1. INTRODUCTION

High voltage multilayer ceramic chip capacitors are manufactured by using green materials without lead and cadmium. These capacitors feature series connection of multi-layer capacitor units in a MLCC to realize high voltage performance. Reliable performances are built-in through exact formulation of dielectric powders, preparation of conductive paste, advanced automatic manufacturing, and strict quality control to assure excellent control in dielectric thickness, electrode integrity, and electrode-to-termination continuity.

2. FEATURES

a. Special interior design offers high voltage rating
b. High reliability and stability.
c. RoHS & SS-00259 compliant

3. APPLICATIONS

a. DC to DC converter
b. High voltage coupling/DC blocking
c. Back-Lighting inverters.
d. LAN/WLAN interface.
e. Modem.
f. Power supplies.

4.HOW TO ORDER

COG	1206	100	J	3A	N	R
DIELECTRIC	SIZE	CAPACITANCE	TOLERANCE	RATED VOLTAGE	TERMINATION CODE	PACKING CODE
NPO=COG X7R = BX	0805 1206 1210 1812 1825 2220	1PF =1R0 1.5PF = 1R5 2.2PF =2R2 100PF=101 120PF=121 10nF=103 100nF= 104	A=±0.05PF B=±0.1PF C=±0.25PF D=±0.5PF F=±1% G=±2% J=±5% K=±10% M=±20%	3A=1000V 3D=2000V 3F=3000V	N=NICKEL BARRIER	B=BULK R=TAPED ON REEL

5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	Tmax (mm)	M_B min (mm)
1206 (3216)	3.20±0.20	1.60±0.20	1.80	0.30
1210 (3225)	3.20±0.40	2.50±0.30	2.80	0.30
1808 (4520)	4.50±0.40	2.00±0.20	2.20	0.26
1812 (4532)	4.50±0.40	3.20±0.30	2.80	0.26
1825 (4563)	4.60±0.30	6.30±0.40	3.00	0.26
2220 (5750)	5.70±0.40	5.00±0.40	3.00	0.30
2225 (5763)	5.70±0.40	6.30±0.40	3.00	0.30

Reflow soldering only is recommended if the thickness is thicker than 1.00mm

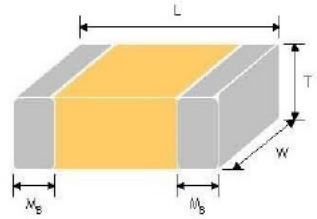


Fig. 1 The outline of MLCC

6.GENERAL ELECTRICAL DATA

Dielectric	NP0		X7R	
Size	1206, 1210, 1808, 1812		1206, 1210, 1812, 1808, 1825, 2220, 2225	
Rated voltage (WVDC)	1KV, 2KV, 3KV		1KV, 2KV, 3KV	
Capacitance range*	1KV	1.5pF ~ 2.2nF	1KV	150pF ~ 56nF
	2KV	1.5pF ~ 1.2nF	2KV	150pF ~ 12nF
	3KV	2.2pF ~ 470pF	3KV	150pF ~ 3.9nF
Capacitance tolerance	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%),K (±10%)		J (±5%), K (±10%), M (±20%)	
Tan δ*	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000		≤2.5%	
Insulation resistance at 500Vdc for 60 seconds	≥100GΩ or R·C≥1000 whichever is smaller		≥10GΩ or R·C≥500Ω-F whichever is smaller	
Operating temperature	-55 to +125°C			
Temperature coefficient	±30ppm / ℃		±15%	
Termination	Ag/Ni/Sn (lead-free termination)			

* Measured at the condition of 30~70% related humidity.

NP0: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap≤1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25°C at ambient temperature

X7R: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.

7.CAPACITANCE RANGE (NP0 Dielectric)

7-1. 1206, 1210, 1808, 1812 Sizes.

DIELECTRIC		NP0 (C0G)											
	SIZE	1206			1210			1808			1812		
	RATED VOLTAGE (VDC)	1000	2000	3000	1000	2000	3000	1000	2000	3000	1000	2000	3000
Capacitance	1.5pF (1R5)												
	1.8pF (1R8)												
	2.2pF (2R2)												
	2.7pF (2R7)												
	3.3pF (3R3)												
	3.9pF (3R9)												
	4.7pF (4R7)												
	5.6pF (5R6)												
	6.8pF (6R8)												
	8.2pF (8R2)												
	10pF (100)												
	12pF (120)												
	15pF (150)												
	18pF (180)												
	22pF (220)												
	27pF (270)												
	33pF (330)												
	39pF (390)												
	47pF (470)												
	56pF (560)												
	68pF (680)												
	82pF (820)												
	100pF (101)												
	120pF (121)												
	150pF (151)												
	180pF (181)												
	220pF (221)												
	270pF (271)												
	330pF (331)												
	390pF (391)												
	470pF (471)												
	560pF (561)												
	680pF (681)												
	820pF (821)												
	1,000pF (102)												
	1,200pF (122)												
	1,500pF (152)												
	1,800pF (182)												
	2,200pF (222)												
	2,700pF (272)												
	3,300pF (332)												
	3,900pF (392)												
	4,700pF (472)												
	5,600pF (562)												
	6,800pF (682)												
	8,200pF (822)												
	0.010μF (103)												

8.CAPACITANCE RANGE (X7R Dielectric)

8.1 1206, 1210, 1808, 1812 Sizes

DIELECTRIC		X7R									
SIZE		1206		1210		1808			1812		
RATED VOLTAGE (VDC)		1000	2000	1000	2000	1000	2000	3000	1000	2000	3000
Capacitance	100pF (101)										
	120pF (121)										
	150pF (151)										
	180pF (181)										
	220pF (221)										
	270pF (271)										
	330pF (331)										
	390pF (391)										
	470pF (471)										
	560pF (561)										
	680pF (681)										
	820pF (821)										
	1,000pF (102)										
	1,200pF (122)										
	1,500pF (152)										
	1,800pF (182)										
	2,200pF (222)										
	2,700pF (272)										
	3,300pF (332)										
	3,900pF (392)										
	4,700pF (472)										
	5,600pF (562)										
	6,800pF (682)										
	8,200pF (822)										
	0.010μF (103)										
	0.012μF (123)										
	0.015μF (153)										
	0.018μF (183)										
	0.022μF (223)										
	0.027μF (273)										
	0.033μF (333)										
	0.039μF (393)										
	0.047μF (473)										
	0.056μF (563)										
	0.068μF (683)										
	0.082μF (823)										
	0.10μF (104)										

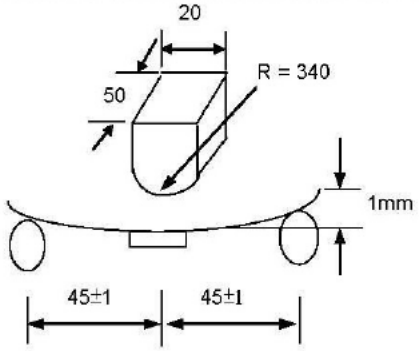
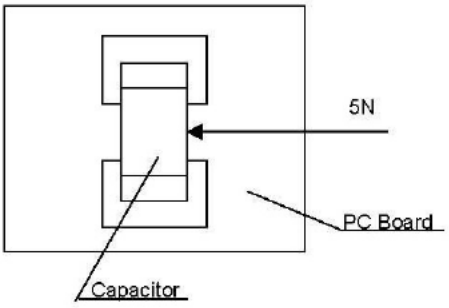
8-2. 2220, 2225 Sizes

DIELECTRIC		X7R								
SIZE		1825			2220			2225		
RATED VOLTAGE (VDC)		1000	2000	3000	1000	2000	3000	1000	2000	3000
Capacitance	1,000pF (102)									
	1,200pF (122)									
	1,500pF (152)									
	1,800pF (182)									
	2,200pF (222)									
	2,700pF (272)									
	3,300pF (332)									
	3,900pF (392)									
	4,700pF (472)									
	5,600pF (562)									
	6,800pF (682)									
	8,200pF (822)									
	0.010μF (103)									
	0.012μF (123)									
	0.015μF (153)									
	0.018μF (183)									
	0.022μF (223)									
	0.027μF (273)									
	0.033μF (333)									
	0.039μF (393)									
	0.047μF (473)									
	0.056μF (563)									
	0.068μF (683)									
	0.082μF (823)									
	0.10μF (104)									

9.RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Test Condition	Requirements
1.	Visual and Mechanical	---	* No remarkable defect. * Dimensions to conform to individual specification sheet.
2.	Capacitance	Class I: (NP0)	* Shall not exceed the limits given in the detailed spec.
3.	Q/ D.F. (Dissipation Factor)	Cap≤1000pF, 1.0±0.2Vrms, 1MHz±10% Cap>1000pF, 1.0±0.2Vrms, 1KHz±10% Class II: (X7R) 1.0±0.2Vrms, 1kHz±10%	NP0: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: ≤2.5%
4.	Temperature Coefficient	With no electrical load. T.C. / Operating Temp NP0 / -55~125°C at 25°C X7R / -55~125°C at 25°C	T.C. / Capacitance Change NP0 / Within ±30ppm/°C X7R / Within ±15%
5.	Insulation Resistance	* To apply voltage at 500VDC for 60 sec.	Class I (NP0) : ≥100GΩ or RxC≥1000Ω-F whichever is smaller. Class II (X7R) : ≥10GΩ or RxC≥500Ω-F whichever is smaller.
6.	Dielectric Strength	* To apply voltage: 1.2 times of U_R * Duration: 1 to 5 sec.	* No evidence of damage or flashover during test.
7.	Solderability	* Solder temperature: 245±5°C * Dipping time: 5±0.5 sec.	75% min. coverage of all metalized area.
8.	Resistance to Soldering Heat	* Solder temperature: 260±5°C * Dipping time: 10±1 sec * Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder. * Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 48±4 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2hrs (Class I) or 48±4 hrs (Class II).	* No remarkable damage. * Cap change: NP0: within ±2.5% or ±0.25pF whichever is larger. X7R: within ±7.5% * 25% max. leaching on each edge.
9.	Temperature Cycle	* Conduct the five cycles according to the temperatures and time. Step / Temp. (°C) / Time (min.) 1 / Min. operating temp. +0/-3 / 30±3 2 / Room temp. / 2~3 3 / Max. operating temp. +3/-0 / 30±3 4 / Room temp. / 2~3 * Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 48±4 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).	* No remarkable damage. * Cap change : NP0: within ±2.5% or ±0.25pF whichever is larger. X7R: within ±15% * Q/D.F.: NP0: ≤2.0 × Initial requirement X7R: ≤1.5 × Initial requirement * I.R.≥ 0.25 × initial requirement
10.	Humidity (Damp Heat) Steady State	* Test temp.: 40±2°C * Humidity: 90~95% RH * Test time: 500+24/-0hrs. * Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).	* No remarkable damage. * Cap change: NP0 within ±5% or ±2pF whichever is larger X7R within ±15% * Q/D.F Value: NP0: Cap≥30pF :Q≥350 10pF≤Cap<30pF :Q≥275+2.5C Cap<10pF :Q≥200+10C X7R: ≤7.0% * I.R.: ≥1GΩ or RxC≥50Ω-F whichever is smaller.
11.	High Temperature Load (Endurance)	* Test temp.: NP0, X7R: 125±3°C * To apply voltage: 120% of rated voltage. * Test time: 1000+24/-0 hrs. * Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).	* No remarkable damage. * Cap change: NP0: within ±3% or ±3pF whichever is larger. X7R: within ±20% * Q/D.F value: NP0: Cap≥30pF :Q≥350 10pF≤Cap<30pF :Q≥275+2.5C Cap<10pF :Q≥200+10C X7R: ≤7.0% * I.R.: ≥10V, ≥1GΩ or RxC≥50Ω-F whichever is smaller.

9.RELIABILITY TEST CONDITIONS AND REQUIREMENTS (Cont.)

No.	Item	Test Condition	Requirements
12.	**Resistance to Flexure of Substrate**	* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm. 	* No remarkable defect. * Dimensions to conform to individual specification sheet.
13.	**Adhesive Strength of Termination**	* Capacitors mounted on a substrate. A force of 5N applied perpendicular to the place of substrate and parallel the line joining the center of terminations for 10±1 sec. 	* No remarkable damage or removal of the terminations.