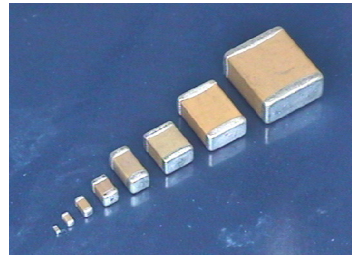


Multilayer Ceramic Chip Capacitors [Normal Chip Capacitor – NPO,X7R,X5R,Y5V] NCC Series



Standard Multilayer Ceramic Chip Capacitors (MLCC's) are available in a full line of sizes and temperature coefficients, with voltage ratings from 6.3V to 50V.

◆ Features

- Surface mount suited for wave and reflow soldering
- Small size and high reliability
- Excellent in high frequency characteristic
- RoHS compliant

◆ Application

- Suitable for general electronics circuit, telecommunications, personal computers and peripheral, power circuit & mobile application...etc.

◆ Summary of Specification

NPO Dielectric Characteristic

Operation Temperature : -55~+125 °C
 Temperature Coefficient : ± 30 ppm/°C , -55~+125 °C (EIA Class I)
 Capacitance Range : 0.5pF to 820pF
 Dissipation Factor : more than 30pF: $Q \geq 1000$ (0.001)
 30pF& below : $Q \geq 400+20C$ C:pF
 Insulation Resistance : 10G Ω or 500/C Ω whichever is smaller
 Aging : 0 % per decade of time, typical
 Dielectric Strength : 250% Rated Voltage

X7R Dielectric Characteristic

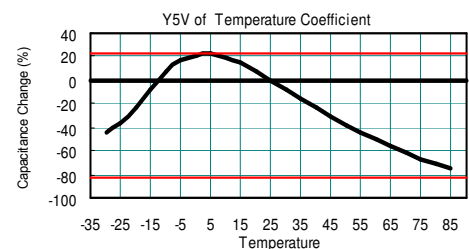
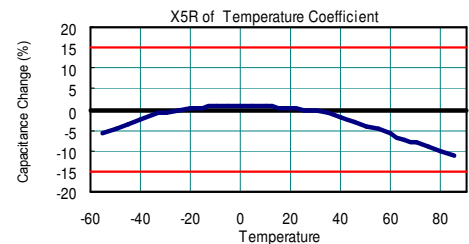
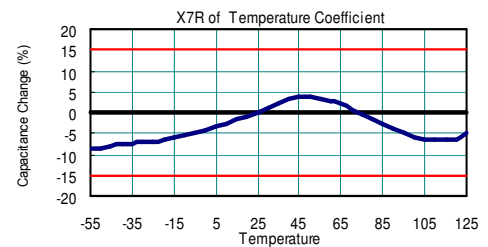
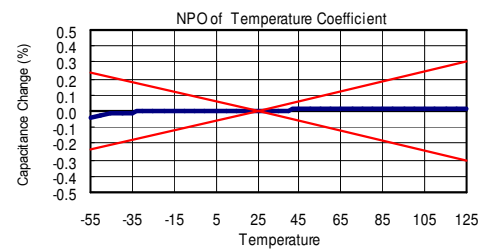
Operation Temperature : -55~+125 °C
 Temperature Coefficient : $\pm 15\%$, -55~+125 °C (EIA Class II)
 Capacitance Range : 100pF to 680nF
 Dissipation Factor : Please see HEC specification data sheet
 Insulation Resistance : 10G Ω or 500/C Ω whichever is smaller
 Aging : ≤ 2.5 % per decade hr, typical
 Dielectric Strength : 250% Rated Voltage

X5R Dielectric Characteristic

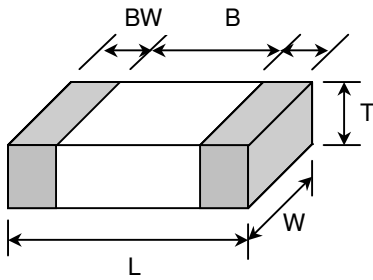
Operation Temperature : -55~+85 °C
 Temperature Coefficient : $\pm 15\%$, -55~+85 °C (EIA Class II)
 Capacitance Range : 3.3nF to 680nF
 Dissipation Factor : Please see HEC specification data sheet
 Insulation Resistance : 10G Ω or 500/C Ω whichever is smaller
 Aging : ≤ 2.5 % per decade hr , typical
 Dielectric Strength : 250% Rated Voltage

Y5V Dielectric Characteristic

Operation Temperature : -30~+85 °C
 Temperature Coefficient : +22/-82 % , -30~+85 °C (EIA Class II)
 Capacitance Range : 1nF to 470nF
 Dissipation Factor : Please see HEC specification data sheet
 Insulation Resistance : 10G Ω or 500/C Ω whichever is smaller
 Aging : ≤ 7.0 % per decade hr , typical
 Dielectric Strength : 250% Rated Voltage



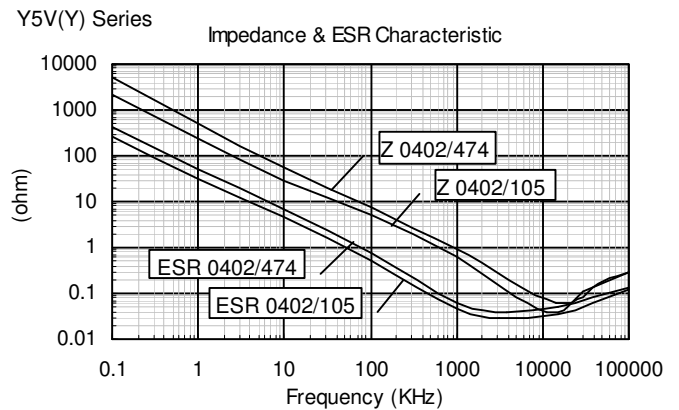
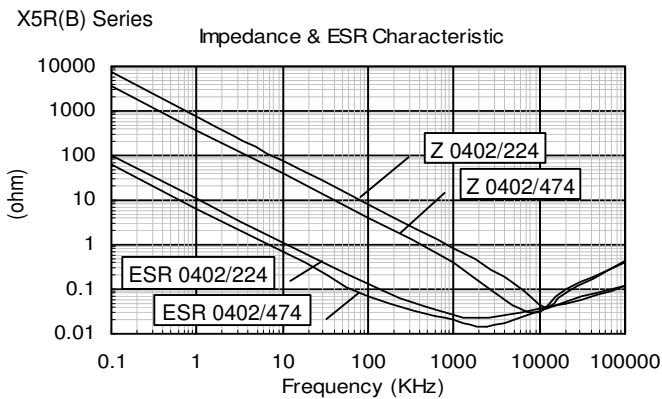
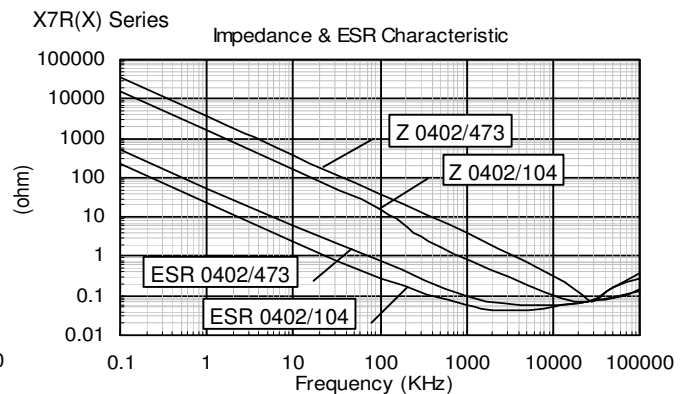
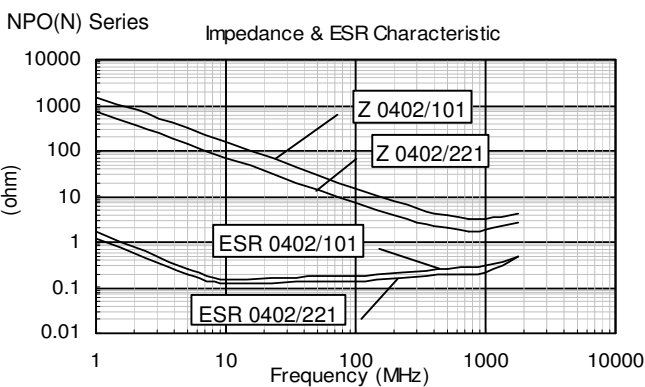
◆ Dimension



Unit : mm [inches]

TYPE	L	W	T (max)	B (min)	BW (min)
0201	0.60±0.03 [.024±.001]	0.30±0.03 [.011 ±.001]	0.33 [.013]	0.20 [.008]	0.10 [.004]
0402	1.00±0.05 [.039±.002]	0.50±0.05 [.020 ±.002]	0.55 [.022]	0.30 [.012]	0.15 [.006]
0603	1.60±0.10 [.063±.004]	0.80±0.10 [.031 ±.004]	0.90 [.035]	0.40 [.016]	0.15 [.006]
0805	2.00±0.20 [.079±.012]	1.25±0.20 [.049 ±.008]	1.45 [.057]	0.70 [.028]	0.20 [.008]
1206	3.20±0.30 [.126±.012]	1.60±0.20 [.126±.012]	1.80 [.071]	1.50 [.059]	0.30 [.012]

◆ Characteristic

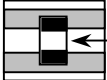
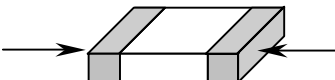


◆ How To Order

C 0402 B 104 M 010 T

Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Packaging
C: MLCC (Multilayer Ceramic Chip of Capacitor)	Ex.: 0201 : 0.6×0.30 mm 0402 : 1.0×0.50 mm 0603 : 1.6×0.80 mm 0805: 2.0×1.25 mm 1206 : 3.2×1.60 mm	Ex.: N: NPO X: X7R B:X5R Y:Y5V	Ex.: 102:10×10 ² 473:47×10 ³ 104:10×10 ⁴	Ex.: C: +/- 0.25pF D: +/- 0.50pF F: +/- 1% G: +/- 2% J: +/- 5% K: +/- 10% M: +/- 20% Z : +80/-20%	Ex.: 007: 6.3Vdc 010: 10Vdc 016: 16Vdc 025: 25Vdc 050: 50Vdc	T: Taping & Reel B: Bulk

NCC Series Specification & Test Condition

Item	Specification		Test Condition
Operation Temperature	Char.	Operation Temp.	
	NPO(N)	-55°C ~ +125°C	
	X7R (X)	-55°C ~ +125°C	
	X5R (B)	-55°C ~ +85°C	
	Y5V (Y)	-30°C ~ +85°C	
Visual	No abnormal exterior appearance		Visual Inspection
Capacitance	Within The Specified Tolerance		Char. Frequency Voltage
Quality Factor	Class I (NPO): More Than 30pF : $Q \geq 1000$ 30pF & Below: $Q \geq 400 + 20C$ (C:Cap., pF)		NPO C≤100pF 1MHz±10% 1.0±0.2Vrms C>100pF 1KHz±10%
			X7R/X5R/Y5V 1KHz±10% 1.0±0.2Vrms
			Perform a heat temperature at 150±5°C for 30min. then place at room temp. for 24±2hr.
Dissipation Factor	Class II (X7R/X5R/Y5V): Please see HEC specification data sheet for details		
Insulation Resistance	10,000MΩ or 500/C Ω whichever is smaller for rated voltage>10V and greater 100/C Ω for rated voltage≤10V.		Applied Voltage : Rated Voltage Charge Time : 60±5 sec. Charge-Discharge current shall be less than 50mA current.
Withstanding Voltage	No dielectric breakdown or mechanical breakdown		250% of the rated voltage for 1~5 sec. Current is limited to less than 50mA
Temperature Capacitance Coefficient	Char.	Temp. Range	Cap. Change
	NPO(N)	-55°C ~ +125°C	± 30ppm/°C
	X7R (X)	-55°C ~ +125°C	± 15%
	X5R (B)	-55°C ~ +85°C	± 15%
	Y5V (Y)	-30°C ~ +85°C	+22-82%
Adhesive Strength of Termination	No indication of peeling shall occur on the terminal electrode.		 A 5N-f (≈ 0.5Kg-f) pull force shall be applied for 10±1 sec.
	Resistance to Flexure of Substrate	No mechanical damage or capacitance change more than the following table.	
Char.		Capacitance Change	
NPO(N)		≤ ± 5.0% of initial value	
X7R (X)		≤ ± 12.5% of initial value	
X5R (B)		≤ ± 12.5% of initial value	
Y5V (Y)	≤ ± 30.0% of initial value		
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.

NCC Series Specification & Test Condition

Item	Specification	Test Condition																
Resistance to Soldering Heat	Appearance	No mechanical damage shall occur																
	Capacitance	Class I (NPO): Within 2.5% or $\pm 0.25\text{pF}$ whichever is larger of initial value Class II : Char. Cap. change <u>X7R(X)</u> $\leq \pm 7.5\%$ of initial value <u>X5R(B)</u> $\leq \pm 7.5\%$ of initial value <u>Y5V(Y)</u> $\leq \pm 20\%$ of initial value	Class II capacitor shall be set for 48 ± 4 hours at room temperature after one hour heat treatment at $150 \pm 0/-10^\circ\text{C}$ before initial measure. Preheat : at $150 \pm 10^\circ\text{C}$ for 60~120sec. Dip : solder temperature of $260 \pm 5^\circ\text{C}$ Dip Time : 10 ± 1 sec. Immersing Speed : $25 \pm 10\%$ mm/s Solder : H63A Flux : Rosin															
	Q / Tan δ	To satisfy the specified initial value	Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours															
	Insulation Resistance	To satisfy the specified initial value																
Temperature Cycle	Appearance	No mechanical damage shall occur																
	Capacitance	Class I (NPO): Within 2.5% or $\pm 0.25\text{pF}$ whichever is larger of initial value Class II : Char. Cap. change <u>X7R(X)</u> $\leq \pm 7.5\%$ of initial value <u>X5R(B)</u> $\leq \pm 7.5\%$ of initial value <u>Y5V(Y)</u> $\leq \pm 20\%$ of initial value	Class II capacitor shall be set for 48 ± 4 hours at room temperature after one hour heat treatment at $150 \pm 0/-10^\circ\text{C}$ before initial measure. Capacitor shall be subjected to five cycles of the temperature cycle as following:															
	Q / Tan δ	To satisfy the specified initial value	<table border="1"> <thead> <tr> <th>Step</th> <th>Temp.($^\circ\text{C}$)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min Rated Temp.+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.+3/-0</td> <td>30</td> </tr> <tr> <td>4</td> <td>25</td> <td>3</td> </tr> </tbody> </table>	Step	Temp.($^\circ\text{C}$)	Time(min)	1	Min Rated Temp.+0/-3	30	2	25	3	3	Max Rated Temp.+3/-0	30	4	25	3
	Step	Temp.($^\circ\text{C}$)	Time(min)															
	1	Min Rated Temp.+0/-3	30															
2	25	3																
3	Max Rated Temp.+3/-0	30																
4	25	3																
Insulation Resistance	To satisfy the specified initial value	Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours																
Humidity	Appearance	No mechanical damage shall occur																
	Capacitance	Class I (NPO): Within 5.0% or $\pm 0.5\text{pF}$ whichever is larger of initial value Class II : Char. Cap. change <u>X7R(X)</u> $\leq \pm 12.5\%$ of initial value <u>X5R(B)</u> $\leq \pm 12.5\%$ of initial value <u>Y5V(Y)</u> $\leq \pm 30\%$ of initial value	Class II capacitor shall be set for 48 ± 4 hours at room temperature after one hour heat treatment at $150 \pm 0/-10^\circ\text{C}$ before initial measure. Temperature : $40 \pm 2^\circ\text{C}$ Relative Humidity : 90 ~95%RH Test Time : $500 \pm 12/-0$ hr															
	Q Class I	30pF & Over : $Q \geq 350$ 10 to 30pF : $Q \geq 275 + 2.5C$ 30pF & Below: $Q \geq 200 + 10C$	Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours															
	Tan δ Class II	Please see HEC specification data sheet for details																
	Insulation Resistance	1,000M Ω or 50/C Ω whichever is smaller for rated voltage $> 10\text{V}$ and greater 10/C Ω for rated voltage $\leq 10\text{V}$. (C in Farad)																

NCC Series Specification & Test Condition

Item	Specification	Test Condition	
Humidity Loading	Appearance	No mechanical damage shall occur	
	Capacitance	Class I (NPO): Within 7.5% or $\pm 0.75\text{pF}$ whichever is larger of initial value Class II : Char. Cap. change <u>X7R(X)</u> $\leq \pm 12.5\%$ of initial value <u>X5R(B)</u> $\leq \pm 12.5\%$ of initial value <u>Y5V(Y)</u> $\leq \pm 30\%$ of initial value	Class II capacitors applied DC voltage of the rated voltage is applied for one hour at maximum operation temperature $\pm 3^\circ\text{C}$ then shall be set for 48 ± 4 hours at room temperature and the initial measurement shall be conducted. Applied Voltage : Rated Voltage Temperature : $40 \pm 2^\circ\text{C}$ Relative Humidity : 90 ~95%RH Test Time : 500 +12/-0Hr Current Applied : 50 mA Max.
	Q Class I	30pF & Over : $Q \geq 350$ 10 to 30pF : $Q \geq 275 + 2.5C$ 30pF & Below: $Q \geq 200 + 10C$	Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours
	Tan δ Class II	Please see HEC specification data sheet for details	
	Insulation Resistance	500M Ω or 25/C Ω whichever is smaller for rated voltage >10V and greater 5/C Ω for rated voltage $\leq 10\text{V}$. (C in Farad)	
High Temperature Load (Life Test)	Appearance	No mechanical damage shall occur	
	Capacitance	Class I (NPO): Within 5.0% or $\pm 0.5\text{pF}$ whichever is larger of initial value Class II : Char. Cap. change <u>X7R(X)</u> $\leq \pm 12.5\%$ of initial value <u>X5R(B)</u> $\leq \pm 12.5\%$ of initial value <u>Y5V(Y)</u> $\leq \pm 30\%$ of initial value	Class II capacitors applied DC testing voltages is applied for one hour at maximum operation temperature $\pm 3^\circ\text{C}$ then shall be set for 48 ± 4 hours at room temperature and the initial measurement shall be conducted. Applied Voltage : please see HEC specification data sheet. Temperature : max. operation temperature Test Time : 1000 +48/-0Hr Current Applied : 50 mA Max.
	Q Class I	30pF & Over : $Q \geq 350$ 10 to 30pF : $Q \geq 275 + 2.5C$ 30pF & Below: $Q \geq 200 + 10C$	Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours
	Tan δ Class II	Please see HEC specification data sheet for details	
	Insulation Resistance	1,000M Ω or 50/C Ω whichever is smaller for rated voltage >10V and greater 10/C Ω for rated voltage $\leq 10\text{V}$. (C in Farad)	
Vibration	Appearance	No mechanical damage shall occur	
	Capacitance	Within the specified tolerance	
	Q / Tan δ	To satisfy the specified initial value	Solder the capacitor on P.C. board. Vibrate the capacitor with amplitude of 1.5mm P-P changing the frequencies from 10Hz to 55Hz and back to 10Hz in about 1 min. Repeat this for 2 hours each in 3 perpendicular directions.