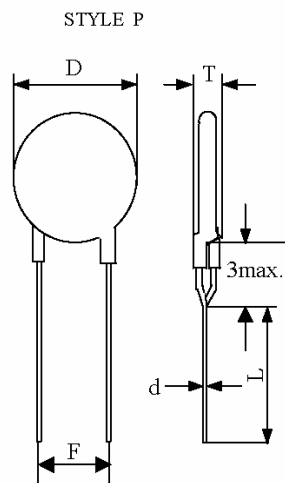


Figure 1-5

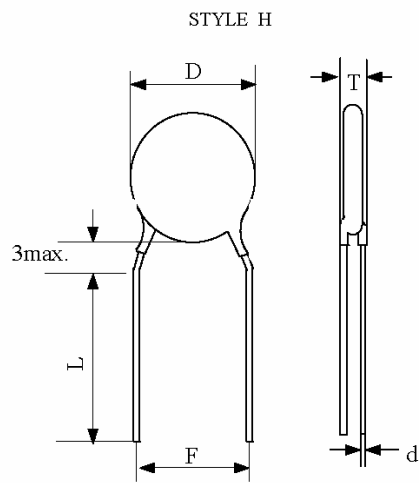
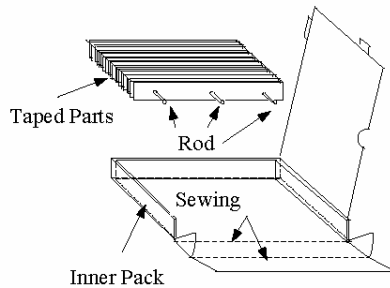
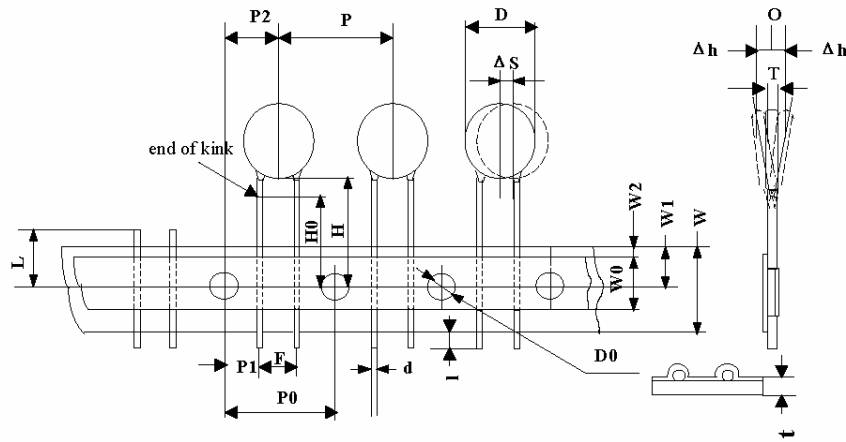


Figure 1-6

## TAPING STYLE F



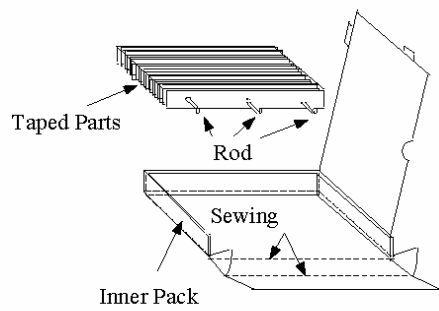
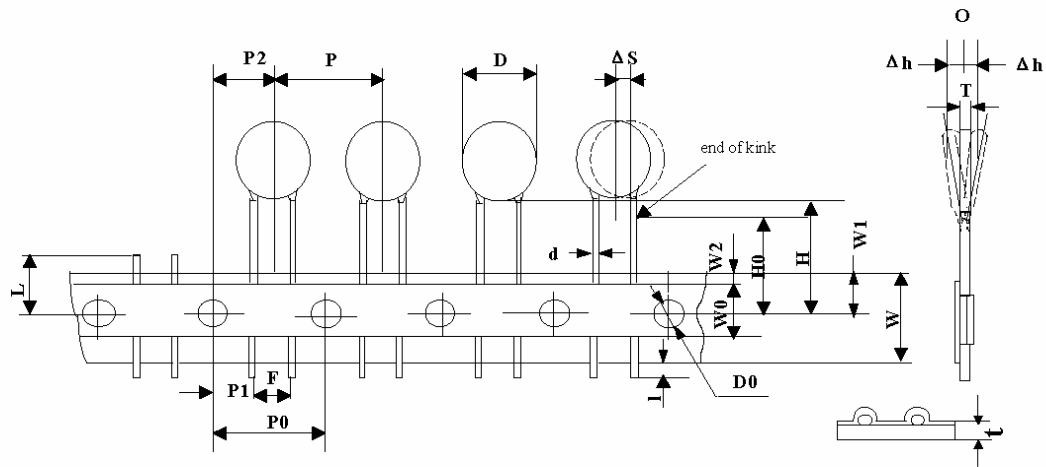
- 1.\* For lead styles of inside kink and outside kink only
2. The lead sharp shall change with lead style.

Symbol	Dimension(mm)
<b>P0</b>	<b>12.7±0.2</b>
<b>P</b>	<b>12.7±1.0</b>
<b>F</b>	<b>5.0<sup>+0.5</sup><sub>-0.2</sub></b>
<b>P1</b>	<b>3.85±0.4</b>
<b>P2</b>	<b>6.35±0.4</b>
<b>H0</b>	<b>16.0±0.5*</b>
<b>H</b>	<b>20.0±0.5</b>
<b>W</b>	<b>18.0±0.5</b>
<b>W0</b>	<b>8.0min.</b>
<b>W1</b>	<b>9.0±0.3</b>
<b>W2</b>	<b>3.0max.</b>
<b>t</b>	<b>0.7±0.2</b>
<b>D</b>	<b>To comply with individual sheet</b>
<b>D0</b>	<b>4±0.2</b>
<b>d</b>	<b>To comply with individual sheet</b>
<b>l</b>	<b>0max.</b>
<b>L</b>	<b>11max.</b>
<b>T</b>	<b>To comply with individual sheet</b>
<b>Δ S</b>	<b>0.5max.</b>
<b>Δ h</b>	<b>0.5max.</b>

**Figure 2**



## TAPING STYLE V

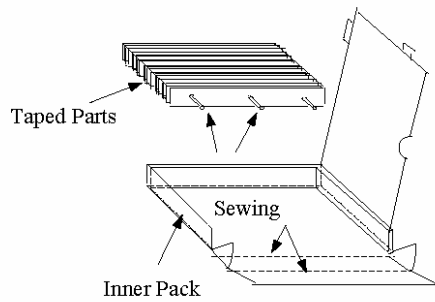
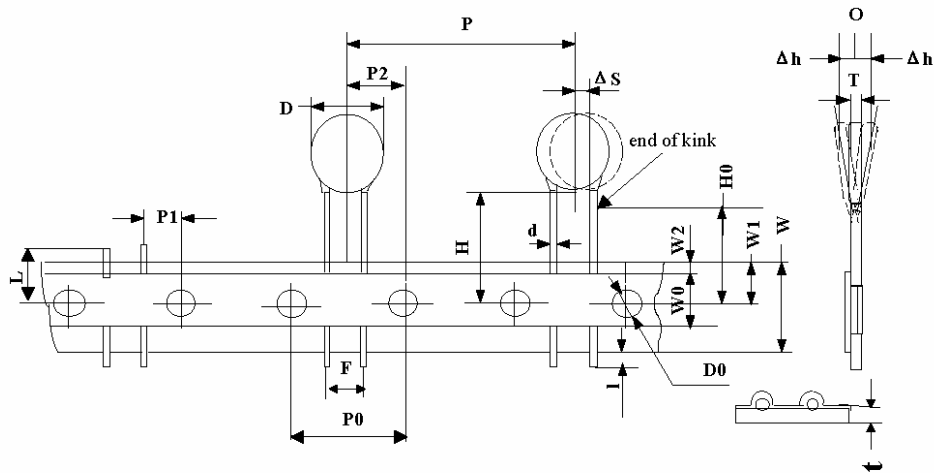


1. \* For lead styles of inside kink and outside kink only.
2. The lead sharp shall change with lead style.

Symbol	Dimension(mm)
P0	15.0±0.2
P	15.0±1.0
F	7.5 <sup>+0.5</sup> <sub>-0.2</sub>
P1	3.75±0.4
P2	7.5±0.4
H0	16.0±0.5*
H	20.0±0.5
W	18.0±0.5
W0	11.5min.
W1	9.0±0.3
W2	3.0max.
t	0.7±0.2
D	To comply with individual sheet
D0	4±0.2
d	To comply with individual sheet
l	0max.
L	11max.
T	To comply with individual sheet
Δ S	0.5max.
Δ h	0.5max.

**Figure 3**

## TAPING STYLE Y

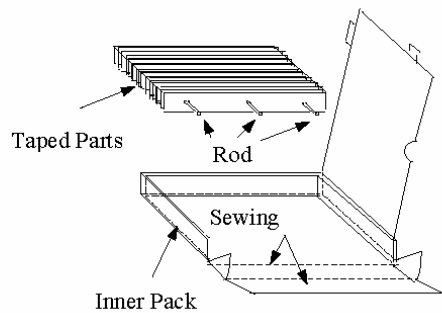
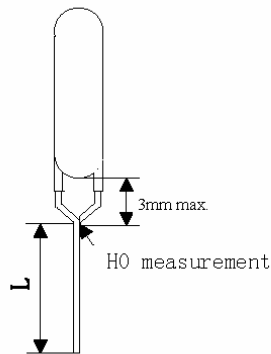
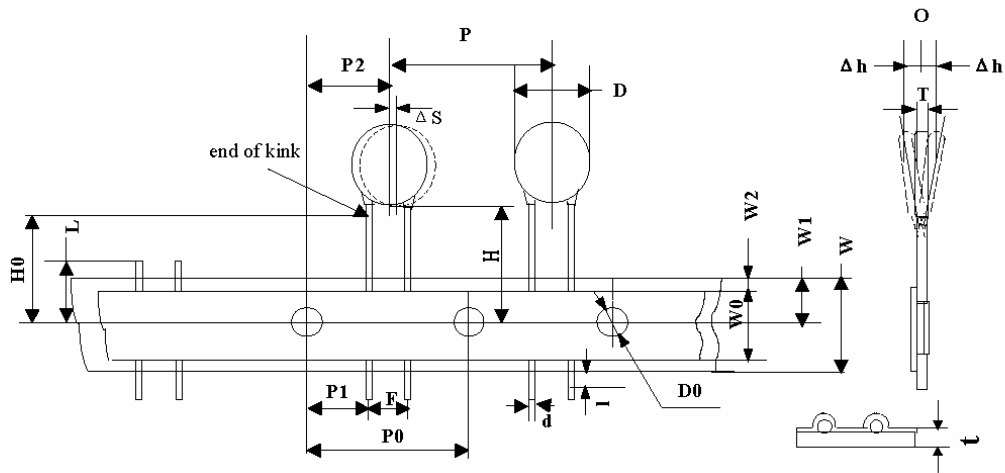


1. \*For lead styles of inside kink and outside kink only
2. The lead sharp shall change with difference of lead style.

Symbol	Dimension(mm)
<b>P0</b>	<b>15.0±0.2</b>
<b>P</b>	<b>30.0±1.0</b>
<b>F</b>	<b>7.5<sup>+0.5</sup><sub>-0.2</sub></b>
<b>P1</b>	<b>3.75±0.40</b>
<b>P2</b>	<b>7.5±0.4</b>
<b>H0</b>	<b>16.0±0.5*</b>
<b>H</b>	<b>20.0±0.5</b>
<b>W</b>	<b>18.0±0.5</b>
<b>W0</b>	<b>11.5min.</b>
<b>W1</b>	<b>9.0±0.3</b>
<b>W2</b>	<b>3.0max.</b>
<b>t</b>	<b>0.7±0.2</b>
<b>D</b>	To comply with individual sheet
<b>D0</b>	<b>4±0.2</b>
<b>d</b>	To comply with individual sheet
<b>l</b>	<b>0max.</b>
<b>L</b>	<b>11max.</b>
<b>T</b>	To comply with individual sheet
<b>Δ S</b>	<b>0.5max.</b>
<b>Δ h</b>	<b>0.5max.</b>

**Figure 4**

## TAPING STYLE S



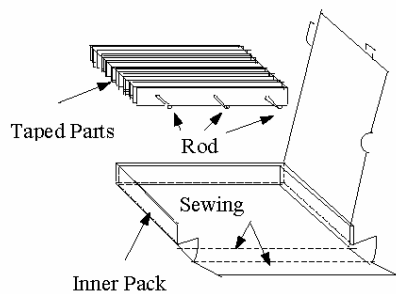
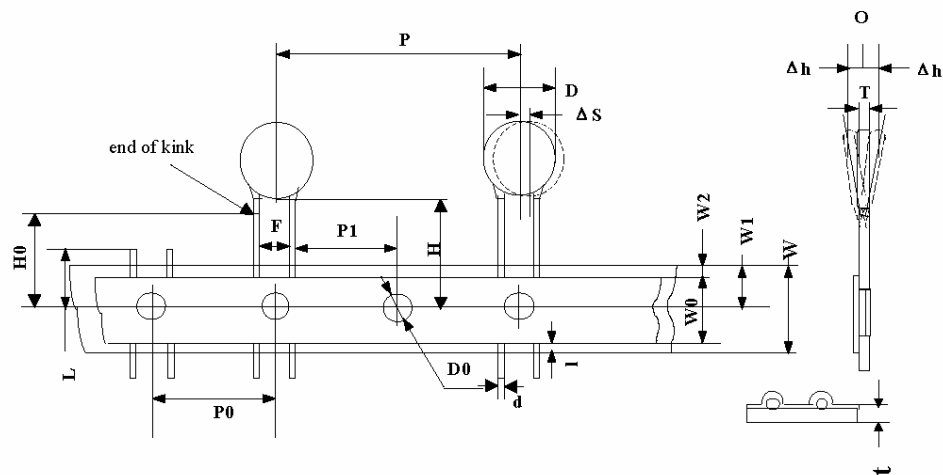
1.\*For crimp lead style only.

2.Crimp shape of lead shall change with lead style.

Symbol	Dimension(mm)
P0	15.0±0.3
P	30.0±2.0
F	7.5±1.0
P1	3.75±1.0
P2	7.5±1.5
H0	16.0±0.5*
H	20.0 <sup>+1.5</sup> <sub>-1.0</sub>
W	18.0±0.5
W0	11.5min.
W1	9.0±0.5
W2	3.0max.
t	0.7±0.2
D	To comply with individual sheet
D0	4±0.3
d	To comply with individual sheet
l	2max.
L	11max.
T	To comply with individual sheet
$\Delta S$	0±1.5
$\Delta h$	2max.

**Figure 5**

## TAPING STYLE U



Symbol	Dimension(mm)
<b>P0</b>	<b><math>12.7 \pm 0.2</math></b>
<b>P</b>	<b><math>25.4 \pm 1.0</math></b>
<b>F</b>	<b><math>10.0^{+0.5}_{-0.2}</math></b>
<b>P1</b>	<b><math>7.7 \pm 0.4</math></b>
<b>P2</b>	
<b>H0</b>	<b><math>16.0 \pm 0.5^*</math></b>
<b>H</b>	<b><math>20.0 \pm 0.5</math></b>
<b>W</b>	<b><math>18.0 \pm 0.5</math></b>
<b>W0</b>	<b>11.5min.</b>
<b>W1</b>	<b><math>9.0 \pm 0.3</math></b>
<b>W<sub>2</sub></b>	<b>3.0max.</b>
<b>t</b>	<b><math>0.7 \pm 0.2</math></b>
<b>D</b>	To comply with individual sheet
<b>D0</b>	<b><math>4 \pm 0.2</math></b>
<b>d</b>	To comply with individual sheet
<b>l</b>	<b>0max.</b>
<b>L</b>	<b>11max.</b>
<b>T</b>	To comply with individual sheet
<b><math>\Delta S</math></b>	<b>0.5max.</b>
<b><math>\Delta h</math></b>	<b>0.5max.</b>

1. \*For lead styles of inside kink and outside kink only
2. The lead sharp shall change with lead style.

**Figure 6**