

SPECIFICATION FOR APPROVAL

CUSTOMER :

DESCRIPTION : DC CERAMIC DISC CAPACITOR

Prepared	Checked	Approved	Date

Revision No.: 02 Page No.2	Prepared	ZHANG ZT	Document No. HM-ES-027/1
	Checked	ZHAO JB	

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	$0 \pm 60 * 10^{-6} / ^\circ\text{C}$
SL	$+100 \text{ to } -1000 * 10^{-6} / ^\circ\text{C}$
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\

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(8) Lead Spacing

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

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

(9) –

(10) 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 ± 5 seconds of charging.	10000M Ω 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	No breakdown or flashover

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Item	Test method	Specification																										
	<p>rated voltage 3000V), or 150% rated voltage (for DCG or SBBLC) shall be applied between leads for 1 to 5 seconds.</p> <p>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.</p>																											
5	<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 border="1" data-bbox="419 745 858 969"> <thead> <tr> <th>Step</th> <th>Temperature</th> </tr> </thead> <tbody> <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> </tbody> </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 = $\frac{C_o - C_1}{C_o}$ or $\frac{C_5 - C_o}{C_o}$ or $\frac{C_5 - C_1}{C_o}$ (whichever is the greater)</p> <p>Where</p> <p>C_o: Capacitance at step 3</p> <p>C_m: Capacitance at step 2 and/or step 4</p> <p>C₁, C₅: Capacitance at step 1 and step 5</p> <p>T_o: 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 & III</p> <table border="1" data-bbox="1035 1059 1431 1361"> <thead> <tr> <th>Temperature characteristic</th> <th>Permitting capacitance change</th> </tr> </thead> <tbody> <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> </tbody> </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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5.2 Mechanical characteristics and test methods

	Item	Test method	Specification
1	Robustness of Termination	The capacitor body shall be held in such a manner so that axis of the lead is vertical. The tensile force of 10 N (for $\Phi 0.6\text{mm}$ lead) or 5N (for $\Phi 0.5\text{mm}$ 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.	The capacitor shall be no broken and the lead shall be no loosened or cut off.
2	Bending	The capacitor is held in such a manner so that axis of the lead is vertical. A mass applying a force of 5N (for $\Phi 0.6\text{mm}$ lead) or 2.5N (for $\Phi 0.5\text{mm}$ lead) is then suspended from the end of the lead. The body of the capacitor is then inclined within a period of 2 to 3 seconds, through an angle of approximately 90° 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.	The lead shall be no broken.

5.3 Endurance characteristics and test methods

	Item	Test method	Specification	
1	Solderability	Solder temperature: $235 \pm 5^\circ\text{C}$ Immersion time: 2 ± 0.5 seconds Immersion speed: $25 \pm 6\text{mm/s}$	A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed.	
2	Vibration	Frequency range: 10~55Hz Amplitude (total excursion): 1.5mm Speed of frequency change: 10~55~10Hz in about 1 minute Total duration: 6 hours This motion shall be applied for 2 hours in each of three mutually perpendicular directions.	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	Solder temperature and immersion time: $260 \pm 5^\circ\text{C}$, 10 ± 0.5 seconds The immersing depth shall be a position 1.27mm from the seating plane. Post-treatment: The capacitor shall be preserved at the standard atmospheric condition for 24 ± 2 hours.	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

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	Item	Test method	Specification	
4	Solvent resistance	The capacitor shall be immersed into isopropylalcohol for 30 ± 5 seconds.	Appearance	No visible damage Legible marking
5	Temperature cycle	The capacitor shall be placed in the test chamber at temperature of $-25 \pm 2^{\circ}\text{C}$ for 30minutes, then at room temperature for 3minutes, at $85 \pm 2^{\circ}\text{C}$ ($125 \pm 2^{\circ}\text{C}$ for YR) for 30minutes and at room temperature for 3minutes. This operation constitutes one cycle. The capacitor shall be subjected to a total of 5 cycles. Post-treatment: The capacitor shall be preserved at the standard atmospheric condition for 24 ± 2 hours.	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	1000M Ω min. 500M Ω min. (SBBLC)
			Voltage proof	For between leads only. Refer to clause 5.1.4
6	Damp heat	The capacitor shall be stored for 500^{+24} hours at a temperature of $40 \pm 2^{\circ}\text{C}$ and a relative humidity of 90 to 95%. Post-treatment: The capacitor shall be preserved for 1 to 2 hours at the standard atmospheric condition.	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	2500M Ω min. (Class I) 1000M Ω min (class II) 500M Ω min (for class III)
			Voltage proof	For between leads only. Refer to clause 5.1.4
7	Endurance	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 $85 \pm 3^{\circ}\text{C}$ ($125 \pm 3^{\circ}\text{C}$ for YR) for 1000^{+48} hours. Post-treatment: The capacitor shall be preserved at the standard atmospheric condition for 24 ± 2 hours.	Appearance	As the same of clause 5.3.5.
			Capacitance change	
			Quality factor or dissipation factor	
			Insulation resistance	
			Voltage proof	

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LEAD STYLE

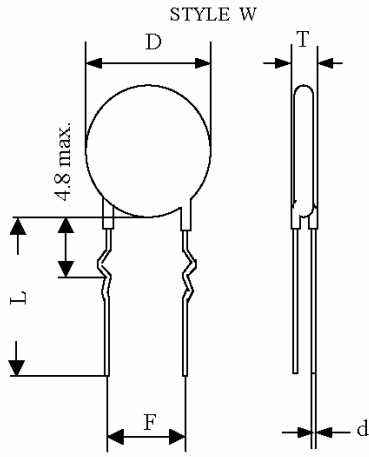


Figure 1-1

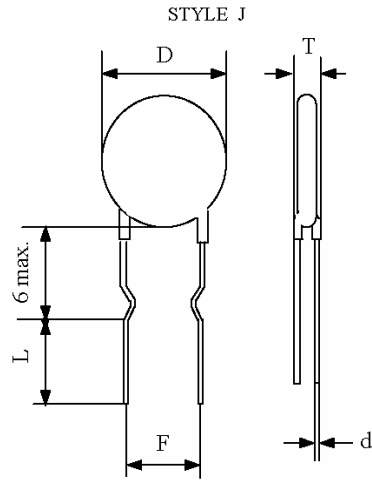


Figure 1-3

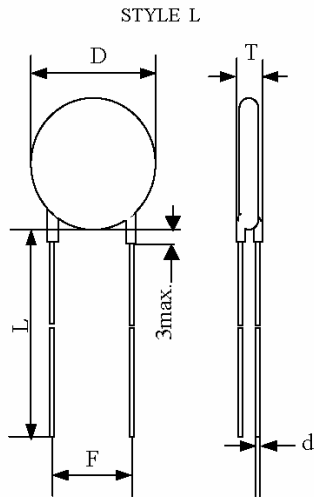


Figure 1-2

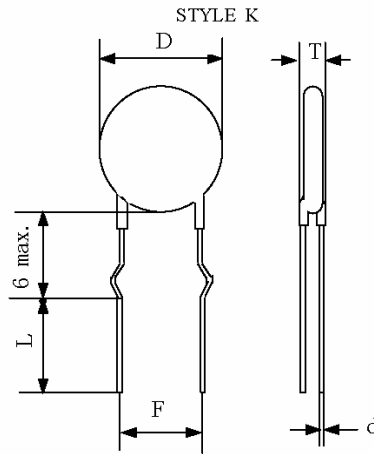


Figure 1-4

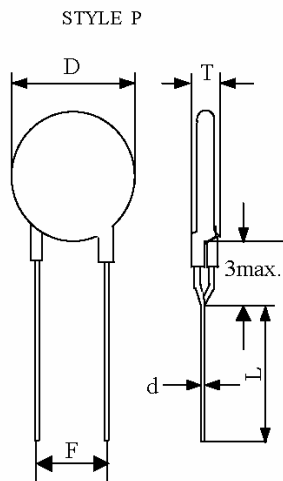


Figure 1-5

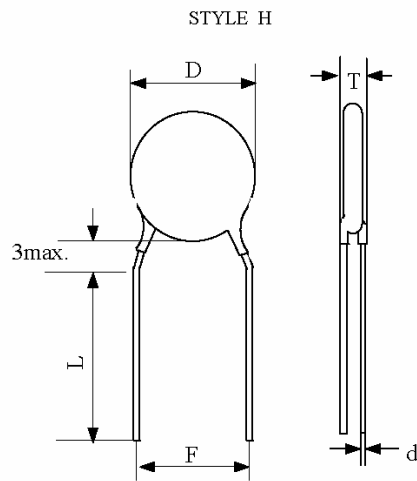
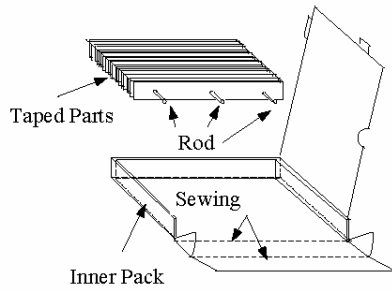
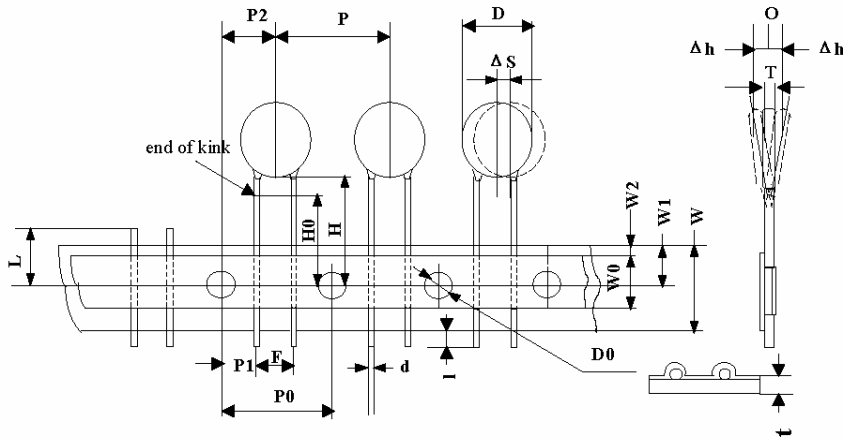


Figure 1-6

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TAPING STYLE F



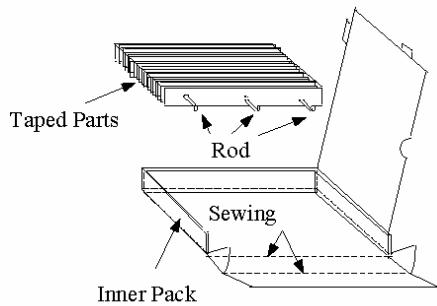
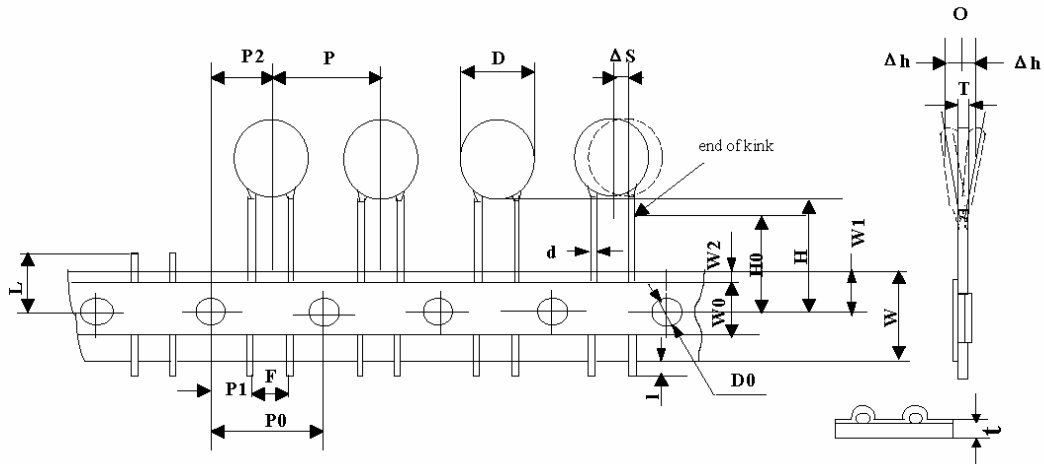
- 1.* For lead styles of inside kink and outside kink only
2. The lead sharp shall change with lead style.

Symbol	Dimension(mm)
P0	12.7±0.2
P	12.7±1.0
F	5.0^{+0.5}_{-0.2}
P1	3.85±0.4
P2	6.35±0.4
H0	16.0±0.5*
H	20.0±0.5
W	18.0±0.5
W0	8.0min.
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
I	0max.
L	11max.
T	To comply with individual sheet
Δ S	0.5max.
Δ h	0.5max.

Figure 2

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TAPING STYLE V



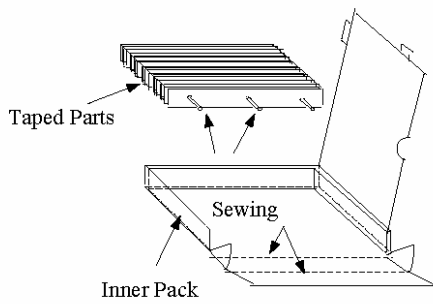
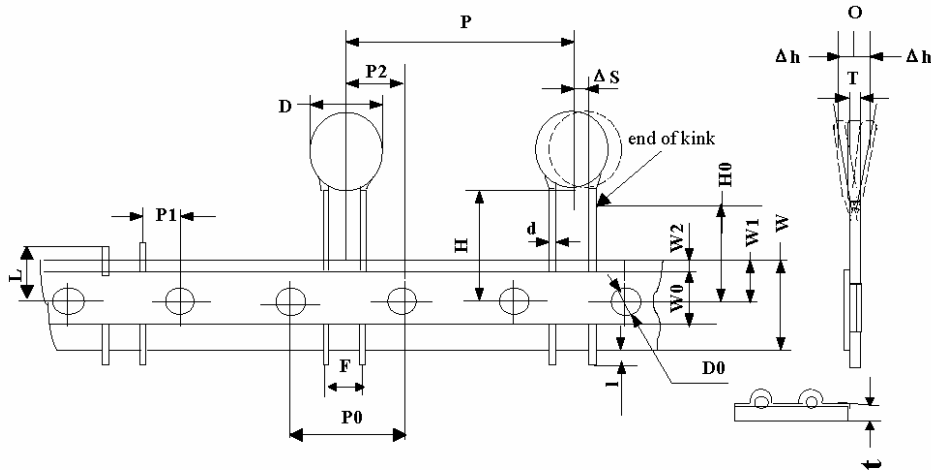
1. * For lead styles of inside kink and outside kink only.
2. The lead sharp shall change with lead style.

Symbol	Dimension(mm)
P0	15.0±0.2
P	15.0±1.0
F	7.5^{+0.5}_{-0.2}
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
I	0max.
L	11max.
T	To comply with individual sheet
Δ S	0.5max.
Δ h	0.5max.

Figure 3

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TAPING STYLE Y



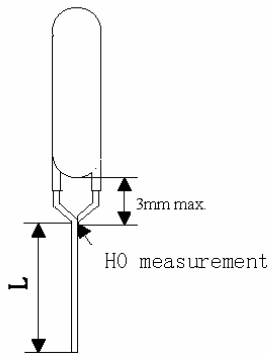
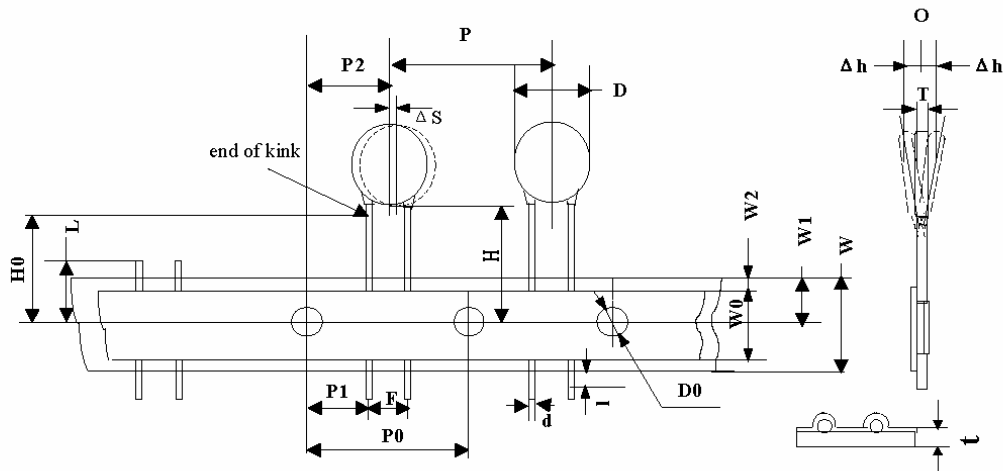
1. *For lead styles of inside kink and outside kink only
2. The lead sharp shall change with difference of lead style.

Symbol	Dimension(mm)
P0	15.0±0.2
P	30.0±1.0
F	7.5^{+0.5}_{-0.2}
P1	3.75±0.40
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 4

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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^{+1.5}_{-1.0}
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
Δ S	0±1.5
Δ h	2max.

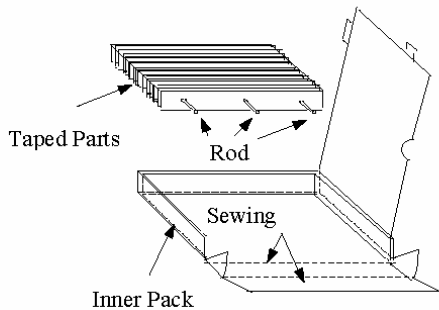
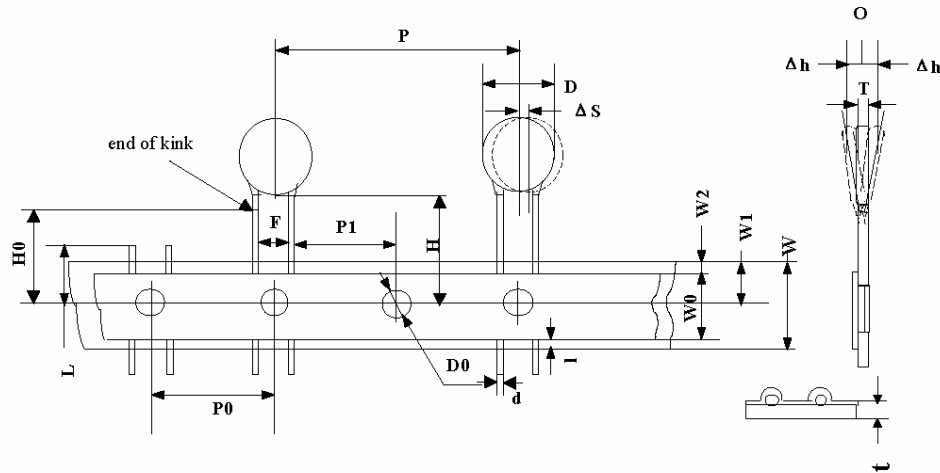


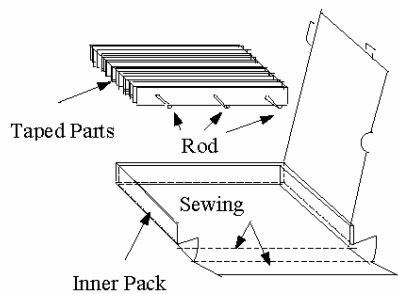
Figure 5

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TAPING STYLE U



Symbol	Dimension(mm)
P0	12.7±0.2
P	25.4±1.0
F	10.0^{+0.5}_{-0.2}
P1	7.7±0.4
P2	
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.



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

Figure 6