

Multilayer Ceramic Chip Capacitors

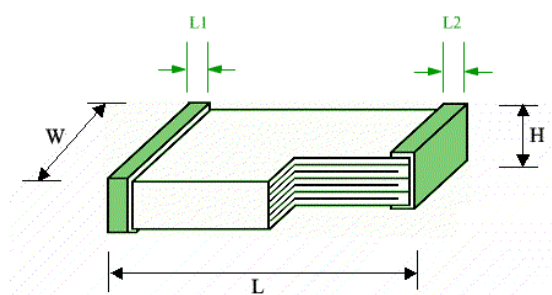
Multilayer Ceramic Chip Capacitors

Middle & high voltage MLCC is a kind of special design 、special technology MLCC that bases on the technology of general MLCC. This kind of MLCC has stable high voltage reliability and suitable to SMT. Middle & high MLCC is widely applicable for many direct high voltage circuits in which it can improve the performance of the circuit.

Features

- Series size from 0603~2225
- Working Voltage from 100V~5000V
- Surface mount suited for wave and reflow soldering
- Wide Operating temperature range from -55℃-125℃
- Good Temperature Coefficient
- High reliability

Dimension



How To Order

HC	1206	X7R	105	K	500	P
Product Code	Size	Dielectric	Capacitance	Tolerance	Rated Voltage	Termination
	Ex.: 0603	Ex.: COG=NPO	Unit : pF	Ex.: A=±0.1pF	Ex.: 6R3=6.6V	P:Ag/Ni/Sn
HV=High Voltage	0805	X7R	Ex.: 0R5=0.5pF	B=±0.2pF	500=50V	S:Ag/Pd/Pt
Capacitance	1210	X5R	2R5=2.5pF	C=±0.25pF	102=1000V	
HA=Safety	1808	Y5V	105=10×10 ⁵	D=±0.5pF	202=2000V	
Capacitors	1812	Z5U		F=±1%	502=5000V	
HC=High	2220			G=±2%		
Capacitance	2225			J=±5%		
				K=±10%		
				M=±20%		
				Z=+80%/-20%		

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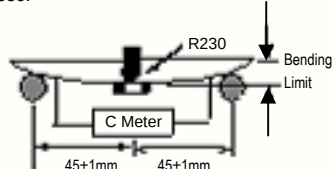
Capacitance Range

Size Inch (mm)	Rated Voltage	Capacitance Range			
		COG (nF)	X5R (nF)	X7R (nF)	Y5V (nF)
0402 (1005)	6.3V		1,000~2,200 (225)	1,000 (105)	1,000 (105)
	10V		1,000 (105)	100 (104)	1,000 (105)
	16V		1,000 (105)	100 (104)	
0603 (1608)	6.3V	1~22 (223)	1,000~10,000 (106)	1,000~2,200 (225)	1,000~4,700 (475)
	10V	1~10 (103)	1,000~4,700 (475)	1,000~2,200 (225)	1,000~4,700 (475)
	16V	1~3.3 (332)	1,000~2,200 (225)	1,000 (105)	1,000~2,200 (225)
	25V	1~3.3 (332)	1,000 (105)		1,000 (105)
0805 (2012)	6.3V		1,000~47,000 (476)	1,000~10,000 (106)	1,000~22,000 (226)
	10V	1~100 (104)	1,000~22,000 (226)	1,000~10,000 (106)	1,000~10,000 (106)
	16V	1~33 (333)	1,000~10,000 (106)	1,000~4,700 (475)	1,000~10,000 (106)
	25V	1~22 (223)	1,000~4,700 (475)	1,000 (105)	1,000~4,700 (475)
	50V	1~10 (103)	1,000 (105)	1,000 (105)	1,000~2,200 (225)
1206 (3216)	6.3V		1,000~10,000 (107)		1,000~100,000 (107)
	10V		1,000~47,000 (476)	1,000~22,000 (226)	1,000~47,000 (476)
	16V	10~100 (104)	1,000~22,000 (226)	1,000~10,000 (106)	1,000~22,000 (226)
	25V	10~47 (473)	1,000~10,000 (106)	1,000~10,000 (106)	1,000~10,000 (106)
	35V		1,000~4,700 (475)	1,000~4,700 (475)	1,000~10,000 (106)
	50V	1~33 (333)	1,000~4,700 (475)	1,000~4,700 (475)	1,000~10,000 (106)
1210 (3225)	6.3V		1,000~100,000 (107)		1,000~100,000 (107)
	10V		1,000~47,000 (476)	1,000~47,000 (476)	1,000~47,000 (476)
	16V		1,000~47,000 (476)	1,000~22,000 (226)	1,000~47,000 (476)
	25V	10~100 (104)	1,000~22,000 (226)	1,000~10,000 (106)	1,000~22,000 (226)
	35V		1000~10,000 (106)	1,000~10,000 (106)	1,000~10,000 (106)
	50V	10~47 (473)	1,000~10,000 (106)	1,000~10,000 (106)	1,000~10,000 (106)
1812 (4532)	6.3V		1,000~100,000 (107)		1,000~100,000 (107)
	10V		1,000~100,000 (107)	1,000~47,000 (476)	1,000~100,000 (107)
	16V	10~220 (224)	1,000~47,000 (476)	1,000~47,000 (476)	1,000~47,000 (476)
	25V	10~120 (124)	1,000~22,000 (226)	1,000~22,000 (226)	1,000~22,000 (226)
	50V	10~100 (104)	1,000~10,000 (106)	1,000~10,000 (106)	1,000~10,000 (106)
2220 (5750)	6.3V		1,000~100,000 (107)		
	10V		1,000~100,000 (107)		
	16V		1,000~47,000 (476)	1,000~47,000 (476)	1,000~100,000 (107)
	25V		1,000~22,000 (226)	1,000~22,000 (226)	1,000~47,000 (476)
	50V		1,000~10,000 (106)	1,000~10,000 (106)	1,000~22,000 (226)

※ We can design according to customer special requirements.

Multilayer Ceramic Chip Capacitors

HV Series Specification & Test Condition

Item	Specification	Test Condition		
Operation Temperature	-55 to +125℃			
Visual	No abnormal exterior appearance	Visual Inspection		
Capacitance	Within The Specified Tolerance	Class	Frequency	Voltage
Quality Factor	Class I (NPO): More Than 30pF : $Q \geq 1000$ 30pF & Below: $Q \geq 400 + 20C$ (C:Cap., pF)	NPO	1MHz±10%	1.0±0.2Vrms
		C≤100pF	1KHz±10%	
		C>100pF		
Dissipation Factor	Class II (X7R): Maximum 0.025	X7R	1KHz±10%	1.0±0.2Vrms
Insulation Resistance	10,000MΩ or 500/C Ω whichever is smaller. (C in Farad)	Perform a heat temperature at 150±5℃ for 30min. then place room temp. for 24±2hr.		
Withstanding Voltage	No dielectric breakdown or mechanical breakdown	V≦500V, Rated Voltage		
		V> 500V, Applied 500Vdc Charge Time : 60sec. Is applied less than 50mA current.		
Temperature Capacitance Coefficient	Char.	Temp. Range	Cap. Change	Class I: [C2-C1/C1(T2-T1)] × 100% Class II : (C2-C1)/C1 × 100% T1:Standard Temperature(25℃) T2:Test Temperature C1:Capacitance At Standard Temperature C2:Capacitance At Test Temperature
	NPO(N)	-55℃~ +125℃	± 30ppm/℃	
	X7R (X)	-55℃~ +125℃	± 15%	
Adhesive Strength of Termination	No indication of peeling shall occur on the terminal electrode.	 5N · f 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	The board shall be bend 1.0mm with a rate of 1.0 mm/sec. 
		NPO(N)	≡ ± 5.0% of initial value	
		X7R (X)	≡ ± 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±5℃ Dip Time : 5 ± 0.5 sec. Immersing Speed : 25±10% mm/s Solder : H63A Flux :Rosin Preheat : At 80~120 ℃ For 10~30sec.		

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HV 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 (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 : $10 \pm 1\text{sec}$. 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): 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> <tr> <th>Step</th><th>Temp.($^\circ\text{C}$)</th><th>Time(min)</th></tr> <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> </table> Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours	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															
Humidity	Appearance	No mechanical damage shall occur															
	Capacitance	Class I (NPO): 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): More Than 30pF : $Q \geq 350$ 30pF & Below: $Q \geq 275 + 2.5C$ Class II (X7R): Maximum $\pm 5.0\%$															
	Insulation Resistance	$1,000\text{M}\Omega$ or $50/C \Omega$ 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															

HV Series Specification & Test Condition

Item	Specification		Test Condition								
High Temperature Load (Life Test)	Appearance	No mechanical damage shall occur	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><tr><th>Rated Voltage</th><th>Applied Voltage</th></tr><tr><td>$\leq 250\text{Vdc}$</td><td>150%Rated Voltage</td></tr><tr><td>$>250\text{Vdc} < 1\text{KVdc}$</td><td>120%Rated Voltage</td></tr><tr><td>$\geq 1\text{KVdc}$</td><td>100%Rated Voltage</td></tr></table> Temperature : max. operation temperature Test Time : $1000 +12/-0\text{Hr}$ Current Applied : 50 mA Max. Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours	Rated Voltage	Applied Voltage	$\leq 250\text{Vdc}$	150%Rated Voltage	$>250\text{Vdc} < 1\text{KVdc}$	120%Rated Voltage	$\geq 1\text{KVdc}$	100%Rated Voltage
	Rated Voltage	Applied Voltage									
	$\leq 250\text{Vdc}$	150%Rated Voltage									
	$>250\text{Vdc} < 1\text{KVdc}$	120%Rated Voltage									
	$\geq 1\text{KVdc}$	100%Rated Voltage									
Capacitance	Class I (NPO): 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): More Than 30pF : $Q \geq 350$ 30pF & Below: $Q \geq 275 + 2.5C$ Class II (X7R): Maximum $\pm 5\%$										
Insulation Resistance	1,000M Ω or 50/C Ω whichever is smaller. (C in Farad)										
Vibration	Appearance	No mechanical damage shall occur									
	Capacitance	Within the specified tolerance									
	Q / Tan δ	To satisfy the specified initial value									
		Repeat this for 2 hours each in 3 perpendicular directions.									