

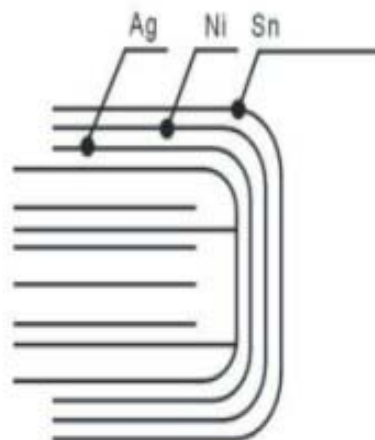
MULTILAYER CERAMIC CHIP CAPACITORS (MLCC)

Features

- Various temperature characteristics a wide range in small size.
- Mounted either by flow soldering methods.
- Excellent dielectric strength due to uniform structure of dielectric layers.
- 500v~3000VDC high voltage application.

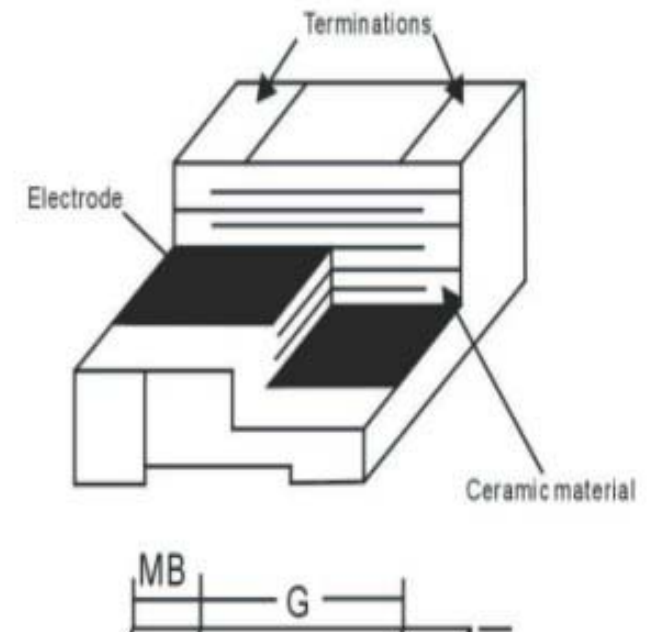
Applications

- MLCC are becoming increasingly important key electronic applications, which are helpful in reducing the size of electronic circuitry.
- MLCC are used extensively in computers, communicative products, and the detail applications which including the following:
 - By-Passing of an AC Signal
 - Frequency Discrimination
 - Transient Voltage and Are Suppression
 - Surge Protection



Part Number Code

Construction of MLCC



C0805

N

120

J

IH

N

T

(1)

(2)

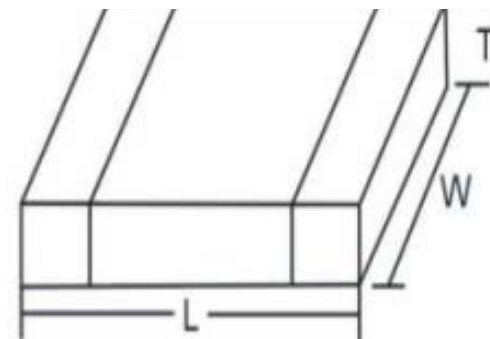
(3)

(4)

(5)

(6)

(7)



Size Code

Unit:mm

Size Code	L	W	T	MB	G(min)
0201	0.60±0.05	0.30±0.05	S:0.50±0.20	0.10~0.20	0.2
0402	1.00±0.05	0.50±0.05	S:0.50±0.10	0.15~0.35	0.3
0603	1.60±0.15	0.80±0.12	P:0.75±0.30	0.27~0.60	0.5
0805	2.0±0.2	1.25±0.20	S:0.60±0.20	0.30~0.70	0.7
			M:0.75±0.20		
			H:0.95±0.30		
			X:1.30±0.30		
1206 1210	3.2±0.2 3.2±0.2	1.60±0.20 2.5±0.2	S:0.60±0.20	0.30~0.70	1.5
			M:0.75±0.20		
			H:0.95±0.30		
			X:1.30±0.30		
1808	4.5±0.3	2.0±0.20	L:1.80±0.40	0.35~0.95	0.2
			X:1.30±0.30		
			F:1.60±0.40 Z:2.00±0.40		
1812 2220 2225 3035	4.5±0.3 5.7±0.5 5.7±0.5 7.6±0.5	3.2±0.3 5.0±0.5 6.3±0.5 9.0±0.5	X:1.30±0.30	0.35~1.00	2.0 3.0 3.0 3.5
			F:1.60±0.40		
			Z:2.00±0.40		
			E:2.50±0.40		
			A:3.00±0.50		

Temperature Characteristic

Code	N	B	Y	E
Dielectric type	COG	X7R/X5R	Y5V	Z5U
Temp.range	-55~125℃	-55~125℃/-55~85℃	-30~85℃	+10~85℃
Cap.chang	0±60-250ppm	±15%	+22~-82%	+22~-56%

Capacitance (Example)

*Two significant figures followed by number of zero. 102=1000pF

Code(EIA code)	Cap.(pF)	Code(EIA code)	Cap.(pF)
0R5	0.5	101	100
2R0	2.0	102	1000(1nF)
100	10	105	1,000,000(1uF)

Capacitance Tolerance		*Tolerances may be restricted by dielectric type					
Product or capacitance		NPO,C<10pF					
Code	A	B	C	D			
Tolerance	±0.05pF	±0.10pF	±0.25pF	±0.50pF			
Product or capacitance		NPO,C>10pF					
Code	F	G	J	K			
Tolerance	±1.0%	±2.0%	±5.0%	±10%			
Product or capacitance		X7R		Y5V		Z5U	
Code	J	K	M	M	Z	M	Z
Tolerance	±5.0%	±10%	±20%	±20%	-20~+80%	±20%	-20~+80%
Voltage							
Code	OJ	1A	1C	1E	1H	2A	2E
Rated Voltage	6.3VDC	10VDC	16VDC	25VDC	50VDC	100VDC	250VDC(AC)
Code	2D	2H	2J	3A	3D	3F	3G
Rated Voltage	200VDC	500VDC	630VDC	1KVDC	2KVDC	3KVDC	4KVDC
Termination							
N=Nickel barrier S=Sliver(option) T=Nickel barrier with 100% Tin (option)							
Termination							
B=Bulk 5=500pcs/Reel, 1=1K/Reel, 2=2KReel, 3=3K/Reel (for plastic tape only) T=4K/Reel U=10K/Reel, S=15K/Reel V=16K/Reel W=20K/Reel							

SIZE	Y5V																																											
	0201				0402				0603				0805				1206				1210				1808				1812															
Cap (nF)	Vr																																											
	EIA	6.3	10	16	25	6.3	10	16	25	50	6.3	10	16	25	50	100	6.3	10	16	25	50	100	6.3	10	16	25	50	100	6.3	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
	103	S	S	S		S	S	S		P	P	P		S	S	S		S	S	S	S		S	S	S	S																		
12123	S	S			S	S			P	P	P		S	S	S		S	S	S	S																								

15 153	S S		S S		P P P		S S S		S S S S										
18 183	S S		S S		P P P		S S S		S S S S										
22 223	S S		S S		P P P		S S S		S S S S										
27 273	S		S S		P P P		S S S		S S S S										
33 333	S S		S S		P P P		S S S		S S S S										
39 393			S S		P P P		S S S		S S S S										
47 473	S S		S S S		P P P		S S S		S S S S										
56 563			S		P P P		S S S		S S M M										
68 683			S		P P P		S S S		S S M M										
82 823			S		P P P		S S S		S S M M										
(μ F)0.1104	S S		S S		P P P		S S S		S/H S/H M M					F				F	
0.15 154			S		P P P		S S S		S S H H					F				F	
0.22 224	S		S S S		P P P		S S S		S S H H					F				F	X
0.33 334			S S		P P P P		M M M M		M M H H					F				F	X
0.47 474			S S		P P P P		H H H H		H H X X					F				Z	F
0.68 684					P P		H H X X		H H X X					F				Z	F
1.0 105			S S		P P P		H/X H/X X X		H H X X					F F				F Z	F
2.2 225			S		P P		H X X X		X X X X X					F F				F E	F F
3.3 335					P		H X		X X/L L L					F F				F E	F E
4.7 475					P		X X X X		X/L X/L X/L L L					F F F				F Z E	F E
10 106					P P		X X X		X/L X/L X/L L					F F Z				F Z Z	F Z E
22 226					P		X X		X/L L L					F Z	E			F Z Z	F F F E E

47	476									X				L	L			Z	Z	E	Z			Z	E	E	Z			Z	Z	Z	E
100	107									X				L	L			E	E	E					E	E			E	E	E		

Z5U Capacitance range

SIZE		Z5U					
		0805	1206	1210	1808	1812	
Cap (nF)	EIA Vr	100V	100V	100V	100V	100V	250V
		10	103				
15	153						
22	223						
33	333						
47	473	H	H				
68	683	H	H				
100	104	H	H				F
150	154		H				F
220	224		H	X	F		F
330	334			X	F		Z
470	474			X	F	F	Z
680	684			X	F	F	Z
1000	105				F	Z	
1500	155					Z	
2200	225						

X1Y2, X2Y3 Capacitance range

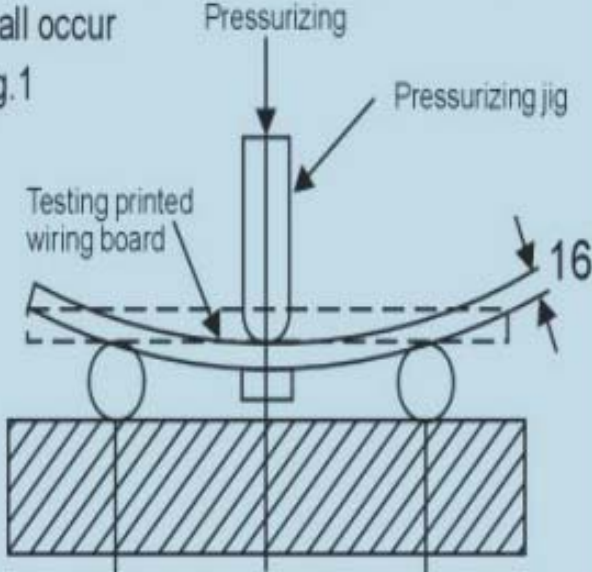
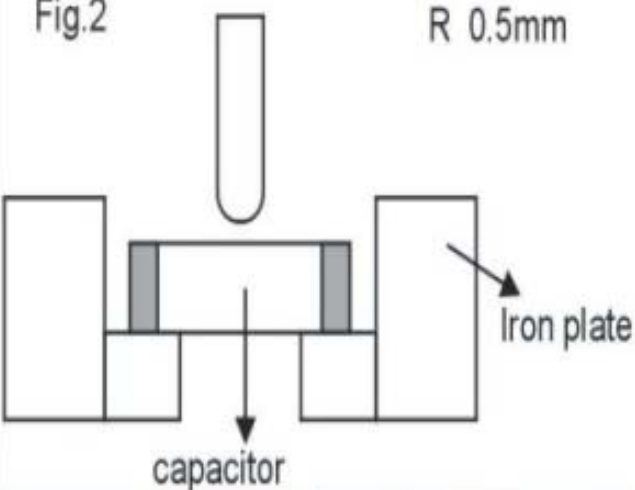
SIZE		NPO			
		1808	1812	2211	2220
Cap (pF)	EIA Vr	X2 Y3	X2 Y3	X1 Y2	X1 Y2
		5.0	5R0	F	F
7	7	F	F	F	F
10	100	F	F	F	F
12	120	F	F	F	F
15	150	F	F	F	F
18	180	F	F	F	F
22	220	F	F	F	F
27	270	F	F	F	F
33	330	F	F	F	F
39	390	F	F	F	F
47	470	F	F	F	F
56	560	F	F	F	F
68	680	F	F	F	F
82	820	F	F	F	F
100	101	F	F	F	F
120	121	Z	Z		
150	151	Z	Z		
180	181	Z	Z		
220	221	Z	Z		
270	271		Z		
330	331		Z		

SIZE		X7R			
		1808	1812	2211	2220
Cap (pF)	EIA Vr	X2 Y3	X2 Y3	X1 Y2	X1 Y2
		100	101	F	F
120	121	F	F	F	F
150	151	F	F	F	F
180	181	F	F	F	F
220	221	F	F	F	F
270	271	F	F	F	F
330	331	F	F	F	F
390	391	F	F	F	F
470	471	F	F	Z	F
560	561	F	F	Z	F
680	681	F	F	Z	F
820	821	F	F	Z	F
1000	102	F	F	Z	Z
1200	122	Z	F		Z
1500	152	Z	F		Z
1800	182	Z	F		Z
2200	222	Z	Z		Z
2700	272		Z		
3300	332		Z		
3900	392		Z		
4700	472		Z		

390	391	Z	
470	471	Z	

470	471	Z	
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No	Item	Test Method	Specification														
15	Capacitance Temperature Characteristic	<p>(a) NPO The temperature coefficient is determine during the capacitance measured in step 3 as a reference. When cycling the temperature sequentially from step 1 through 5. The capacitance shall be within the specified tolerance for the temperature coefficient.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+25±2°C</td> </tr> <tr> <td>2</td> <td>-55±3°C</td> </tr> <tr> <td>3</td> <td>+25±2°C</td> </tr> <tr> <td>4</td> <td>+125±3°C(for NPO/X7R) +85±3°C(for X5R/Y5V/Z5U)</td> </tr> <tr> <td>5</td> <td>+25±2°C</td> </tr> </tbody> </table> <p>(b) X7R,X5R, Y5V,Z5U The ranges of capacitance change compared with the 25±2°C value over the temperature range shall be</p>	Step	Temperature(°C)	1	+25±2°C	2	-55±3°C	3	+25±2°C	4	+125±3°C(for NPO/X7R) +85±3°C(for X5R/Y5V/Z5U)	5	+25±2°C	Dielectric	Temperature Range	Capacitance Change
			Step	Temperature(°C)													
			1	+25±2°C													
			2	-55±3°C													
			3	+25±2°C													
			4	+125±3°C(for NPO/X7R) +85±3°C(for X5R/Y5V/Z5U)													
			5	+25±2°C													
NPO	-55°C to +125°C	0±60 ppm/°C															
X7R	-55°C to +125°C	Within 15%															
X5R	-55°C to +85°C	Within 15%															
Z5U	+10°C to +85°C	Within +22%~-56%															
Y5V	-30°C to	Within															

		25 ± 2 °C value over the temperature range shall be within the specified ranges.	10V	+85°C	+22%~-82%
16	Resistance to Board Bending	<p>Mount the capacitor to the testing print wiring board. Then apply force in the direction shown in Fig.1. The bending stroke shall be more than 1mm.</p> <p>Pressuring is carried out at the rate of 1mm/s. After reaching the specified bending. Keeping it for 5 ± 1 seconds then measure the capacitance value.</p> <p>The capacitance could not be lower 5% of the initial value</p>	<p>No cracking or marking defects shall occur Unit:mm</p> <p>Fig.1</p> 		
17	Chip Break Strength	<p>Place the capacitor on an iron plate, then gradually apply a load on the center of the chip until it breaks.</p> <p>Tip of push-pull gauge is shown in Fig.2</p>	<p>To load 2 kg at least. Φ 1.0mm R 0.5mm</p> <p>Fig.2</p> 		
No	Item	Test Method	Specification		
		Mount the capacitor on test board, then cycling the temperature			

18	Temperature Cycle	sequentially from step 1 to step 5, and perform 25 cycles.					No crack and electric failure	
		Step	NPO	X7R	X5R	Z5U		Y5V
			Temperature(°C) / time(min)		Temperature(°C) / time(min)			
		1	$+25\pm 2^{\circ}\text{C} / 3\pm 1$		$+25\pm 2^{\circ}\text{C} / 3\pm 1$			
		2	$-55\pm 2^{\circ}\text{C} / 30\pm 3$		$-30\pm 2^{\circ}\text{C} / 30\pm 3$ (Z5U IS $+10\pm 2^{\circ}\text{C}$ /X5R IS $-55\pm 2^{\circ}\text{C}$)			
		3	$+25\pm 2^{\circ}\text{C} / 3\pm 1$		$+25\pm 2^{\circ}\text{C} / 3\pm 1$			
		4	$+125\pm 3^{\circ}\text{C} / 30\pm 3$		$+85\pm 3^{\circ}\text{C} / 30\pm 3$			
5	$+25\pm 2^{\circ}\text{C} / 3\pm 1$		$+25\pm 2^{\circ}\text{C} / 3\pm 1$					
Remove and let sit for 24 ± 2 hours(NPO) or 48 ± 4 hours(X7R,X5R,Z5U,Y5V) at room temperature(25°C), then measure.								

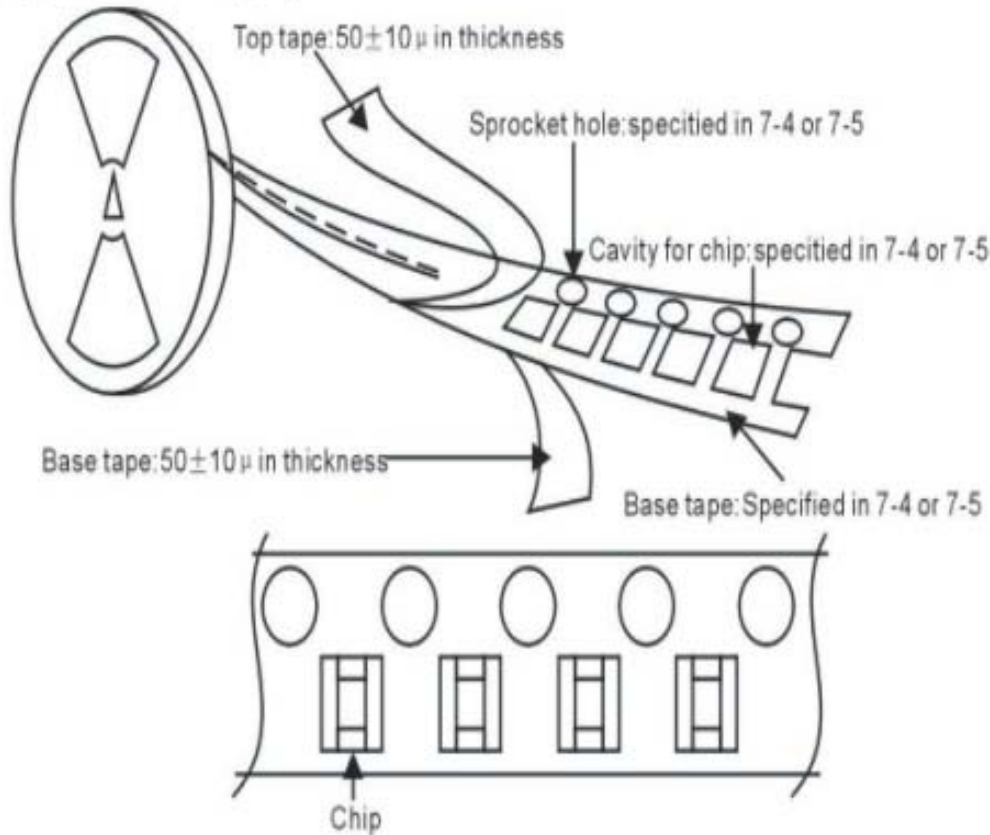
Packing

- Bulk Packaging : Packing code (B)
- Tape Packaging : Please specify the packing code when ordering.

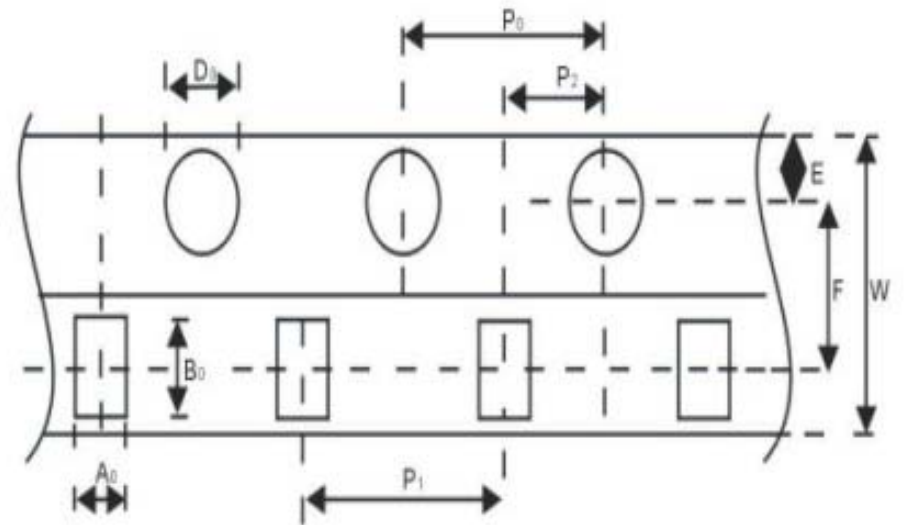
Packing Code	Pcs /Reel	Reel size
5	500	7"
1	1000	7"
2	2000	7"
3	3000	7"

T	4000	7"	
U	10000	0402	7"
		0603	10"
S	15000	13"	
V	16000	13"	
W	20000	13"	

■ Appearance of Taping



■ Dimension of paper Tape



Unit: mm

Mark	Chip size										tolerance
	0201	0402	0603	0805	1206	1210	1808	1812	2211 2220 2225	3035	
A ₀ (width of compartment)	0.4	0.63	1	1.5	1.85	2.9	2.4	3.6	5.5 6.7	9.3	±0.1
B ₀ (length of compartment)	0.63	1.13	1.8	2.25	3.45	3.6	4.9	4.9	6.0	7.9	±0.1
W (tape width)	8	8	8	8	8	8	12	12	12 16	16	±0.3
E (distance between a sprocket hole and upper)	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	±0.1
F (distance between centers of a sprocket and chip hole)	3.2	3.5	3.5	3.5	3.5	3.5	5.5	5.5	5.5 7	7	±0.1
D ₀ (diameter of sprocket hole)	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	±0.1
P ₁ (compartment pitch)	2 1	2	4	4	4	4	8	8	8 12	12	±0.1
P ₀₂ (distance between centers of compartment hole and chip hole)	1 0.5	1	2	2	2	2	4	4	4 6	6	±0.1
P ₀₁ (Sprocket hole pitch)	2 1	2	4	4	4	4	8	8	8 12	12	±0.1

- Paper thickness T :0.65±0.05 mm(for 0402 product)
- Paper thickness T :0.75±0.05mm(for thickness code S)
- Paper thickness T :0.95±0.05mm(for thickness code :P、M、H)
- Note : (1). The top tape and bottom tape shall not protrude beyond the edges of the tape, and shall not cover sprocket holes
- Note : (2). Cumulative tolerance of sprocket holes 10 pitch : ±0.3mm