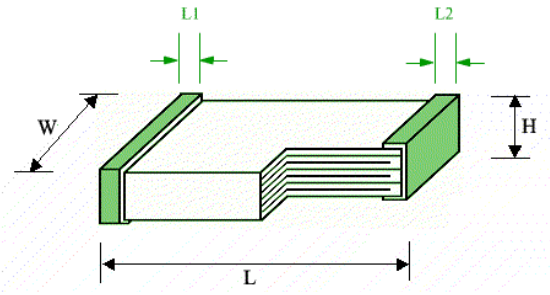
Multilayer Ceramic Chip Capacitors

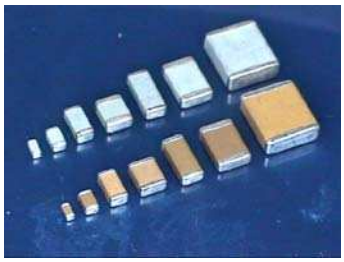
Middle & high voltage MLCC is a kind of special design 、special technology MLCC that bases on the technology of general MLCC. This kind of MLCC has stable high voltage reliability and suitable to SMT. Middle & high MLCC is widely applicable for many direct high voltage circuits in which it can improve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

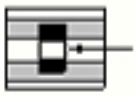
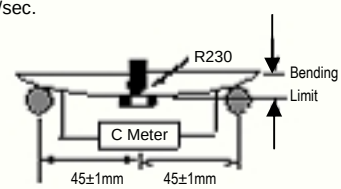
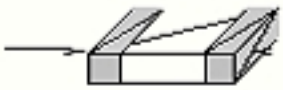
HV	1206	X7R	102	K	202	P
Product Code HV=High Voltage Capacitance HA=Safety Capacitors HC=High Capacitance	Size Ex.: 0603 0805 1206 1210 1808 1812 2220 2225	Dielectric Ex.: C0G=NP0 X7R X5R Y5V Z5U	Capacitance Unit : pF Ex.: 0R5=0.5pF 2R5=2.5pF $102=10\times10^2$ $684=68\times10^4$	Tolerance Ex.: A=±0.1pF B=±0.2pF C=±0.25pF D=±0.5pF F=±1% G=±2% J=±5% K=±10% M=±20% Z=+80%/-20%	Rated Voltage Ex.: 6R3=6.6V 500=50V 102=1000V 202=2000V 502=5000V	Termination P:Ag/Ni/Sn S:Ag/Pd/Pt

Capacitance Range

Size Inch (mm)	L	W	H (MAX)	Rated Voltage	Capacitance Range (PF)	
					C0G/NP0	X7R
0603 (1608)	1.60± 0.20	0.80± 0.20	0.8	100V	1～470(471)	150～18000(183)
				200V	1～150(151)	150～6800(682)
0805 (2012)	2.0± 0.2	1.25± 0.2	1.3	100V	1～1000(102)	150～100000(104)
				200V/250V	1～680(681)	150～22000(223)
				500V	1～560(561)	150～10000(103)
1206 (3216)	3.2± 0.3	1.6± 0.2	1.6	100V	5～4700(472)	150～4740000(474)
				200V/250V	5～2700(272)	150～100000(104)
				500V	5～1500(152)	150～47000(563)
				1000V	5～820(821)	150～10000(103)
				2000V	5～390(391)	150～2200(222)
				2500V	——	150～1000(102)
1210 (3225)	3.2± 0.3	2.5± 0.3	2.0	100V	10～10000(103)	150～1000000(105)
				250V	10～4700(472)	150～220000(224)
				500V	10～3300(332)	150～68000(683)
				1000V	10～1000(102)	150～22000(223)
				2000V	10～560 (561)	150～6800(682)
1808 (4520)	4.5± 0.35	2.0± 0.3	2.0	1000V	2～1000 (102)	150～15000(153)
				2000V	2～330 (331)	150～2200(222)
				3000V	2～270 (271)	150～1800(182)
				5000V	2～100 (101)	——
1812 (4532)	4.5± 0.35	3.2± 0.3	2.8	100V	——	10000～2200000 (225)
				250V	10～10000 (103)	10000～1000000 (105)
				500V/630V	10～6800 (682)	1000～470000 (474)
				1000V	10～5600 (562)	1000～47000 (473)
				2000V	10～1000 (102)	150～10000 (103)
				3000V	10～680 (681)	150～4700 (472)
				4000V	10～100 (101)	150～1000 (102)
2220 (5750)	5.7± 0.4	5.0± 0.4	3.5	100V	——	470000～4700000 (475)
				250V	100～33000 (333)	10000～2200000 (225)
				500V/630V	100～15000 (153)	10000～470000 (474)
				1000V	100～10000 (103)	10000～220000 (224)
2225 (5763)	5.7± 0.4	6.3± 0.4		2000V	100～1500 (152)	1000～33000 (333)
				3000V	100～1000 (102)	150～10000 (103)
				4000V	100～680 (681)	150～3900 (392)
				5000V	100～470 (471)	150～2200 (222)

※ We can design according to customer special requirements。

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 NPO, C≤100pF: 1MHz±10%, 1.0±0.2Vrms NPO, C>100pF: 1KHz±10% X7R: 1KHz±10%, 1.0±0.2Vrms
Quality Factor	Class Ⅰ(NPO): More Than 30pF : Q ≧1000 30pF & Below: Q≧400+20C (C:Cap., pF)	
Dissipation Factor	Class Ⅱ(X7R): Maximum 0.025	Perform a heat temperature at 150±5℃ for 30min. then place room temp. for 24±2hr.
Insulation Resistance	10,000MΩ or 500/C Ω whichever is smaller. (C in Farad)	V≦500V, Rated Voltage V> 500V, Applied 500Vdc Charge Time : 60sec. Is applied less than 50mA current.
Withstanding Voltage	No dielectric breakdown or mechanical breakdown	200V≦V＜500V : 200% Rated Voltage 500V≦V＜1000V: 150% Rated Voltage 1000≦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 NPO(N) / -55℃~ +125℃ / ± 30ppm/℃ X7R (X) / -55℃~ +125℃ / ± 15%	ClassⅠ: [C2-C1/C1(T2-T1)] × 100% ClassⅡ: (C2-C1)/C1 × 100% T1:Standard Temperature(25℃) T2:Test Temperature C1:Capacitance At Standard Temperature C2:Capacitance At Test Temperature
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 NPO(N) / ≦ ± 5.0% of initial value X7R (X) / ≦ ± 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℃ Dip Time : 5 ± 0.5 sec. Immersing Speed : 25±10% mm/s Solder : H63A Flux :Rosin Preheat : At 80~120 ℃ For 10~30sec.

HV Series Specification & Test Condition

Item		Specification	Test Condition
Resistance to Soldering Heat	Appearance	No mechanical damage shall occur	Class Ⅱ capacitor shall be set for 48± 4 hours at room temperature after one hour heat treatment at 150 +0/-10℃ before initial measure. Preheat : at 150±10°C for 60~120sec. Dip : solder temperature of 260±5℃ Dip Time : 10 ± 1sec. Immersing Speed : 25±10% mm/s Solder : H63A Flux : Rosin Measure at room temperature after cooling for Class Ⅰ: 24 ± 2 Hours Class Ⅱ: 48 ± 4 Hours
	Capacitance	Class Ⅰ(NPO): Within 2.5% or ±0.25pF whichever is larger of initial value Class Ⅱ(X7R): Within ±10% of initial value	
	Q / Tanδ	To satisfy the specified initial value	
	Insulation Resistance	To satisfy the specified initial value	
Temperature Cycle	Appearance	No mechanical damage shall occur	Class Ⅱ capacitor shall be set for 48±4 hours at room temperature after one hour heat treatment at 150 +0/-10 ℃ before initial measure. Capacitor shall be subjected to five cycles of the temperature cycle as following: Step / Temp.(℃) / 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
	Capacitance	Class Ⅰ(NPO): Within 2.5% or ±0.25pF whichever is larger of initial value Class Ⅱ(X7R): Within ±7.5% of initial value	
	Q / Tanδ	To satisfy the specified initial value	
	Insulation Resistance	To satisfy the specified initial value	
Humidity	Appearance	No mechanical damage shall occur	Class Ⅱ capacitor shall be set for 48±4 hours at room temperature after one hour heat treatment at 150 +0/-10 ℃before initial measure. Temperature : 40± 2 ℃ Relative Humidity : 90 ~95%RH Test Time : 500 +12/-0 hr Measure at room temperature after cooling for Class Ⅰ: 24 ± 2 Hours Class Ⅱ: 48 ± 4 Hours
	Capacitance	Class Ⅰ(NPO): Within 5% or ±0.5pF whichever is larger of initial value Class Ⅱ(X7R): Within ±15% of initial value	
	Q / Tanδ	Class Ⅰ(NPO): More Than 30pF : Q ≧350 30pF & Below: Q≧275＋2.5C Class Ⅱ(X7R): Maximum ±5.0%	
	Insulation Resistance	1,000MΩ or 50/C Ω whichever is smaller. (C in Farad)	

HV Series Specification & Test Condition

<table>
<tr><th>Item</th><th colspan="2">Specification</th><th>Test Condition</th></tr>
<tr><td rowspan="4">High Temperature Load
(Life Test)</td><td>Appearance</td><td>No mechanica damage shall occur</td><td rowspan="4">Class Ⅱ capacitors applied DC voltage (following table) is applied for one hour at maximum operation temperature ±3℃ 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>≤250Vdc</td><td>150%Rated Voltage</td></tr><tr><td>>250Vdc < 1KVdc</td><td>120%Rated Voltage</td></tr><tr><td>≥1KVdc</td><td>100%Rated Voltage</td></tr></table>
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</td></tr>
<tr><td>Capacitance</td><td>Class Ⅰ (NPO):
Within 3% or ±0.3pF whichever is larger of initial value
Class Ⅱ (X7R):
Within ±15% of initial value</td></tr>
<tr><td>Q / Tanδ</td><td>Class Ⅰ (NPO):
More Than 30pF : Q ≥350
30pF & Below: Q≥275＋2.5C
Class Ⅱ (X7R):
Maximum ±5%</td></tr>
<tr><td>Insulation Resistance</td><td>1,000MΩ or 50/C Ω whichever is smaller. (C in Farad)</td></tr>
<tr><td>Vibration</td><td>Appearance</td><td>No mechanical damage shall occur</td><td>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.</td></tr>
<tr><td></td><td>Capacitance</td><td>Within the specified tolerance</td><td></td></tr>
<tr><td></td><td>Q / Tanδ</td><td>To satisfy the specified initial value</td><td></td></tr>
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