

Multilayer Ceramic Chip Capacitors [Multilayer Capacitor Arrays]

MCA Series



The capacitor array combines four separate multilayer ceramic capacitors. It's can reduce PCB space and improve placement efficiency compared to 2xMLCC & 4xMLCC.

◆ Features

- ❑ Small size with 2xMLCC & 4xMLCC capacitor
- ❑ Space saving for high density placing requirement
- ❑ Improve placement efficiency
- ❑ Suitable for Cellular, Pagers, I/O Port, Mother Boards and General Electronic Equipment.
- ❑ RoHS compliant

◆ Summary of Specification

NPO Dielectric Characteristic

Temperature Coefficient : $\pm 30\text{ppm}/^\circ\text{C}$, $-55\sim+125^\circ\text{C}$
 Capacitance Range : 10pF to 470pF
 Dissipation Factor : more than 30pF: $Q \geq 1000$ (0.001)
 30pF & below : $Q \geq 400+20C$ C:pF
 Insulation Resistance : $10G\Omega$ or $500/C \Omega$ whichever is smaller
 Dielectric Strength : 250% Rated Voltage

X7R Dielectric Characteristic

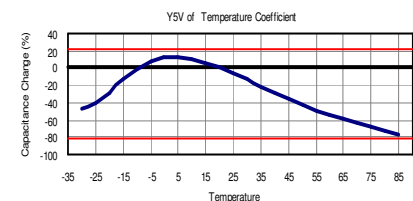
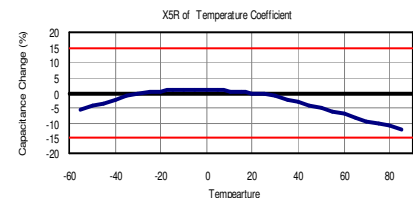
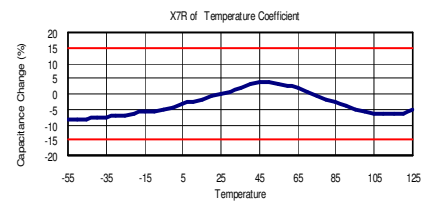
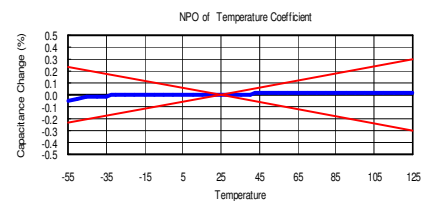
Temperature Coefficient : $\pm 15\%$, $-55\sim+125^\circ\text{C}$
 Capacitance Range : 180pF to 1.0uF
 Dissipation Factor : See table 1.
 Insulation Resistance : $10G\Omega$ or $500/C \Omega$ whichever is smaller
 Dielectric Strength : 250% Rated Voltage

X5R Dielectric Characteristic

Temperature Coefficient : $\pm 15\%$, $-55\sim+85^\circ\text{C}$
 Capacitance Range : 100nF to 2.2uF
 Dissipation Factor : See table 1.
 Insulation Resistance : $10G\Omega$ or $500/C \Omega$ whichever is smaller
 Dielectric Strength : 250% Rated Voltage

Y5V Dielectric Characteristic

Temperature Coefficient : $+22/-82\%$, $-30\sim+85^\circ\text{C}$
 Capacitance Range : 10nF to 1.0uF
 Dissipation Factor : See table 2.
 Insulation Resistance : $10G\Omega$ or $500/C \Omega$ whichever is smaller
 Dielectric Strength : 250% Rated Voltage

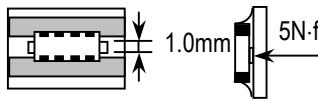
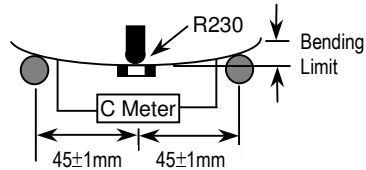
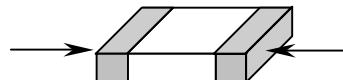


◆ How To Order

CA 4 B 1C 105 M T

Product Code	Chip Size	Dielectric	Rated Voltage	Capacitance Unit : pF	Tolerance	Packaging
CA: MLCC Array	6 : 1206 3.2x1.6 mm 5 : 0805 2.0x1.25 mm 4 : 0504 1.37x1.0 mm	Ex.: N: NPO X: X7R B: X5R Y: Y5V	Ex.: 1J : 6.3Vdc 1A: 10Vdc 1C: 16Vdc 1E: 25Vdc 1H: 50Vdc	Ex.: 102: 10×10^2 473: 47×10^3 104: 10×10^4	Ex.: K : +/- 10% M: +/- 20% Z : +80/-20 %	T: Taping & Reel B: Bulk

MCA 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 ≥ 1000			NPO 1MHz±10% 1.0±0.2Vrms
	30pF & Below: Q ≥ 400+20C (C:Cap., pF)			X7R/X5R/Y5V 1KHz±10% 1.0±0.2Vrms
Dissipation Factor	Class II (X7R/X5R/Y5V): Shall meet the value in Table 1, Table 2			Perform a heat treatment at 150±5°C for 30min. then place at room temp. for 24±2hr.
Insulation Resistance	10,000MΩ or 500/C Ω whichever is smaller for rated voltage > 10V and greater 100/C Ω for rated voltage ≤ 10V. (C in Farad)			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	Class I : [C2-C1/C1(T2-T1)] × 100% Class II : (C2-C1)/C1 × 100% T1:Standard Temperature(25°C) T2:Test Temperature C1:Capacitance at Standard Temperature C2:Capacitance at Test Temperature
	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.			 <p>A 5N·f (≈ 0.5Kg·f) pull force shall be applied for 10 ± 1 sec.</p>
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)	≤ ± 5.0%		
	X7R (X)	≤ ± 12.5%		
	X5R (B)	≤ ± 12.5%		
	Y5V (Y)	≤ ± 30.0%		
Solderability	More than 90% of the terminal surface is to be soldered newly, so metal part does not come out or dissolve .			 <p>Solder Temperature : 245±5°C Dip Time : 5 ± 1 sec. Immersing Speed : 25±10% mm/s Solder : H63A Flux : Rosin Preheat : At 80~120 °C For 10~30sec.</p>

MCA 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 measurement. 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 measurement. 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	Shall meet the value in Table 1, Table 2																
	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)																

MCA 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	Shall meet the value in Table 1, Table 2	
	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 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 :200%Rated Voltage However: The size 0504, applied voltage of 100% rated voltage 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	Shall meet the value in Table 1, Table 2	
	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.	

X7R/X5R Table 1.

Size	Rated voltage	Capacitance Range	tan δ (D.F.)	
			Initial Vibration Resistance to solder heat Temperature cycle	Humidity Humidity loading High temperature loading
0504	DC 6.3V	All Capacitance	15.0 %	25.0 %
	DC 10V		15.0 %	25.0 %
	DC 16V		15.0 %	25.0 %
0805	DC 10V	All Capacitance	7.5 %	12.5 %
	DC 16V		3.5 %	7.5 %
	DC 25V		3.5 %	7.5 %
	DC 50V		2.5 %	5.0 %
1206	DC 6.3V	C=1 uf	7.5 %	12.5 %
	DC 16V	C<1 uf	3.5 %	7.5 %
	DC 25V	C<1 uf	3.5 %	7.5 %
	DC 50V	C<1 uf	2.5 %	5.0 %

Y5V Table 2.

Size	Rated voltage	Capacitance Range	tan δ	
			Initial Vibration Resistance to solder heat Temperature cycle	Humidity Humidity loading High temperature loading
0805	DC 16V	C<1 uf	10.0 %	15.0 %
1206	DC 10V	C=1 uf	12.5 %	20.0 %
	DC 16V	C<1 uf	10.0 %	15.0 %
	DC 25V	C<1 uf	7.0 %	10.5 %