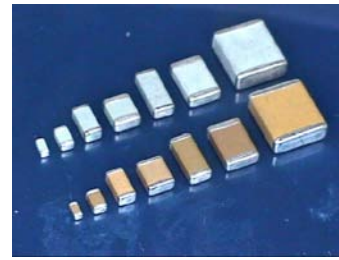


Multilayer Ceramic Chip Capacitors [High Voltage Capacitor]

HVC Series – Middle Voltage (100V-1KV)



Holy Stone high voltage products are designed and manufactured to meet the general requirements of international standards.

The product offering is well suited for commercial and industrial applications and includes C0G (NPO) and X7R characteristics in 0603 to 2225 sizes with working voltages up to 1KV.

◆ Features

- Special internal electrode design offers the highest voltage rating
- Surface mount suited for wave and reflow soldering
- High reliability
- RoHS compliant

◆ Applications.

- Suitable for LAN/WLAN interface, Back-Lighting Inverter ,DC-DC Converters, Ballast, Modems & Power Supplies.

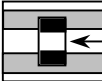
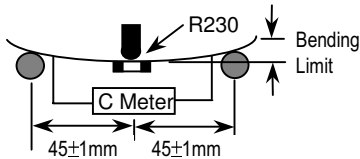
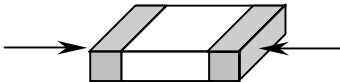
◆ Summary of Specification

Operation Temperature	-55~+125 °C
Rated Voltage	100Vdc to 1000Vdc
Temperature Coefficient	NPO : $\pm 30\text{ppm}/^\circ\text{C}$, -55~+125 °C (EIA Class I)
	X7R : $\leq \pm 15\%$, -55~+125 °C (EIA Class II)
Capacitance Range	NPO :2pF to 100nF ; X7R :150pF to 2.2uF
Dissipation Factor :	NPO : $Q \geq 1000$; X7R : D.F. $\leq 2.5\%$
Insulation Resistance	10G Ω or 500/C Ω whichever is smaller
Aging	NPO:0% ; X7R: 2.5 % per decade of time
Dielectric Strength	100V \leq V < 500V : 200% Rated Voltage
	500V \leq V < 1000V : 150% Rated Voltage
	1000V \leq V : 120% Rated Voltage

◆ How To Order

C	1210	X	103	K	102	T	X
Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Packaging	Special Requirement
C: MLCC (Multilayer Ceramic Chip of Capacitor)	EX.: 0603 : 1.6×0.80mm 0805 : 2.0×1.25mm 1206 : 3.2×1.60mm 1210 : 3.2×2.50mm 1808 : 4.6×2.00mm 1812: 4.6×3.20mm 2220 : 5.7×5.00mm	Ex.: N: NPO X: X7R	Ex.: 2R0:2.0pF 100:10×10 ⁰ 471:47×10 ¹ 102:10×10 ²	Ex.: C:±0.25pF D:±0.50pF J :±5% K :±10% M:±20%	Ex.: 251:250Vdc 631:630Vdc 102:1000Vdc	T: Taping & Reel B: Bulk	Ex.: O: Arc Prevention Coating X: Cushion Termination (Super Term)

HVC 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	Class Frequency Voltage		
Quality Factor	Class I (NPO/SL): More Than 30pF : $Q \geq 1000$ 30pF & Below: $Q \geq 400+20C$ (C:Cap., pF)	NPO/SL $C \leq 100\text{pF}$ 1MHz $\pm 10\%$ 1.0 $\pm 0.2V_{rms}$		
		$C > 100\text{pF}$ 1KHz $\pm 10\%$		
Dissipation Factor	Class II (X7R): Maximum 0.025	X7R 1KHz $\pm 10\%$ 1.0 $\pm 0.2V_{rms}$		
		Perform a heat treatment at 150 $\pm 5^\circ\text{C}$ for 30min. then place room temp. for 24 ± 2 hr.		
Insulation Resistance	10,000M Ω or 500/C Ω whichever is smaller. (C in Farad)	V \leq 500V, Rated Voltage V > 500V, Applied 500Vdc Charge Time : 60sec. Is applied less than 50mA current.		
Withstanding Voltage	No dielectric breakdown or mechanical breakdown	V < 500V : 200% Rated Voltage 500V \leq V < 1000V: 150% Rated Voltage 1000 \leq V : 120% Rated Voltage for 1~5 sec. Current is limited to less than 50mA. Withstanding voltage testing requires immersion of the element in a isolation fluid prevent arcing on the chip surface, at voltage over 1000Vdc.		
Temperature Capacitance Coefficient	Char.	Temp. Range	Cap. Change	Class I : [C2-C1/C1(T2-T1)] $\times 100\%$ Class II : (C2-C1)/C1 $\times 100\%$ T1:Standard Temperature(25 $^\circ\text{C}$) T2:Test Temperature C1:Capacitance At Standard Temperature C2:Capacitance At Test Temperature
	NPO(N)	-55 $^\circ\text{C}$ ~ +125 $^\circ\text{C}$	$\pm 30\text{ppm}/^\circ\text{C}$	
	SL (L)	-25 $^\circ\text{C}$ ~ +85 $^\circ\text{C}$	+350/-1000ppm / $^\circ\text{C}$	
	X7R (X)	-55 $^\circ\text{C}$ ~ +125 $^\circ\text{C}$	$\pm 15\%$	
Adhesive Strength of Termination	No indication of peeling shall occur on the terminal electrode.	 5N-f A 5N-f($\approx 0.5\text{Kg}\cdot\text{f}$) 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.	The board shall be bent 1.0mm with a rate of 1.0 mm/sec.		
		Char.	Capacitance Change	
NPO(N)/SL(L)	$\leq \pm 5.0\%$ of initial value			
X7R (X)	$\leq \pm 12.5\%$ 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 $\pm 5^\circ\text{C}$ Dip Time : 5 \pm 0.5 sec. Immersing Speed : 25 $\pm 10\%$ mm/s Solder : H63A Flux : Rosin Preheat : At 80~120 $^\circ\text{C}$ For 10~30sec.		

HVC Series Specification & Test Condition

Item	Specification	Test Condition															
Resistance to Soldering Heat	Appearance	No mechanical damage shall occur															
	Capacitance	Class I (NPO/SL): Within 2.5% or $\pm 0.25\text{pF}$ whichever is larger of initial value Class II (X7R): Within $\pm 10\%$ of initial value															
	Q / Tan δ	To satisfy the specified initial value															
	Insulation Resistance	To satisfy the specified 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															
		Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours															
Temperature Cycle	Appearance	No mechanical damage shall occur															
	Capacitance	Class I (NPO/SL): Within 2.5% or $\pm 0.25\text{pF}$ whichever is larger of initial value Class II (X7R): Within $\pm 7.5\%$ of initial value															
	Q / Tan δ	To satisfy the specified initial value															
	Insulation Resistance	To satisfy the specified 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:															
		<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 (-55)</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 (125)</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 (-55)	30	2	25	3	3	Max Rated Temp.+3/-0 (125)	30	4	25	3
Step	Temp.($^\circ\text{C}$)	Time(min)															
1	Min Rated Temp.+0/-3 (-55)	30															
2	25	3															
3	Max Rated Temp.+3/-0 (125)	30															
4	25	3															
		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/SL): Within 5% or $\pm 0.5\text{pF}$ whichever is larger of initial value Class II (X7R): Within $\pm 15\%$ of initial value															
	Q / Tan δ	Class I (NPO/SL): More Than 30pF : $Q \geq 350$ 30pF & Below: $Q \geq 275 + 2.5C$ Class II (X7R): Maximum 5.0%															
	Insulation Resistance	1,000M Ω or 50/C Ω whichever is smaller. (C in Farad)															
		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															
		Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours															

HVC Series Specification & Test Condition

Item	Specification	Test Condition								
High Temperature Load (Life Test)	Appearance	No mechanical damage shall occur								
	Capacitance	Class I (NPO/SL): Within 3% or $\pm 0.3\text{pF}$ whichever is larger of initial value Class II (X7R): Within $\pm 15\%$ of initial value								
	Q / Tan δ	Class I (NPO/SL): More Than 30pF : $Q \geq 350$ 30pF & Below: $Q \geq 275 + 2.5C$ Class II (X7R): Maximum 5%								
	Insulation Resistance	1,000M Ω or 50/C Ω whichever is smaller. (C in Farad)								
		Class II capacitors applied DC voltage (following table) 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 :								
		<table border="1"> <thead> <tr> <th>Rated Voltage</th> <th>Applied Voltage</th> </tr> </thead> <tbody> <tr> <td>$V \leq 250\text{Vdc}$</td> <td>150% Rated Voltage</td> </tr> <tr> <td>$250\text{Vdc} < V < 1\text{KVdc}$</td> <td>120% Rated Voltage</td> </tr> <tr> <td>More Than 1KVdc(include 1KV)</td> <td>100% Rated Voltage</td> </tr> </tbody> </table>	Rated Voltage	Applied Voltage	$V \leq 250\text{Vdc}$	150% Rated Voltage	$250\text{Vdc} < V < 1\text{KVdc}$	120% Rated Voltage	More Than 1KVdc(include 1KV)	100% Rated Voltage
Rated Voltage	Applied Voltage									
$V \leq 250\text{Vdc}$	150% Rated Voltage									
$250\text{Vdc} < V < 1\text{KVdc}$	120% Rated Voltage									
More Than 1KVdc(include 1KV)	100% Rated Voltage									
		Temperature : max. operation temperature Test Time : 1000 +12/-0Hr Current Applied : 50 mA Max.								
		Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours								
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.								