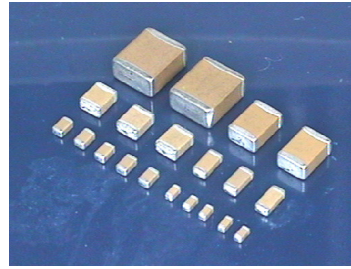


Multilayer Ceramic Chip Capacitors [Low Distortion Capacitor]

LDC Series



Low Distortion Capacitor (NPO/X7R Hybrid)

◆ Features

- Small Size & High Capacitance
- Ultra Stable T/C for a Class II
- Excellent Bias, High Temperature Stability & Low Tan δ
- High Breakdown Voltage
- Replacement for Film Capacitors
- RoHS compliant

◆ Application

- Suitable for Telecommunication (ADSL · Modem...), Power (Inverter for oscillation Circuit) & Audio Circuit

◆ Summary of Specification

Operation Temperature	-55~+125 °C
Rated Voltage	25V and 50Vdc
Temperature Coefficient	X7E : $\leq \pm 4.7\%$, -55~+125 °C (EIA Class II)
Capacitance Range	1nF ~ 270nF
Dissipation Factor :	For 50V : 1.2% max. at 1KHz 25°C
	For 25V : 2.0% max. at 1KHz 25°C
Insulation Resistance	10G Ω or 500/C Ω whichever is smaller
Dielectric Strength	250% Rated Voltage for 5 second @ 50mA max. current
Capacitance Tolerance	$\pm 5\%$, $\pm 10\%$, $\pm 20\%$
Aging	1.0% per decade hr , Typical

◆ How To Order

LDC

1206

C

103

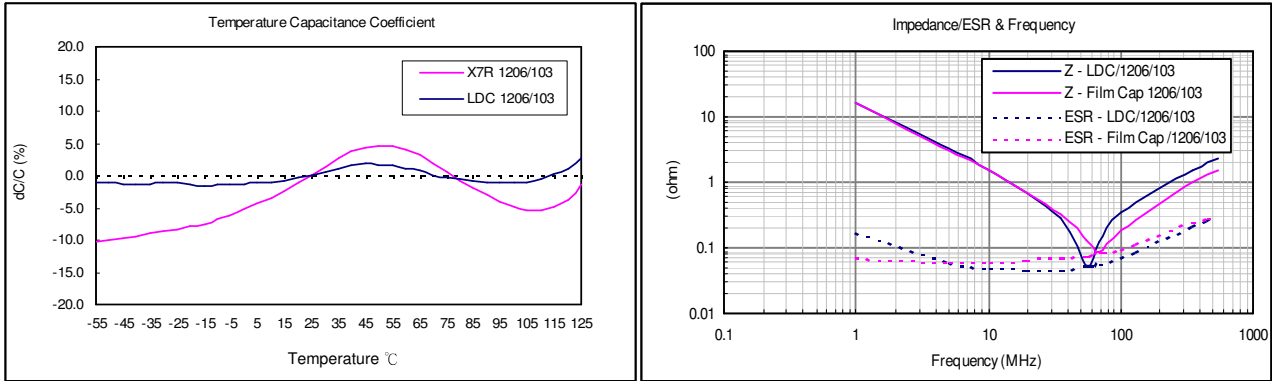
K

025

T

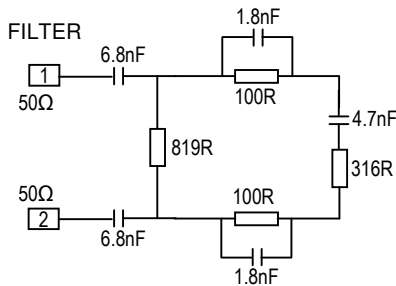
Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Packaging
LDC: Low Distortion Capacitor	Ex.: 0603 : 1.6×0.80 mm 0805 : 2.0×1.25 mm 1206 : 3.2×1.60 mm 1210 : 3.2×2.50 mm 1812 : 4.6×3.20 mm 2220 : 5.7×5.00 mm	C: X7E	Ex.: 102:10×10 ² 224:22×10 ⁴	Ex.: J : +/- 5% K: +/- 10% M: +/- 20%	Ex.: 025:25Vdc 050:50Vdc	T: Taping & Reel B: Bulk

◆ Characteristic

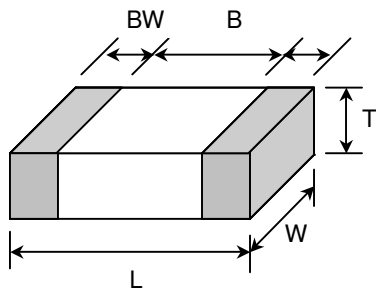


◆ Application

Example Circuit



◆ Dimension



Unit : mm [inches]

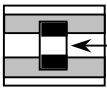
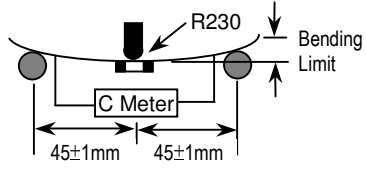
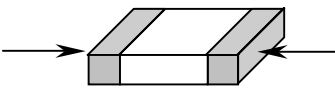
TYPE	L	W	T (max)	B (min)	BW (min)
0603	1.60±0.1 [.063±.004]	0.80±0.1 [.031 ±.004]	0.90 [.035]	0.40 [.016]	0.15 [.006]
0805	2.00±0.2 [.079±.012]	1.25±0.2 [.049 ±.008]	1.45 [.057]	0.70 [.028]	0.20 [.008]
1206	3.20±0.3 [.126±.012]	1.60±0.2 [.126±.012]	1.80 [.071]	1.50 [.059]	0.30 [.012]
1210	3.20±0.3 [.126±.012]	2.50±0.2 [.098±.008]	1.80 [.071]	1.60 [.063]	0.30 [.012]
1812	4.60±0.3 [.181±.012]	3.20±0.3 [.126±.012]	2.20 [.087]	2.50 [.098]	0.30 [.012]
2220	5.70±0.4 [.220±.016]	5.00±0.4 [.197±.016]	2.20 [.087]	3.50 [.137]	0.30 [.012]

◆ Capacitance Range

Dielectric Characteristic	Size	Rated Voltage	Capacitance Range																												
			102	122	152	182	222	272	332	392	472	562	682	822	103	123	153	183	223	273	333	393	473	563	683	823	104	154	224	274	
X7E	0603	50V	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0805	50V																													
	1206	25V																													
		50V																													
	1210	50V																													
	1812	50V																													
2220	50V																														
Symbol Code	S	O	A	B	C	D	E	F	G	H																					
Thickness(mm)	0.3±0.03	0.5±0.05	0.6±0.1	0.85±0.1	1.0±0.1	1.25±0.15	1.6±0.2	2.0±0.2	2.4±0.2	2.8±0.2																					

■ Other dimensions, capacitance values and voltages rating are available. Please contact HEC.

LDC Series Specification & Test Condition

Item	Specification	Test Condition										
Operation Temperature	-55 to +125°C											
Visual	No Abnormal Exterior Appearance	Visual Inspection										
Capacitance	Within The Specified Tolerance	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>1KHz±10%</td> <td>1.0±0.2Vrms</td> </tr> </tbody> </table>	Frequency	Voltage	1KHz±10%	1.0±0.2Vrms						
Frequency	Voltage											
1KHz±10%	1.0±0.2Vrms											
Dissipation Factor	<table border="1"> <thead> <tr> <th>Rated Voltage</th> <th>50V</th> <th>25V</th> </tr> </thead> <tbody> <tr> <td>D.F. (max.)</td> <td>1.2%</td> <td>2.0%</td> </tr> </tbody> </table>	Rated Voltage	50V	25V	D.F. (max.)	1.2%	2.0%	Perform a heat temperature at 150±5°C for 30min. then place at room temp. for 24±2hr.				
Rated Voltage	50V	25V										
D.F. (max.)	1.2%	2.0%										
Insulation Resistance	10,000MΩ or 500/C Ω whichever is smaller. (C in Farad)	Applied Voltage : Rated Voltage Charge Time : 60sec. Current is limited to less than 50mA										
Dielectric Strength	No dielectric breakdown or mechanical breakdown	250% of the rated voltage for 1 to 5 sec. Current is limited to less than 50mA.										
Temperature Capacitance Coefficient	<table border="1"> <thead> <tr> <th>Temperature Range</th> <th>Cap. Change</th> </tr> </thead> <tbody> <tr> <td>-55°C ~ +125°C</td> <td>≤ ± 4.7%</td> </tr> </tbody> </table>	Temperature Range	Cap. Change	-55°C ~ +125°C	≤ ± 4.7%	(C2-C1)/C1 × 100% C1:Capacitance At Standard Temperature(25°C) C2:Capacitance At Test Temperature						
Temperature Range	Cap. Change											
-55°C ~ +125°C	≤ ± 4.7%											
Adhesive Strength of Termination	No indication of peeling shall occur on the terminal electrode.	 <p>5N-f A 5N-f (≈ 0.5Kg-f) pull force shall be applied for 10±1 sec.</p>										
Resistance to Flexure of Substrate	No mechanical damage or change capacitance more than the following table. Capacitance Change : ≤ ±12.5% of initial value	The board shall be bend 1.0mm with a rate of 1.0 mm/sec. 										
Solderability	More than 90% of the terminal surface is to be soldered newly, so metal part does not come out or dissolve . 	Solder Temperature : 245±5°C Dip Time : 5± 0.5 sec. Immersing Speed : 25±10% mm/s Solder : H63A Flux : Rosin Preheat : At 80~120 °C For 10~30sec.										
Resistance To Soldering Heat	<table border="1"> <tbody> <tr> <td>Appearance</td> <td>No mechanical damage shall occur</td> </tr> <tr> <td>Capacitance</td> <td>Cap. change within ±7.5% of initial value</td> </tr> <tr> <td>Tanδ(D.F.)</td> <td>To satisfy the specified initial value</td> </tr> <tr> <td>Insulation Resistance</td> <td>To satisfy the specified initial value</td> </tr> <tr> <td>Dielectric Strength</td> <td>To satisfy the specified initial value</td> </tr> </tbody> </table>	Appearance	No mechanical damage shall occur	Capacitance	Cap. change within ±7.5% of initial value	Tanδ(D.F.)	To satisfy the specified initial value	Insulation Resistance	To satisfy the specified initial value	Dielectric Strength	To satisfy the specified initial value	Preheat : at 150±10°C for 60~120sec. Dip : solder temperature of 260±5°C Dip Time : 10 ± 1sec. Immersing Speed : 25±10% mm/s Solder : H63A Flux : Rosin Measure at room temperature after cooling for 48 ± 4 Hours
Appearance	No mechanical damage shall occur											
Capacitance	Cap. change within ±7.5% of initial value											
Tanδ(D.F.)	To satisfy the specified initial value											
Insulation Resistance	To satisfy the specified initial value											
Dielectric Strength	To satisfy the specified initial value											

LDC Series Specification & Test Condition

Item	Specification	Test Condition															
Temperature Cycle	Appearance	No mechanical damage shall occur															
	Capacitance	Cap. change within $\pm 7.5\%$ of initial value															
	Tan δ (D.F.)	To satisfy the specified initial value															
	Insulation Resistance	To satisfy the specified initial value															
		Capacitor shall be set for 48 \pm 4 hours at room temperature after one hour deage at 150 +0/-10 $^{\circ}$ C before initial measurement. Capacitor shall be subjected to five cycles of the temperature cycle as following:															
		<table border="1"> <thead> <tr> <th>Step</th> <th>Temp.($^{\circ}$C)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min Rated Temp.(-55)+0/-3</td> <td>30</td> </tr> <tr> <td>2</td> <td>25</td> <td>3</td> </tr> <tr> <td>3</td> <td>Max Rated Temp.(+125)+3/-0</td> <td>30</td> </tr> <tr> <td>4</td> <td>25</td> <td>3</td> </tr> </tbody> </table>	Step	Temp.($^{\circ}$ C)	Time(min)	1	Min Rated Temp.(-55)+0/-3	30	2	25	3	3	Max Rated Temp.(+125)+3/-0	30	4	25	3
Step	Temp.($^{\circ}$ C)	Time(min)															
1	Min Rated Temp.(-55)+0/-3	30															
2	25	3															
3	Max Rated Temp.(+125)+3/-0	30															
4	25	3															
		Measure at room temperature after cooling for 48 \pm 4 Hours															

Humidity	Appearance	No mechanical damage shall occur	Capacitor shall be set for 48 \pm 4 hours at room temperature after one hour heat treatment at 150 +0/-10 $^{\circ}$ C before initial measure. Temperature : 40 \pm 2 $^{\circ}$ C Relative Humidity : 90 ~95%RH Test Time : 500 +12/-0 hr				
	Capacitance	Cap. change within $\pm 12.5\%$ of initial value					
	Tan δ (D.F.)	<table border="1"> <thead> <tr> <th>50V</th> <th>25V</th> </tr> </thead> <tbody> <tr> <td>max. 3.5%</td> <td>max. 5.0%</td> </tr> </tbody> </table>		50V	25V	max. 3.5%	max. 5.0%
	50V	25V					
max. 3.5%	max. 5.0%						
Insulation Resistance	1,000M Ω or 50/C Ω whichever is smaller. (C in Farad)						
		Measure at room temperature after cooling for 48 \pm 4 Hours					

Humidity Loading	Appearance	No mechanical damage shall occur	Capacitors applied DC voltage of the rated voltage is applied for one hour at maximum operation temperature $\pm 3^{\circ}$ C then shall be set for 48 \pm 4 hours at room temperature and the initial measurement shall be conducted. Applied Voltage :Rated Voltage Temperature : 40 $\pm 2^{\circ}$ C Relative Humidity : 90 ~ 95%RH Test Time : 500 +12/-0Hr Current Applied : 50 mA Max.				
	Capacitance	Cap. change within $\pm 12.5\%$ of initial value					
	Tan δ (D.F.)	<table border="1"> <thead> <tr> <th>50V</th> <th>25V</th> </tr> </thead> <tbody> <tr> <td>max. 3.5%</td> <td>max. 5.0%</td> </tr> </tbody> </table>		50V	25V	max. 3.5%	max. 5.0%
	50V	25V					
max. 3.5%	max. 5.0%						
Insulation Resistance	500M Ω or 25/C Ω whichever is smaller. (C in Farad)						
		Measure at room temperature after cooling for 48 \pm 4 Hours					

High Temperature Load (Life Test)	Appearance	No mechanical damage shall occur	Capacitors applied DC voltage of 200% the rated voltage is applied for one hour at maximum operation temperature $\pm 3^{\circ}$ C then shall be set for 48 \pm 4 hours at room temperature and the initial measurement shall be conducted. Applied Voltage :200% of Rated Voltage Temperature : max. operation temperature Test Time : 1000 +48/-0Hr Current Applied : 50 mA Max.				
	Capacitance	Cap. change within $\pm 15\%$ of initial value					
	Tan δ (D.F.)	<table border="1"> <thead> <tr> <th>50V</th> <th>25V</th> </tr> </thead> <tbody> <tr> <td>max. 3.5%</td> <td>max. 5.0%</td> </tr> </tbody> </table>		50V	25V	max. 3.5%	max. 5.0%
	50V	25V					
max. 3.5%	max. 5.0%						
Insulation Resistance	1,000M Ω or 50/C Ω whichever is smaller. (C in Farad)						
		Measure at room temperature after cooling for 48 \pm 4 Hours					