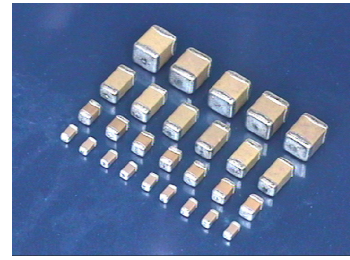


Multilayer Ceramic Chip Capacitors [High Capacitance MLCC—More Than 1.0uF]

HCC Series – X7R,X6S,X5R,Y5V



◆ Features.

- ❑ Surface mount suited for wave and reflow soldering
- ❑ High reliability and no polarity
- ❑ Small size and high capacitance value
- ❑ Excellent in high frequency characteristic
- ❑ RoHS compliant

◆ Application

- ❑ Ideal for smoothing and decoupling circuits
- ❑ Suitable for DC-DC converter, personal computer and peripherals, telecommunication and general electronic equipment

◆ Summary of Specification

X7R Dielectric Characteristic

Operation Temperature : -55~+125 °C
 Temperature Coefficient : ± 15% under -55~+125 °C (EIA Class II)
 Capacitance Range : 1.0uF to 22uF
 Dissipation Factor : Please see HEC specification data sheet
 Insulation Resistance : 10GΩ or 500/C Ω whichever is smaller
 Aging : ≤ 2.5 % per decade hr , typical
 Dielectric Strength : 250% Rated Voltage

X6S Dielectric Characteristic

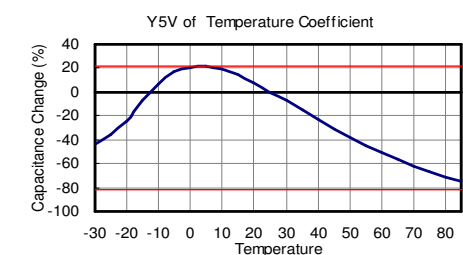
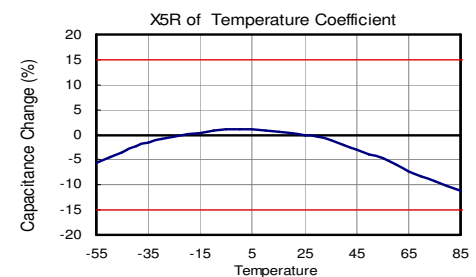
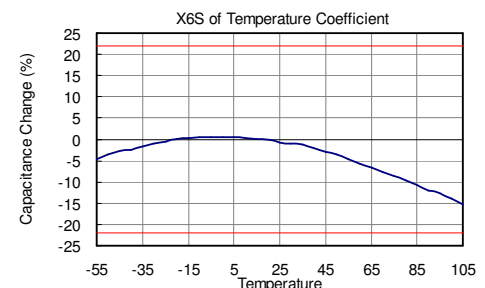
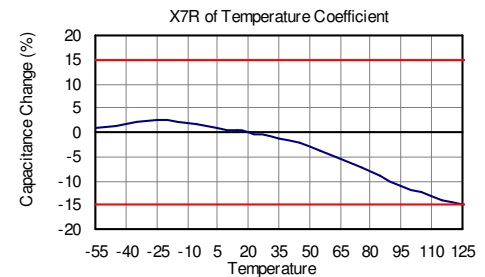
Operation Temperature : -55~+105 °C
 Temperature Coefficient : ± 22% under -55~+105 °C (EIA Class II)
 Capacitance Range : 1.0uF to 22uF
 Dissipation Factor : Please see HEC specification data sheet
 Insulation Resistance : 10GΩ or 500/C Ω whichever is smaller
 Aging : ≤ 2.5 % per decade hr , typical
 Dielectric Strength : 250% Rated Voltage

X5R Dielectric Characteristic

Operation Temperature : -55~+85 °C
 Temperature Coefficient : ± 15% under -55~+85 °C (EIA Class II)
 Capacitance Range : 1.0uF to 100uF
 Dissipation Factor : Please see HEC specification data sheet
 Insulation Resistance : 10GΩ or 500/C Ω whichever is smaller
 Aging : ≤ 2.5 % per decade hr , typical
 Dielectric Strength : 250% Rated Voltage

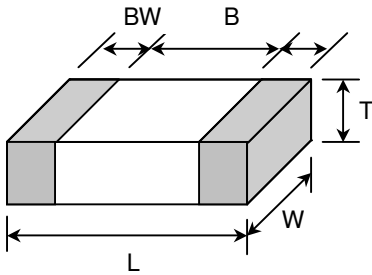
Y5V Dielectric Characteristic

Operation Temperature : -30~+85 °C
 Temperature Coefficient : +22/ -82 %, -30~+85 °C (EIA Class II)
 Capacitance Range : 1.0uF to 47uF
 Dissipation Factor : Please see HEC specification data sheet.
 Insulation Resistance : 10GΩ or 500/C Ω whichever is smaller
 Aging : ≤ 7.0 % per decade hr , typical
 Dielectric Strength : 250% Rated Voltage



◆ Dimension

Unit : mm [inches]

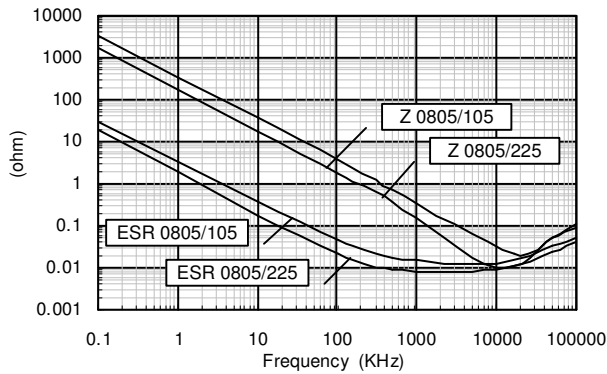


TYPE	L	W	T (max)	B (min)	BW (min)
0402	1.00±0.05 [.039±.002]	0.50±0.05 [.020±.002]	0.55 [.022]	0.30 [.012]	0.15 [.006]
0603	1.60±0.10 [.063±.004]	0.80±0.10 [.031±.004]	0.90 [.035]	0.40 [.016]	0.15 [.006]
0805	2.00±0.20 [.079±.012]	1.25±0.20 [.049±.008]	1.45 [.057]	0.70 [.028]	0.20 [.008]
1206	3.20±0.30 [.126±.012]	1.60±0.20 [.126±.012]	1.80 [.071]	1.50 [.059]	0.30 [.012]
1210	3.20±0.30 [.126±.012]	2.50±0.20 [.098±.008]	2.60 [.102]	1.60 [.063]	0.30 [.012]
1812	4.60±0.3 [.181±.012]	3.20±0.3 [.126±.012]	3.00 [.118]	2.50 [.098]	0.30 [.012]
2220	5.7±0.40 [.220±.016]	5.00±0.40 [.197±.016]	3.00 [.118]	3.50 [.137]	0.30 [.012]

◆ Characteristic

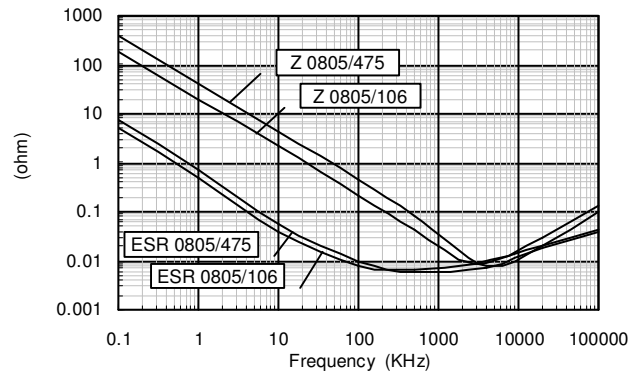
X7R(X) Series

Impedance & ESR Characteristic



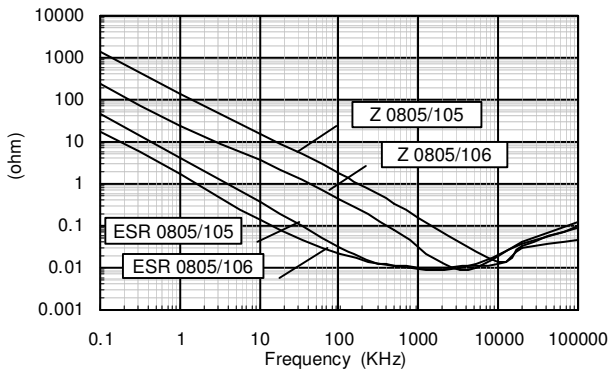
X5R(B) Series

Impedance & ESR Characteristic



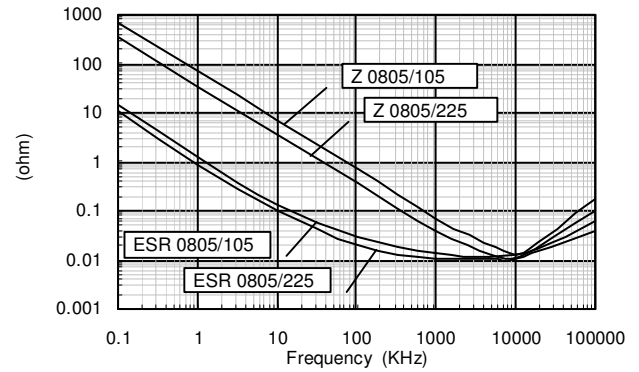
Y5V(Y) Series

Impedance & ESR Characteristic



X6S(S) Series

Impedance/ESR & Frequency



◆ How To Order

C 0805 B 106 M 010 T

Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Packaging
C: MLCC (Multilayer Ceramic Chip of Capacitor)	0402 : 1.0×0.50 mm 0603 : 1.6×0.80 mm 0805 : 2.0×1.25 mm 1206 : 3.2×1.6 mm 1210 : 3.2×2.5 mm	Ex.: X:X7R S:X6S B:X5R Y:Y5V	Ex.: 105:10×10 ⁵ 106:10×10 ⁶ 226:22×10 ⁶	Ex.: J : +/- 5% K : +/- 10% M : +/- 20% Z : +80/-20%	Ex.: 004: 4Vdc 007: 6.3Vdc 010: 10Vdc 016: 16Vdc 025: 25Vdc 035: 35Vdc 050: 50Vdc	T: Taping & Reel B: Bulk

◆ Capacitance Range

X7R (X) Series																			
Size	0603			0805				1206				1210				1812	2220		
Code	6.3V	10V	16V	6.3V	10V	16V	25V	10V	16V	25V	35V	50V	10V	16V	25V	35V	35V	35V	
105	B	B	B		D	D	D		E	E	E	E		E	E	E	F	F	
155																	F	F	
225	B	B		D	D	D		E	E	E				E	E/F	F	F	F	
335				D	D			E	E									F	
475				D	D	D		E	E	E				E	F	F		F	
106				D				E	E					E	E	F			G
226														G					

X6S (S) Series																			
Size	0402	0603				0805				1206					1210				
Code	6.3V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	35V	50V	10V	16V	25V	50V
105	O	B	B	B	B			D	D					E	E				F
225		B	B				D	D	D				E	E					F
475		B				D	D	D	D		E	E	E				F	F	
106						D	D			E	E	E				F	F	G	
226						D				E						G	G		

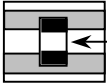
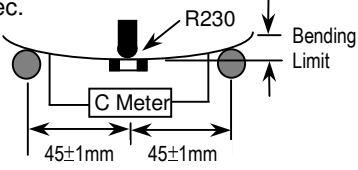
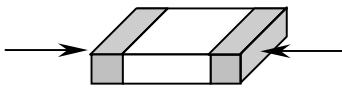
X5R (B) Series																								
Size	0402	0603					0805					1206					1210							
Code	6.3V	10V	4V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	35V	50V	6.3V	10V	16V	25V	35V	
105	O	O		B	B	B	B			D	D	D			E	E	E	E						F
155															E	E								
225	O			B	B	B			D	D	D	D			E	E	E				E	E/F	F	
335									D	D	D	D			E	E	E							
475				B	B				D	D	D	D		E	E	E	E				F	F	F	F
106			B	B					D	D	D	D		E	E	E	E				F	F	F	F/G
226								D	D					E	E	E				G	G	G	G	
476														E	E					G	G			
107																				G				

Y5V (Y) Series																									
Size	0402	0603				0805					1206					1210					1812				
Code	6.3V	10V	6.3	10V	16V	25V	6.3V	10V	16V	25V	50V	10V	16V	25V	35V	50V	6.3V	10V	16V	25V	35V	50V	35V	50V	
105	O	O		B	B	B			B	B	D		B	D	D	D									
225			B	B	B			D	D	D			B	D	D										
475			B	B			D	D	D				D	D						F	F	F	F	F	
106							D	D	D			D	D/E	D/E						E	F	F	F	F	F
226							D					D	D/E							F	F			F	F
476																	F	F							
107																	G								

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.

HCC Series Specification & Test Condition

Item	Specification		Test Condition	
Operation Temperature	Char.	Operation Temp.		
	X7R (X)	-55°C ~ +125°C		
	X6S (S)	-55°C ~ +105°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		Capacitance Frequency Voltage	
Dissipation Factor	Please see HEC specification data sheet for details		$C \leq 10\mu\text{F}$ 1KHz \pm 10% 1.0 \pm 0.2Vrms	
			$C > 10\mu\text{F}$ 120Hz \pm 20% 0.5 \pm 0.2Vrms	
			Perform a heat temperature at 150 \pm 5°C for 30min. then place at room temp. for 24 \pm 2hr.	
Insulation Resistance	10,000M Ω or 500/C Ω whichever is smaller for rated voltage $>$ 10V and greater 100/C Ω for rated voltage \leq 10V.		Applied Voltage : Rated Voltage Charge Time : 60 \pm 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	$(C2-C1)/C1 \times 100\%$ C1:Capacitance At Standard Temperature (25°C) C2:Capacitance At Test Temperature The detail condition please see HEC specification data sheet.	
	X7R (X)	-55°C ~ +125°C		$\pm 15\%$
	X6S (S)	-55°C ~ +105°C		$\pm 22\%$
	X5R (B)	-55°C ~ +85°C		$\pm 15\%$
	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 (\approx 0.5Kg-f) pull force shall be applied for 10 \pm 1 sec.	
Resistance to Flexure of Substrate	No mechanical damage or capacitance change more than the following table.		The board shall be bend 1.0mm with a rate of 1.0 mm/sec. 	
	Char.	Capacitance Change		
	X7R(X)	$\leq \pm 12.5\%$ of initial value		
	X6S(S)	$\leq \pm 12.5\%$ of initial value		
	X5R(B)	$\leq \pm 12.5\%$ of initial value		
	Y5V(Y)	$\leq \pm 30.0\%$ 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 \pm 5°C Dip Time : 5 \pm 0.5 sec. Immersing Speed : 25 \pm 10% mm/s Solder : H63A Flux : Rosin Preheat : At 80~120 °C For 10~30sec.	
				

HCC Series Specification & Test Condition

Item	Specification	Test Condition
Resistance to Soldering Heat	Appearance	No mechanical damage shall occur
	Capacitance	Char. Cap. change
		X7R(X) $\leq \pm 7.5\%$ of initial value
		X6S(S) $\leq \pm 7.5\%$ of initial value
		X5R(B) $\leq \pm 7.5\%$ of initial value
Y5V(Y) $\leq \pm 20\%$ of initial value		
Tan δ	To satisfy the specified initial value	
Insulation Resistance	To satisfy the specified initial value	
Temperature Cycle	Appearance	No mechanical damage shall occur
	Capacitance	Char. Cap. change
		X7R(X) $\leq \pm 7.5\%$ of initial value
		X6S(S) $\leq \pm 7.5\%$ of initial value
		X5R(B) $\leq \pm 7.5\%$ of initial value
Y5V(Y) $\leq \pm 20\%$ of initial value		
Tan δ	To satisfy the specified initial value	
Insulation Resistance	To satisfy the specified initial value	
Humidity	Appearance	No mechanical damage shall occur
	Capacitance	Char. Cap. change
		X7R(X) $\leq \pm 12.5\%$ of initial value
		X6S(S) $\leq \pm 12.5\%$ of initial value
		X5R(B) $\leq \pm 12.5\%$ of initial value
Y5V(Y) $\leq \pm 30\%$ of initial value		
Tan δ	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 10V. (C in Farad)	

HCC Series Specification & Test Condition

Item	Specification	Test Condition										
Humidity Loading	Appearance	No mechanical damage shall occur										
	Capacitance	<table border="1"> <thead> <tr> <th>Char.</th> <th>Cap. change</th> </tr> </thead> <tbody> <tr> <td>X7R(X)</td> <td>$\leq \pm 12.5\%$ of initial value</td> </tr> <tr> <td>X6S(S)</td> <td>$\leq \pm 12.5\%$ of initial value</td> </tr> <tr> <td>X5R(B)</td> <td>$\leq \pm 12.5\%$ of initial value</td> </tr> <tr> <td>Y5V(Y)</td> <td>$\leq \pm 30\%$ of initial value</td> </tr> </tbody> </table>	Char.	Cap. change	X7R(X)	$\leq \pm 12.5\%$ of initial value	X6S(S)	$\leq \pm 12.5\%$ of initial value	X5R(B)	$\leq \pm 12.5\%$ of initial value	Y5V(Y)	$\leq \pm 30\%$ of initial value
	Char.	Cap. change										
	X7R(X)	$\leq \pm 12.5\%$ of initial value										
X6S(S)	$\leq \pm 12.5\%$ of initial value											
X5R(B)	$\leq \pm 12.5\%$ of initial value											
Y5V(Y)	$\leq \pm 30\%$ of initial value											
Tan δ	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 10V. (C in Farad)											
High Temperature Load (Life Test)	Appearance	No mechanical damage shall occur										
	Capacitance	<table border="1"> <thead> <tr> <th>Char.</th> <th>Cap. change</th> </tr> </thead> <tbody> <tr> <td>X7R(X)</td> <td>$\leq \pm 12.5\%$ of initial value</td> </tr> <tr> <td>X6S(S)</td> <td>$\leq \pm 12.5\%$ of initial value</td> </tr> <tr> <td>X5R(B)</td> <td>$\leq \pm 12.5\%$ of initial value</td> </tr> <tr> <td>Y5V(Y)</td> <td>$\leq \pm 30\%$ of initial value</td> </tr> </tbody> </table>	Char.	Cap. change	X7R(X)	$\leq \pm 12.5\%$ of initial value	X6S(S)	$\leq \pm 12.5\%$ of initial value	X5R(B)	$\leq \pm 12.5\%$ of initial value	Y5V(Y)	$\leq \pm 30\%$ of initial value
	Char.	Cap. change										
	X7R(X)	$\leq \pm 12.5\%$ of initial value										
X6S(S)	$\leq \pm 12.5\%$ of initial value											
X5R(B)	$\leq \pm 12.5\%$ of initial value											
Y5V(Y)	$\leq \pm 30\%$ of initial value											
Tan δ	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 10V. (C in Farad)											
Vibration	Appearance	No mechanical damage shall occur										
	Capacitance	Within the specified tolerance										
	Tan δ	To satisfy the specified initial value										
		<p>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\pm4 hours at room temperature and the initial measurement shall be conducted.</p> <p>Applied Voltage : Rated Voltage Temperature : 40\pm2$^{\circ}\text{C}$ Relative Humidity : 90 ~95%RH Test Time : 500 +12/-0Hr Current Applied : 50 mA Max.</p> <p>Measure at room temperature after cooling for 48 \pm 4 Hours</p>										
		<p>Class II capacitors applied DC testing voltage is applied for one hour at maximum operation temperature $\pm 3^{\circ}\text{C}$ then shall be set for 48\pm4 hours at room temperature and the initial measurement shall be conducted.</p> <p>Applied Voltage : please see HEC specification data sheet. Temperature : max. operation temperature Test Time : 1000 +48/-0Hr Current Applied : 50 mA Max.</p> <p>Measure at room temperature after cooling for 48 \pm 4 Hours</p>										
		<p>Solder the capacitor on P.C. board.</p> <p>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.</p> <p>Repeat this for 2 hours each in 3 perpendicular directions.</p>										