General series of ceramic chip capacitors

◆Feature

*There is high reliability on monolithic structure of laminated layers.
*And its character of excellent soldering ability and
soldering resistance ability is suitable for reflow soldering and peak soldering.
*It includes high and stable capacitance.
*High Frequency Type: This kind of dielectric material is considered as Class I capacitor. COG and COH capacitors have the most stable electrical performance, which almost does not change with the change of temperature, voltage or time, they are suitable for the low-loss and high stability requirement circuits.
*X7R、X5R、X7S、X6S：X7R、X5R、 X7S、X6S material is a kind of material has high dielectric constant. The capacitor made of this kind material is considered as Class Ⅱ capacitor whose capacitance is higher than that of class Ⅰ. These capacitors are classified as having a semi-stable temperature characteristic and used over a wide temperature range, such in these kinds of circuits, DC-blocking, decoupling, bypassing, frequency discriminating etc.
执行标准：GB/T 21041-2007　GB/T 21042-2007
Executive Standard: GB/T 21041-2007　GB/T 21042-2007

◆Application

*It is suitable for all kinds of filter, coupled, harmonic vibration, bypassing and high frequency circuits.

◆ How To Order

0805	CG	102	J	500	N	T

Size Code		
Size Code	(L×W) inch	(L×W) mm
1005	0.01×0.005	0.40×0.20
0201	0.02×0.01	0.60×0.30
0402	0.04×0.02	1.00×0.50
0603	0.06×0.03	1.60×0.80
0805	0.08×0.05	2.00×1.25
1206	0.12×0.06	3.20×1.60
1210	0.12×0.10	3.20×2.50
1808	0.18×0.08	4.50×2.00
1812	0.18×0.12	4.50×3.20

Nominl Capacitance	
Express Method	Actual Value
0R5	0.5
1R0	1.0
102	10×10^2
Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point.	

Rated Voltage unit：V	
Express Method	Actual Value
6R3	6.3
500	50×10^0
201	20×10^1
Note: the first two digitsare significant; third digit denotes number of zeros; R=decimal point.	

Package Styles	
Express Method	Package Styles
B	Bulk Bag
T	Taping Package

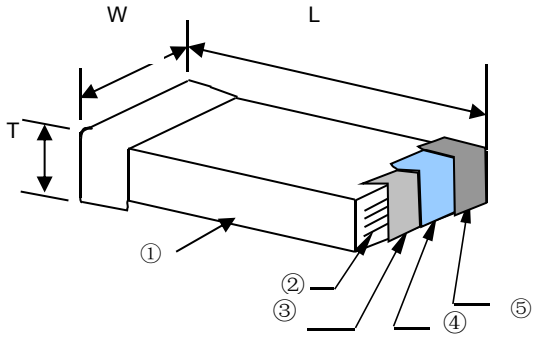
Dielectric Code	
Dielectric Code	Dielectric
CG	C0G
X	X5R
B	X7R
BS	X7S
BT	X7T
DS	X6S
DT	X6T

Capacitance Tolerance		
Code	Tolerance	Note
A	±0.05pF	These Capacitance tolerance A，B, C, D are just applicable the capacitance that equals to or less than 10pF。
B	±0.10pF	
C	±0.25pF	
D	±0.50pF	
F	±1%	
G	±2%	
J	±5%	
K	±10%	
M	±20%	
S	-20% +50%	
Z	-20% +80%	

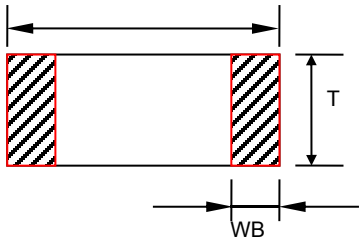
Terminal Material Styles	
Termination Styles	Express Method
Copper Solderable Termination	C
Nickel Barrier Termination	N

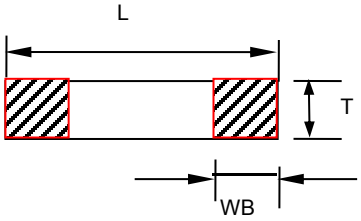
◆ Product Structure

NO	Name
①	Ceramic dielectric
②	Inner electrode
③	Substrate electrode
④	Nickel Layer
⑤	Tin Layer



◆ Product Dimensi L





Type		Dimensions (mm)				Special Instructions
British expression	Metric expression	L	W	T	WB	
1005	0402	0.4±0.02	0.2±0.02	0.2±0.02	0.1±0.03	All
0201	0603	0.6±0.03	0.3±0.03	0.3±0.03	0.15±0.05	C＜220nF
		0.6±0.05	0.3±0.05	0.3±0.05	0.15±0.05	C≥220nF
0402	1005	1.00±0.05	0.50±0.05	0.50±0.05	0.25±0.05	C＜1uF
		1.00±0.15	0.50±0.15	0.50±0.15	0.25±0.05	1uF≤C＜10uF
		1.00±0.20	0.50±0.20	0.50±0.20	0.25±0.05	C≥10uF
0603	1608	1.60±0.10	0.80±0.10	0.80±0.10	0.35±0.20	C≤1uF
		1.60±0.20	0.80±0.20	0.80±0.20	0.35±0.20	C＞1uF
0805	2012	2.00±0.20	1.25±0.20	0.80±0.20	0.50±0.20	C＜0.47μF
		2.00±0.20	1.25±0.20	1.25±0.20	0.50±0.20	C≥0.47μF
1206	3216	3.20±0.30	1.60±0.30	0.80±0.20	0.60±0.30	C≤220nF
		3.20±0.30	1.60±0.30	1.00±0.20	0.60±0.30	220nF＜C＜1μF
		3.20±0.30	1.60±0.30	1.60±0.30	0.60±0.30	C≥1μF
1210	3225	3.20±0.30	2.50±0.30	≤2.80	0.60±0.30	All
1808	4520	4.50±0.40	2.00±0.20	≤2.20	0.60±0.30	All
1812	4532	4.50±0.40	3.20±0.30	≤3.50	0.60±0.30	All

Note：1、The specific thickness of the product can read "capacity range and voltage "in this approval sheet

2、We can design according to customer special requirements

◆Temperature Coefficient /Characteristics

Dielectric	Reference Temperature Point	Temperature Coefficient	Operation Temperature Range
COG	20°C	0±30 ppm/℃	-55℃～125℃
X7R	20°C	±15%	-55℃～125℃
X7S	20°C	±22%	-55℃～125℃
X7T	20°C	-33%~+22%	-55℃～125℃
X6S	20°C	±22%	-55℃～105℃
X6T	20°C	-33%~+22%	-55℃～105℃
X5R	20°C	±15%	-55℃～85℃

Note :Nominal temperature coefficient and allowed tolerance of class Ⅰ are decided by the changing of the capacitance between 20°C and 85°C. Nominal temperature coefficient of class Ⅱ are decided by the temperature of 20°C.

◆Capacitance Range and Operating Voltage

*A list of the specific voltage-specific capacitors of Class I capacitors

Dielectric	C0G									
Dimension	1005 (0.4mm*0.2mm)				0201 (0.6mm*0.3mm)		0402 (1.0mm*0.5mm)		0603 (1.6mm*0.8mm)	
Capacity/ Voltage	10V	16V	25V	50V	25V	50V	25V	50V	25V	50V
0.1pF	0.2±0.02				0.3±0.03	0.3±0.03	0.50±0.05	0.50± 0.05	0.80±0.10	0.80±0.10
0.2pF										
0.5pF										
1pF										
1.2pF										
1.5pF										
1.8pF										
2.0pF										
2.2pF										
2.7pF										
3.0pF										
3.3pF										
3.6pF										
3.9pF										
4.7pF										
5.0pF										
5.6pF										
6.8pF										
8.0pF										
8.2pF										
10pF										
12pF										
15pF										
18pF										
22pF										
27pF										
33pF										
39pF										
47pF										
56pF										
68pF										
100pF										
120pF										
150pF										
180pF										
220pF										
270pF										
330pF										
390pF										
470pF										
560pF										

680pF							
1nF							
1.5nF							
1.8nF							
2.2nF							
2.7nF							
3.3nF							
4.7nF							
10nF							

Note: 1、Corresponding product design thickness，unit:mm　2、We can design according to customer special requirements

Dielectric	C0G							
Dimension	0805 (2.0mm*1.25mm)		1206 (3.2mm*1.6mm)		1210 (3.2mm*2.5mm)		1812 (4.5mm*3.2mm)	
Capacity/ Voltage	25V	50V	25V	50V	25V	50V	25V	50V
0.1pF	0.8±0.02		0.8±0.02					
0.22pF								
0.3pF								
0.47pF								
1pF								
1.2pF								
1.5pF								
1.8pF								
2.0pF								
2.2pF								
2.7pF								
3.0pF								
3.3pF								
3.6pF								
3.9pF								
4.7pF								
5.0pF								
5.6pF								
6.8pF								
8.0pF								
8.2pF								
10pF					1.25±0.20		1.6±0.30	
12pF								
15pF								
18pF								
22pF								
27pF								
33pF								
39pF								
47pF								
56pF								
68pF								
100pF								

120pF						
150pF						
180pF						
220pF						
270pF						
330pF						
390pF						
470pF						
560pF						
680pF						
1nF						
1.5nF						
1.8nF						
2.2nF						
2.7nF						
3.3nF						
4.7nF						
6.8nF						
10nF		1.25±0.20				
12nF	1.25±0.20	1.60±0.30				
22nF						
33nF						
47nF						
100nF						

Note: 1、Corresponding product design thickness，unit:mm　2、We can design according to customer special requirement。

*A list of the specific voltage-specific capacitors of Class I capacitors

Dimension	1005 (0.4mm*0.2mm)														
Dielectric	X7R 系列			X7S 系列			X7T 系列			X6S/X6T 系列			X5R 系列		
Capacity/ Voltage	6.3V	10V	16V	6.3V	10V	16V	6.3V	10V	16V	6.3V	10V	16V	6.3V	10V	16V
120pF	0.2±0.02			0.2±0.02			0.2±0.02			0.2±0.02			0.2±0.02		
180pF															
220pF															
270pF															
330pF															
390pF															
470pF															
560pF															
680pF															
1nF															
1.2nF															
1.5nF															
1.8nF															
2.2nF															
2.7nF															
3.3nF															

3.9nF																								
4.7nF																								
5.6nF																								
6.8nF																								
10nF																								
15nF																								

Dimension	0201 (0.6mm*0.3mm)																							
Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
120pF		0.3±0.03				0.3±0.03					0.3±0.03					0.3±0.03									
180pF																									
220pF																									
330pF																									
470pF																									
560pF																									
680pF																									
1nF																									
2.2nF		0.3±0.03				0.3±0.03					0.3±0.03					0.3±0.03									
3.9nF																									
4.7nF																									0.30±0.03
5.6nF		0.3±0.03				0.3±0.03					0.3±0.03					0.3±0.03									
6.8nF																									
10nF																									
15nF		0.3±0.03				0.3±0.03															0.30±0.03				
18nF																									
22nF																									
33nF																									

Note: 1、Corresponding product design thickness，unit:mm　2、We can design according to customer special requirement

Dimension	0201 (0.6mm*0.3mm)																							
Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
47nF						0.3±0.03					0.3±0.03					0.3±0.05					0.30±0.05				
56nF																									
68nF																									
100nF																									
220nF						0.3±0.05					0.30±0.05					0.30±0.05					0.30±0.05				
330nF																									
470nF																									
1μF																									
2.2μF																									

Dimension	0402 (1.0mm*0.5mm)

Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	0.50±0.05					0.50±0.05					0.50±0.05					0.50±0.05									
470pF																									
560pF																									
680pF																									
1nF																									
2.2nF																									
3.9nF																									
4.7nF																									
5.6nF																									
6.8nF																									
10nF																									
15nF																									
18nF																									
22nF																									
33nF																									
47nF																									0.50±0.05
56nF																									
68nF																									
100nF																					0.50±0.05				
220nF	0.50±0.05					0.50±0.05					0.50±0.05					0.50±0.05					0.50±0.05				
330nF	0.50±0.05					0.50±0.05					0.50±0.05					0.50±0.05					0.50±0.05				
470nF																									
680nF	0.50±0.05					0.50±0.05					0.50±0.05					0.50±0.05					0.50±0.05				
1μF	0.50±0.15					0.50±0.15					0.50±0.15					0.50±0.15					0.50±0.15				
2.2μF						0.50±0.15					0.50±0.15					0.50±0.15					0.50±0.15				
4.7μF											0.50±0.15					0.50±0.15					0.50±0.15				
6.8μF											0.50±0.15					0.50±0.15					0.50±0.15				
10μF											0.50±0.20					0.50±0.20					0.50±0.20				

Note: 1、Corresponding product design thickness，unit:mm　2、We can design according to customer special requirement

Dimension	0603 (1.6mm*0.8mm)																								
Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	0.8±0.1					0.8±0.1					0.8±0.1					0.8±0.1									
470pF																									

560pF																									
680pF																									
1nF																									
2.2nF																									
3.9nF																									
4.7nF																									
5.6nF																									
6.8nF																									
10nF																									
15nF																									
18nF																									
22nF																									
33nF																									
47nF																									
56nF																									
68nF																									
100nF																									
220nF																									
330nF																									
470nF																						0.8±0.1			
680nF																									
1μF																									
2.2 μF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2				
3.3 μF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2				
4.7 μF																									
6.8 μF																									
10 μF																									
15 μF											0.8±0.2					0.8±0.2					0.8±0.2				
22 μF																									
47μF											0.8±0.2					0.8±0.2					0.8±0.2				

Dimension	0805 (2.0mm*1.25mm)																								
Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2									
470pF																									
560pF																									
680pF																									
1nF																									
2.2nF																									
3.9nF																									
4.7nF																									
5.6nF																									
6.8nF																									
10nF																									
15nF																									

Note: 1、Corresponding product design thickness，unit:mm 2、We can design according to customer special requiremen

Dimension	0805 (2.0mm*1.25mm)																								
Dielectric	X7R 系列					X7S					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
18nF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2									
22nF																									
33nF																									
47nF																									
56nF																									
68nF																									
100nF																									
220nF																									
330nF																									
470nF	1.25±0.2					1.25±0.2					1.25±0.2					1.25±0.2									
680nF																									
1μF																					1.25±0.2				
2.2μF																									
3.3μF	1.25±0.2					1.25±0.2																			
4.7μF																									
6.8μF	1.25±0.2					1.25±0.2																			
10μF																									
15μF											1.25±0.2										1.25±0.2				
22μF																1.25±0.2									
47μF											1.25±0.2					1.25 ±0.2					1.25±0.2				

Dimension	1206 (3.2mm*1.6mm)																								
Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2									
470pF																									
560pF																									
680pF																									
1nF																									
2.2nF																									
3.9nF																									
4.7nF																									
5.6nF																									
6.8nF																									
10nF																									
15nF																									
18nF																									
22nF																									
33nF																									
47nF																									

56nF										
68nF										
100nF										
220nF										
330nF	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2						
470nF										
680nF										
1μF	1.6±0.3	1.6±0.3	1.6±0.3	1.6±0.3	1.6±0.3					
2.2μF										

Note: 1、Corresponding product design thickness，unit:mm 2、We can design according to customer special requirement

Dimension	1206 (3.2mm*1.6mm)																									
Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
3.3μF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3				
4.7μF																										
6.8μF																										
10μF																										
15μF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3				
22μF																										
47μF						1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3				
100μF											1.6±0.3					1.6±0.3					1.6±0.3				

Dimension	1210 (3.2mm*2.5mm)																									
Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	1.25±0.2					1.25±0.2					1.25±0.2					1.25±0.2									
470pF																									
560pF																									
680pF																									
1nF																									
2.2nF																									
3.9nF																									
4.7nF																									
5.6nF																									
6.8nF																									
10nF																									
15nF																									
18nF																									
22nF																									
33nF																									
47nF																									
56nF																									
68nF																									
100nF																									
220nF	1.4±0.2					1.4±0.2					1.4±0.2					1.4±0.2									
330nF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3									
470nF																									
680nF																									
1μF						2.5±0.3					2.5±0.3					2.5±0.3									
2.2μF																									
3.3μF																									
4.7μF																					2.5±0.3			1.8±0.3	
6.8μF	2.5±0.3					2.5±0.3					2.5±0.3					2.5±0.3									
10μF																									
15μF																					2.5±0.3				
22μF																									
47μF											2.5±0.3					2.5±0.3					2.5±0.3				
100μF											2.5±0.3										2.5±0.30				

Note: 1、Corresponding product design thickness，unit:mm 2、We can design according to customer special requirement

Dimension	1808 (4.5mm*2.0mm)																									
Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3				
470pF																									
560pF																									
680pF																									

1nF																																
2.2nF																																
3.9nF																																
4.7nF																																
5.6nF																																
6.8nF																																
10nF																																
15nF																																
18nF																																
22nF																																
33nF																																
47nF																																
56nF																																
68nF																																
100nF																																
220nF																																
330nF																																
470nF																																
680nF																																
1μF																																
2.2μF	1.6±0.3			1.6±0.3				1.6±0.3				1.6±0.3				1.6±0.3														
3.3μF																																
4.7μF																																
6.8μF																																

Dimension	1812 (4.5mm*3.2mm)																									
Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	1.60±0.20					1.60±0.20					1.60±0.20					1.60±0.20					1.60±0.20				
470pF																										
560pF																										
680pF																										
1nF																										
2.2nF																										
3.9nF																										
4.7nF																										
5.6nF																										
6.8nF																										
10nF																										
15nF																										
18nF																										
22nF																										
33nF																										
47nF																										
56nF																										
68nF																										
100nF																										

220nF																									

Dimension	1812 (4.5mm*3.2mm)																								
Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330nF	1.60±0.20					1.60±0.20					1.60±0.20					1.60±0.20					1.60±0.20				
470nF																									
680nF																									
1μF																									
2.2μF	2.0±0.20					2.0±0.20					2.0±0.20					2.0±0.20					2.0±0.20				
3.3μF																									
4.7μF																									
6.8μF																									

Note：1、【】General thickness corresponds to the capacity，unit：mm2、We can design according to the customer requirements

◆ Reliability Test

Item	Technical Specification		Test Method and Remarks		
Capacitance	ClassⅠ	Should be within the specified tolerance.	Capacitance	Measuring Frequency	Measuring Voltage
			≤1000pF	1MHz±10%	1.0±0.2Vrms
			> 1000 pF	1KHz±10%	
	ClassⅡ	Should be within the specified tolerance.	Test Temperature: 25℃±3℃ C≤10μF： Test Frequency: 1KHz±10% Test Voltage: 1.0±0.2Vrms C > 10μF Test Frequency: 120±24 Hz Test Voltage: 0.5±0.1Vrms		
Insulation Resistance	ClassⅠ	C≤10 nF, Ri≥50000MΩ C > 10 nF, Ri•C_R≥500S	Measuring Voltage: Rated Voltage（Max 500V） Duration: 60±5s Test Humidity: ≤75% Test Temperature: 25℃±3℃ Test Current: ≤50mA		
	ClassⅡ	C≤25 nF, Ri≥10000MΩ C > 25 nF, Ri•C_R > 100S			
	注：S=Ω·F				
Dissipation Factor	ClassⅠ	DF	Capacitance	Measuring Frequency	Measuring Voltage
		≤1/（400+20C）	C < 30 pF	1MHz±10%	1.0±0.2Vrms
		≤0.1%	C≥30pF		

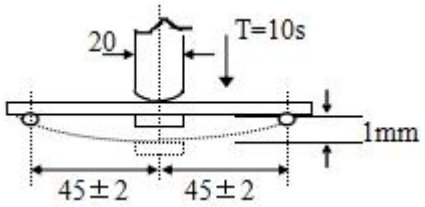
<table>
<tr><td>Item</td><td colspan="8">Technical Specification</td><td>Test Method and Remarks</td></tr>
<tr><td rowspan="21">Dissipation Factor</td><td rowspan="21">Class II</td><td>电压</td><td>DF(×10^{-4})</td><td>1005</td><td>0201</td><td>0402</td><td>0603</td><td>0805</td><td>1206 及上</td><td rowspan="21">C≤10μF
Test Frequency: 1KHz±10%
Test Voltage: 1.0±0.2Vrms

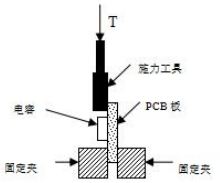
C＞10μF
X7R、X5R、X7T、X6S
Test Frequency: 120±24Hz
Test Voltage: 0.5 ±0.1Vrms</td></tr>
<tr><td rowspan="5">50V</td><td>≤250</td><td>——</td><td>——</td><td>≤10nF</td><td>＜100nF</td><td>——</td><td>≤680nF</td></tr>
<tr><td>≤350</td><td>——</td><td>≤3.3nF</td><td>≤47nF</td><td>＜470nF</td><td>≤1uF</td><td>≤2.2uF</td></tr>
<tr><td>≤500</td><td>——</td><td>≤10nF</td><td>≤0.1μF</td><td>——</td><td>——</td><td>——</td></tr>
<tr><td>≤750</td><td>——</td><td>——</td><td>——</td><td>——</td><td>≤2.2uF</td><td>≤4.7uF</td></tr>
<tr><td>≤1000</td><td>——</td><td>——</td><td>——</td><td>≤2.2μF</td><td>≤10μF</td><td>≤10μF</td></tr>
<tr><td rowspan="5">25V</td><td>≤250</td><td>——</td><td>——</td><td>≤10nF</td><td>＜100nF</td><td>——</td><td>≤680nF</td></tr>
<tr><td>≤350</td><td>——F</td><td>≤3.3nF</td><td>≤47nF</td><td>＜470nF</td><td>≤1uF</td><td>——</td></tr>
<tr><td>≤500</td><td>——</td><td>≤10nF</td><td>0.22μF</td><td>——</td><td>——</td><td>——</td></tr>
<tr><td>≤750</td><td>——</td><td>＞10nF</td><td>——</td><td>——</td><td>≤2.2μF</td><td>≤10μF</td></tr>
<tr><td>≤1000</td><td>——</td><td>≤100nF</td><td>≤2.2μF</td><td>≤10μF</td><td>≤22μF</td><td>≤22μF</td></tr>
<tr><td rowspan="5">16V</td><td>250</td><td>——</td><td>——</td><td>≤10nF</td><td>＜100nF</td><td>——</td><td>≤680nF</td></tr>
<tr><td>≤350</td><td>≤1nF</td><td>≤3.3nF</td><td>≤47nF</td><td>＜470nF</td><td>≤1uF</td><td>——</td></tr>
<tr><td>≤500</td><td>——</td><td>≤15nF</td><td>≤220nF</td><td>——</td><td>——</td><td>——</td></tr>
<tr><td>≤750</td><td>≤10nF</td><td>≤47nF</td><td>——</td><td>——</td><td>≤4.7μF</td><td>≤10μF</td></tr>
<tr><td>≤1000</td><td>——</td><td>≤100nF</td><td>≤4.7μF</td><td>≤10μF</td><td>≤22μF</td><td>≤47μF</td></tr>
<tr><td rowspan="5">10V</td><td>≤250</td><td>——</td><td>——</td><td>≤10nF</td><td>＜100nF</td><td>——</td><td>≤680nF</td></tr>
<tr><td>≤350</td><td>≤1nF</td><td>≤3.3nF</td><td>≤47nF</td><td>＜470nF</td><td>≤1uF</td><td>——</td></tr>
<tr><td>≤500</td><td>——</td><td>≤15nF</td><td>≤220nF</td><td>——</td><td>——</td><td>——</td></tr>
<tr><td>≤750</td><td>≤10nF</td><td>≤100nF</td><td>——</td><td>——</td><td>≤2.2μF</td><td>≤10μF</td></tr>
<tr><td>≤1000</td><td>——</td><td>≤2.2μF</td><td>≤10μF</td><td>≤22μF</td><td>≤47μF</td><td>≤100μF</td></tr>
<tr><td rowspan="5">≤ 6.3V</td><td>≤250</td><td>——</td><td>——</td><td>≤10nF</td><td>＜100nF</td><td>——</td><td>≤680nF</td></tr>
<tr><td>≤350</td><td>≤1nF</td><td>≤3.3nF</td><td>47nF</td><td>＜470nF</td><td>≤1uF</td><td>——</td></tr>
<tr><td>≤500</td><td>——</td><td>≤15nF</td><td>≤220nF</td><td>——</td><td>——</td><td>——</td></tr>
<tr><td>≤750</td><td>≤10nF</td><td>≤47nF</td><td>——</td><td>——</td><td>≤2.2uF</td><td>≤10μF</td></tr>
<tr><td>≤1000</td><td>——</td><td>≤2.2μF</td><td>≤10μF</td><td>≤47μF</td><td>≤47μF</td><td>≤100uF</td></tr>
<tr><td>Dielectric Withstanding Voltage</td><td colspan="3">No breakdown or damage.</td><td colspan="6">Measuring Voltage:
ClassI:300% Rated voltage ClassII:250% Rated voltage
Duration: 1~5s Charge/ Discharge Current: 50mA max.
(This method excludes high-voltage MLCC)</td></tr>
<tr><td rowspan="2">Solderability</td><td colspan="3" rowspan="2">At least 95% of the terminal electrode is covered by new solder.
Visual Appearance: No visible damage.</td><td colspan="6">Preheating conditions:80 to 120℃; 10~30s.</td></tr>
<tr><td colspan="3">Pb-Sn soldering
Solder Temperature: 235±5℃
Duration: 2±0.5s</td><td colspan="3">Lead-free soldering
Solder Temperature: 245±5℃
Duration: 2±0.5s</td></tr>
</table>

<table>
<tr><th>Item</th><th>Technical Specification</th><th>Test Method and Remarks</th></tr>
<tr><td>Resistance to Soldering Heat</td><td>
<table>
<tr><td>Item</td><td>ClassI</td><td>ClassII</td></tr>
<tr><td>ΔC/C</td><td>≤±2.5% or ±0.25PF，whichever is larger</td><td>±15%</td></tr>
<tr><td>DF</td><td colspan="2">Same to initial value.</td></tr>
<tr><td>IR</td><td colspan="2">Same to initial value.</td></tr>
</table>
Appearance : No visible damage.At least 95% of the terminal electrode is covered by new solder.</td><td>Preheating conditions: 100 to 200℃; 60-120 seconds.
Solder Temperature: 265±5℃
Duration: 10±1s
Clean the capacitor with solvent and examine it with a 10X(min.) microscope.

Recovery Time: 24±2h.
Recovery condition: Room temperature</td></tr>
<tr><td>Resistance to Flexure of Substrate (Bending Strength)</td><td>Appearance: No visible damage.

ΔC/C:

ClassI: ≤±5%或±0.5pF,whichever is larger.
ClassII: ≤±10%</td><td>Test Board: PCB Warp: 1mm
Speed: 1mm/sec. Unit: mm
The measurement should be made with the board in
 

the bending position.</td></tr>
<tr><td>Termination Adhesion</td><td>No visible damage.</td><td>As shown in the picture，Slowly apply a T force to the porcelain body on the side of the capacitor and hold for 60+1 seconds.
<table>
<tr><td>规格</td><td>施加力 T</td></tr>
<tr><td>≤0402</td><td>2N</td></tr>
<tr><td>≥0603</td><td>5N</td></tr>
</table>

</td></tr>
<tr><td>Temperature Cycle</td><td>
<table>
<tr><td>Item</td><td>ClassI</td><td>ClassII</td></tr>
<tr><td>ΔC/C</td><td>≤±1% or ±1pF，whichever is larger</td><td>-15% ~+15%</td></tr>
</table>
No visible damage.</td><td>Preheating conditions: up-category temperature, 1h
Recovery time: 24±1h
Initial Measurement
Cycling Times: 5 times, 1 cycle, 4 steps:
<table>
<tr><th>Step</th><th>Temperature (℃)</th><th>Time</th></tr>
<tr><td>1</td><td>Low- category temp:
:-55</td><td>30min</td></tr>
<tr><td>2</td><td>Normal temp : +20℃</td><td>2 ~ 3min</td></tr>
<tr><td>3</td><td>Up- category temp
(COG/X7R/X7T/X7S: +125
X5R:+85 X6S/X6T:+105)</td><td>30min</td></tr>
<tr><td>4</td><td>Normal temp : +20℃</td><td>2 ~ 3min</td></tr>
</table>
Recovery time after test:24±2h</td></tr>
</table>

<table>
<tr><th>Item</th><th>Technical Specification</th><th>Test Method and Remarks</th></tr>
<tr><td>Humidity load</td><td>
<table>
<tr><td>ΔC/C</td><td colspan="2">ClassI: ±7.5% or ±0.75pF, whichever is larger.
ClassII: ≤±12.5%</td></tr>
<tr><td>DF</td><td colspan="2">Not more than twice of initial value.</td></tr>
<tr><td rowspan="2">IR</td><td>ClassI</td><td>Ri≥5000MΩ或 Ri•C_R≥50S whichever is smaller.</td></tr>
<tr><td>Class II</td><td>Ri≥1000MΩ或 Ri•C_R≥10S whichever is smaller.</td></tr>
<tr><td colspan="3">Appearance: No visible damage.</td></tr>
</table>
</td><td>※ Pretreatment (Class II) : After preheating at 140℃~150℃ for 1h±10min, place at room temperature for 24±2h.
Humidity: 90~95%RH
Voltage: Rated Voltage
Duration: 500h
Recovery Time: 24h±2h
Class 2 : 0201≥47nF、0402≥33nF、0603≥1μF、0805≥4.7μF、1206≥10μF product need to keep in 150℃、1h after the test ,and measurement to be made after being kept at room temperature for 24±2h.</td></tr>
<tr><td>Life Test</td><td>
<table>
<tr><td>ΔC/C</td><td>ClassI</td><td>≤±3%或±0.3pF, whichever is larger.</td></tr>
<tr><td></td><td>Class II</td><td>-20% ~ +20%</td></tr>
<tr><td>DF</td><td colspan="2">≤2 倍初始标准
Not more than twice of initial value.</td></tr>
<tr><td rowspan="2">IR</td><td>ClassI</td><td>Ri≥4000MΩ或 Ri•C_R≥40S 取两者之中较小者
Ri≥4000MΩ或 Ri•C_R≥40S
whichever is smaller.</td></tr>
<tr><td>Class II</td><td>Ri≥2000MΩ或 Ri•C_R≥50S
whichever is smaller.</td></tr>
<tr><td colspan="3">Appearance: No visible damage.</td></tr>
</table>
</td><td>※ Pretreatment (ClassII) :After preheating at 140℃~150℃ for 1h±10min, place at room temperature for 24±2h.
Low-Voltage（ ＜100V ）
Applied Voltage: 2*Ur，except the table 1
Duration: 1000h
Temperature：125℃（C0G、X7R、X7S） 85℃（X5R）105℃（X6S、X6T）
Charge/ Discharge Current: 50mA max.
Recovery Time: 24h±2h
Class 2：0201≥47nF、0402≥33nF、0603≥1μF、0805≥4.7μF、1206≥10μF product need to keep in 150℃、1h after the
<table>
<tr><td colspan="4">table 1</td></tr>
<tr><td>Capacitance</td><td>testing voltage</td><td>Capacitance</td><td>testing voltage</td></tr>
<tr><td>0201≥10nF</td><td rowspan="3">1.5Ur</td><td>0805≥0.47uF</td><td rowspan="3">1.5Ur</td></tr>
<tr><td>0402≥47nF</td><td>1206≥1uF</td></tr>
<tr><td>0603≥220nF</td><td>1210≥1uF</td></tr>
</table>
test ，and measurement to be made after being kept at room temperature for 24±2h.</td></tr>
</table>

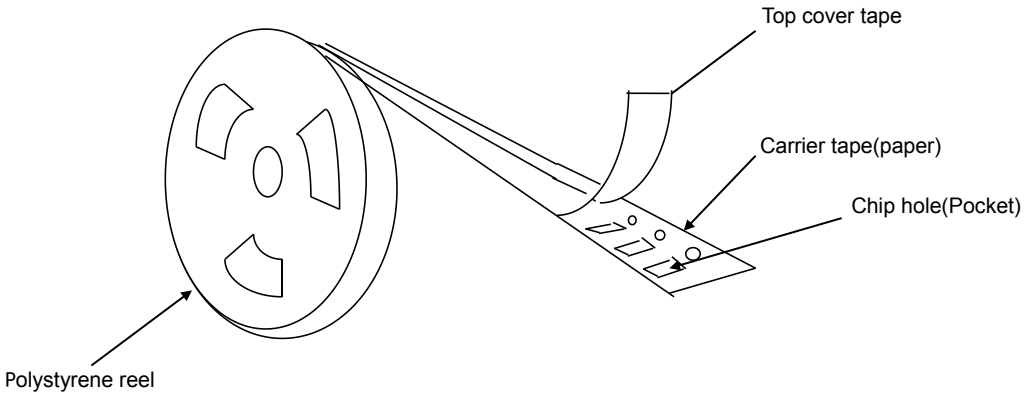
Note：

Pretreatment (only for class2 capacitor)

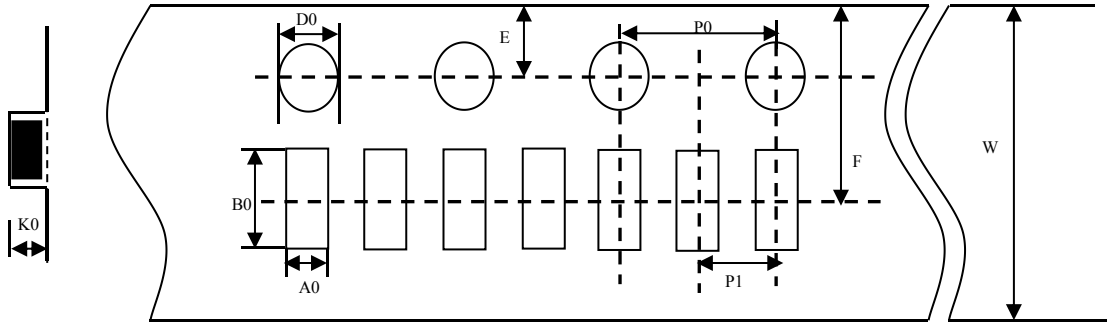
Pretreatment (only for class2 capacitor) is a method to treat the capacitor before measurement. First, place the capacitor in the up-category temperature or other specified higher temperature environment for 1hour. Then recovery the capacitor at standard pressure conditions for 24±1hours。

◆ Package

* Embossed Plastic Taping



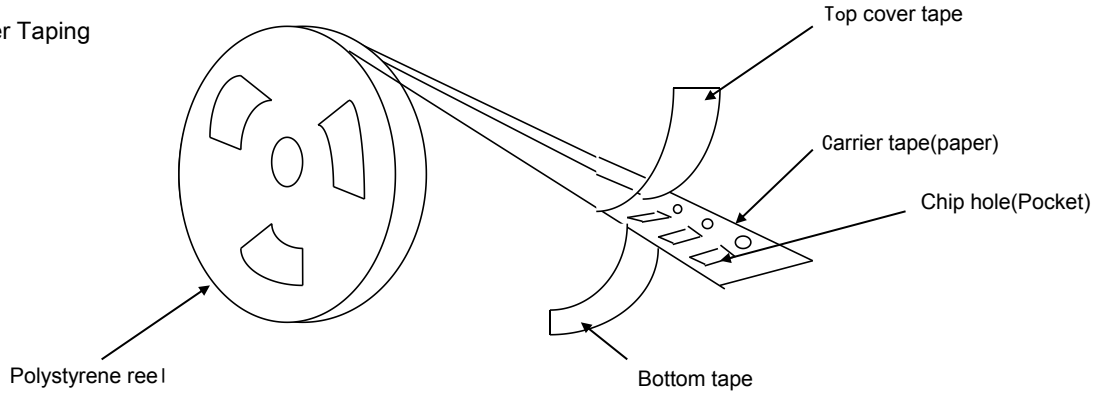
* The emboss plastic applies only to 1005 type，the dimensions as follows:



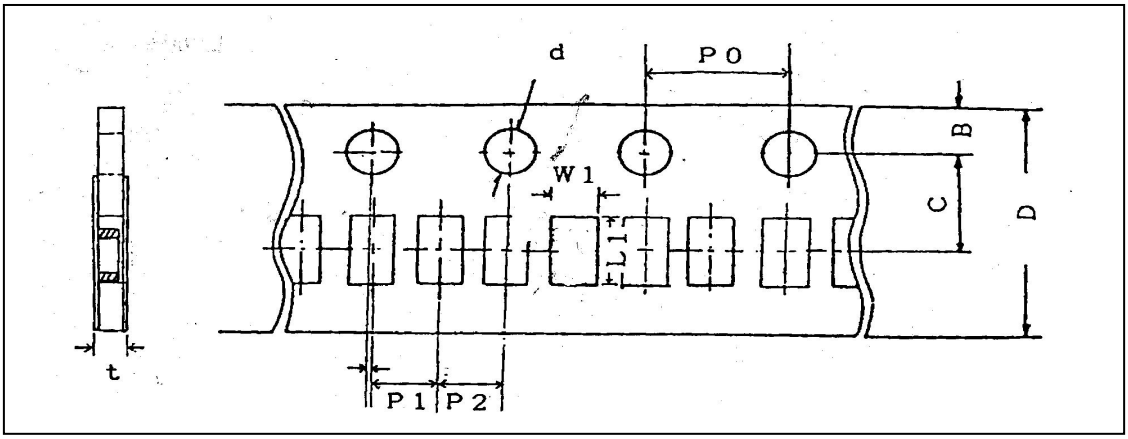
Unit：mm

W	P0	P1	E	F	D0	A0	B0	K0
4±0.05	2±0.04	1±0.02	0.9±0.05	1.8±0.02	0.8±0.04	0.24±0.02	0.45±0.02	0.24±0.02

* Paper Taping

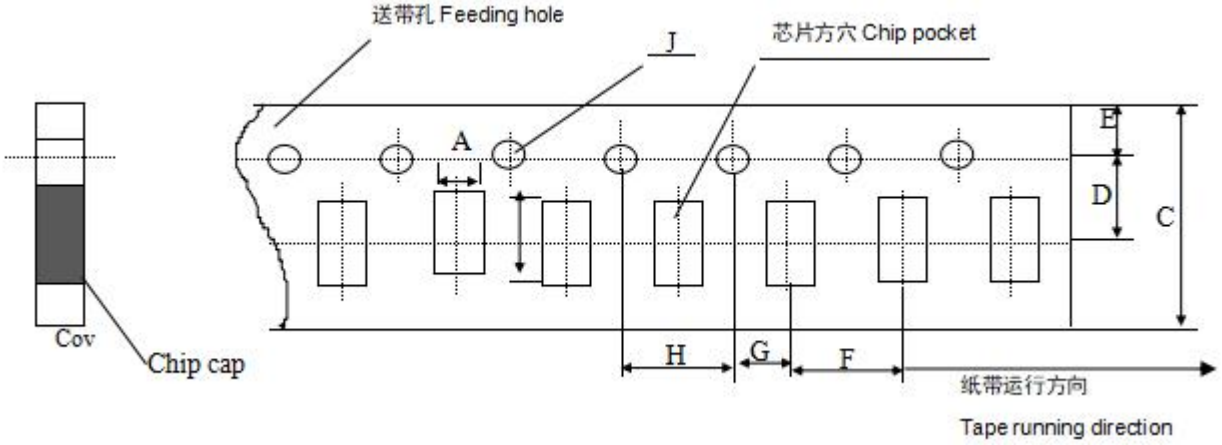


* Dimensions of paper taping for 1005、0201、0402 type



Code	W1	L1	D	C	B	P1	P2	P0	d	t
1005	0.24 ±0.02	0.45 ±0.02	8.00 ±0.10	3.50 ±0.05	1.75 ±0.10	2.00 ±0.05	2.00 ±0.05	4.00 ±0.10	1.50 -0/+0.10	0.30 Below
0201	0.37 ±0.10	0.67 ±0.10	8.00 ±0.10	3.50 ±0.05	1.75 ±0.10	2.00 ±0.05	2.00 ± 0.05	4.00 ±0.10	1.50 -0/+0.10	0.80 Below
0402	0.65 ±0.10	1.15 ±0.10	8.00 ±0.10	3.50 ±0.05	1.75 ±0.10	2.00 ±0.05	2.00 ±0.05	4.00 ±0.10	1.50 -0/+0.10	0.80 Below

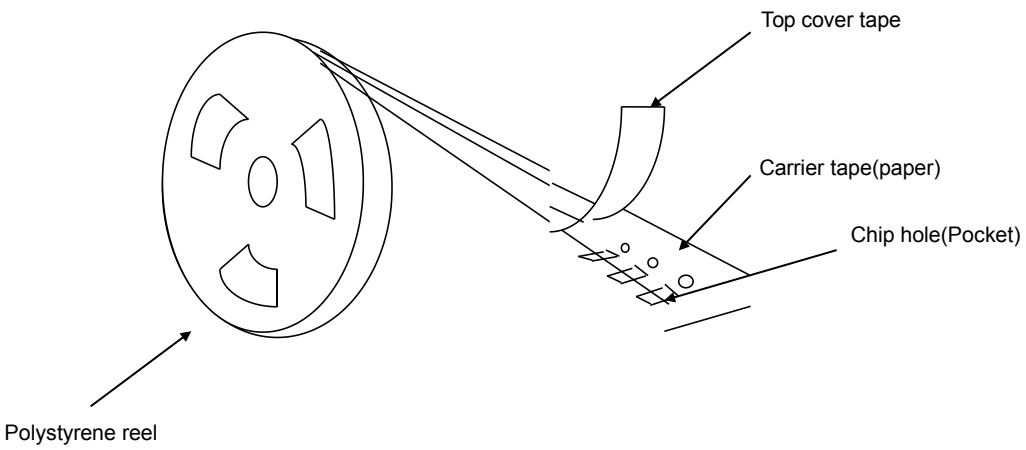
*Dimensions of paper taping for 0603，0805，1206 types.



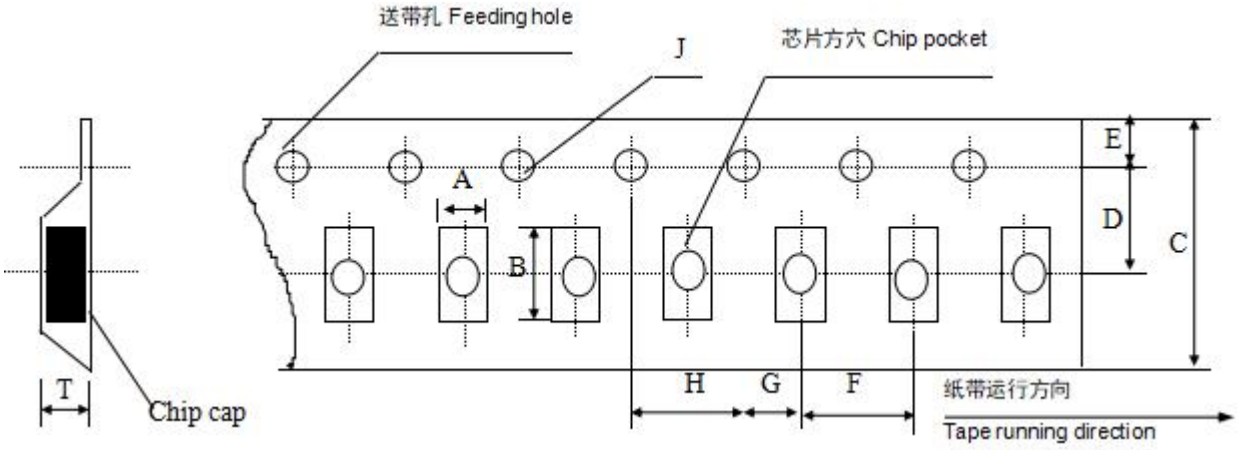
Unit：mm

Code / paper size	A	B	C	D*	E	F	G*	H	J	T
0603	1.10 ±0.10	1.90 ±0.10	8.00 ±0.10	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 Max
0805	1.45 ±0.15	2.30 ±0.15	8.0 ±0.15	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 Max
1206	1.80 ±0.20	3.40 ±0.20	8.00 ±0.20	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 Max

* Embossed taping



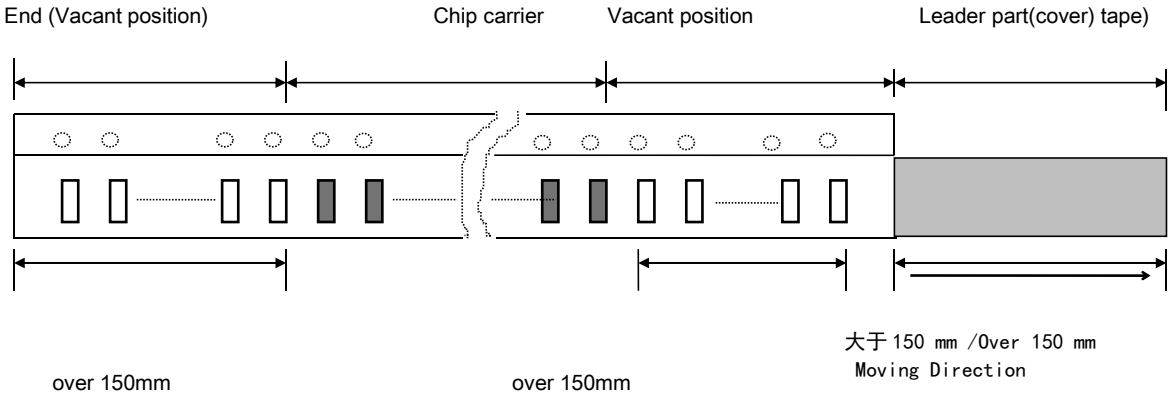
* Dimensions of embossed taping for 0805~1812 type



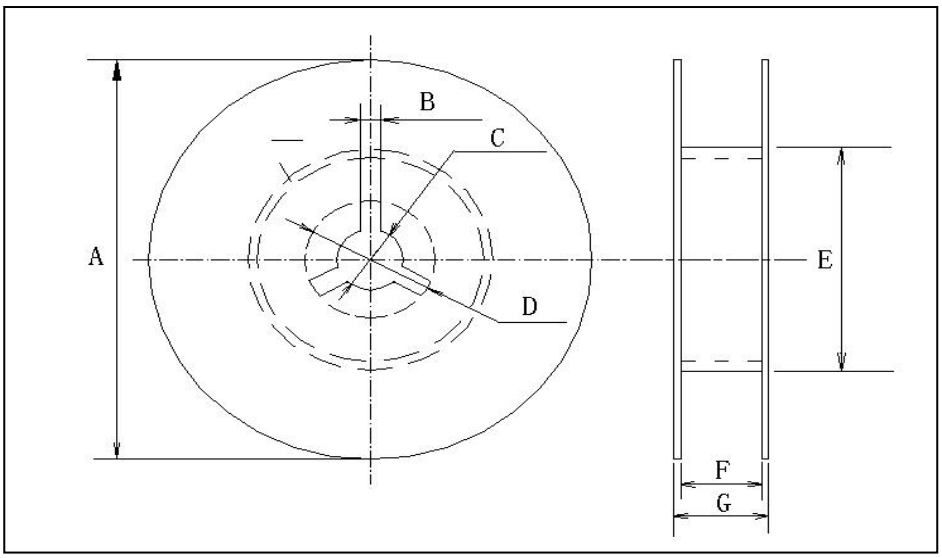
Code / Tape size	A	B	C	D*	E	F	G*	H	J	T
0805	1.55 ± 0.20	2.35 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	4.00 ± 0.10	1.50 -0/+0.10	1.50 Max
1206	1.95 ± 0.20	3.60 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	4.00 ± 0.1	1.50 -0/+0.10	1.85 Max
1210	2.70 ± 0.10	3.42 ± 0.10	8.00 ± 0.10	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.55 -0/+0.10	3.2 Max
1808	2.20 ± 0.10	4.95 ± 0.10	12.00 ± 0.10	5.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.50 -0/+0.10	3.0 Max
1812	3.66 ± 0.10	4.95 ± 0.10	12.00 ± 0.10	5.50 ± 0.05	1.75 ± 0.10	8.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.55 -0/+0.10	4.0 Max

Note：The place with “*” means where needs exactly dimensions.

* Structure of leader part and end part of the carrier paper

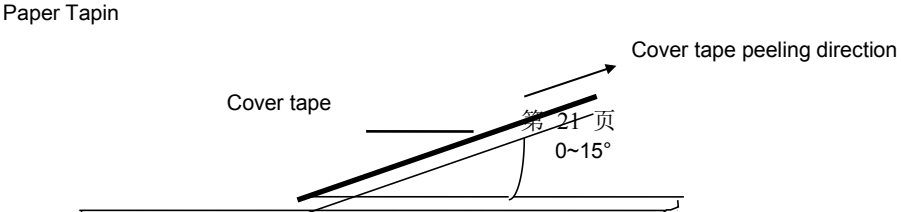


* Reel dimensions (unit: mm)

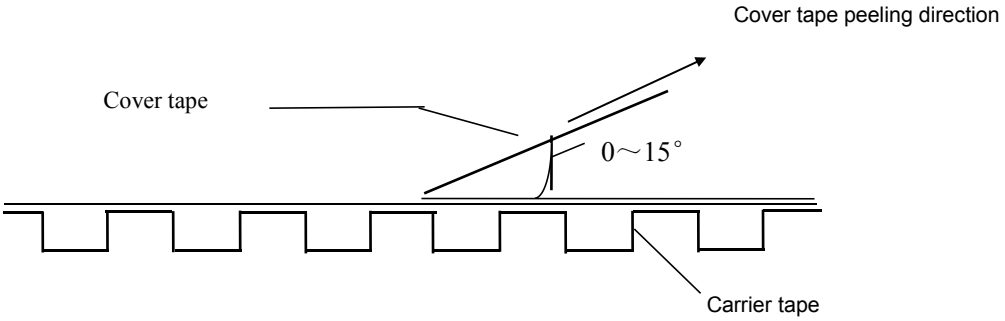


Reel model	A	B	C	D	E	F	G
7′REEL	φ178±2.0	3.0	φ13±0.5	φ21±0.8	φ50 或更大 φ50 or more	10.0±1.5	12max

* Taping specification：top tape peeling strength



*Embossed Taping



Standard: 0.1N < peeling strength < 0.7N

No paper dirty remains on the scotch when peeling, and sticks to top and bottom tape.

* Bulk Case Package

单位（unit）:mm

Symbol	A	B	T	C	D	E
Dimension	6.80±0.10	8.80±1.00	12.00±0.10	15.00+0.10/-0	2.00+0/-0.10	4.70±0.10
Symbol	F	W	G	H	L	I
Dimension	31.50+0.20/-0	36.00+0/-0.20	19.00±0.35	7.00±0.35	110.00±0.70	5.00±0.35

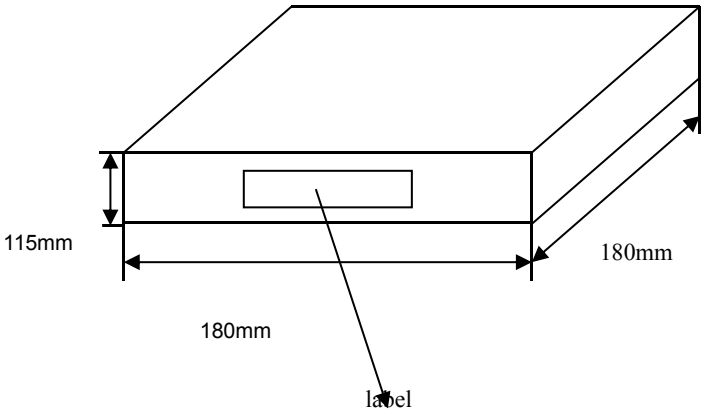
* Packing Quantity

(SIZE)	Package Style & Quantity unit: pcs				
	EPT	PT	ET	BC	BP
1005	——	20000	——	——	——
0201	——	15000	——	——	——
0402	------	10000	------	20000	5000
0603	------	4000	------	15000	5000
0805	------	4000	3000	10000	5000
1206	------	4000	T≤1.35mm 3000 T > 1.35mm 2000	5000	5000
1210	------	-------	T≤1.80mm 2000 T > 1.80mm 1000	-------	2000
1808	------	-------	2000	-------	2000
1812	------	--------	T≤1.85mm 1000 T > 1.85mm 500	-------	2000

Note：We can choose packing style and quantity can be according to the customer's requirement.

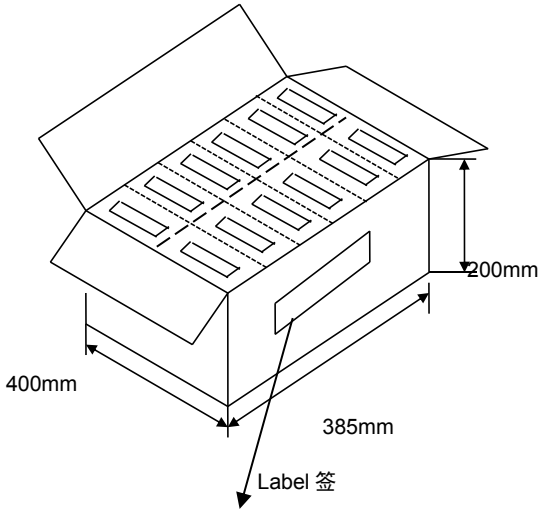
* **Outer packing**

The first package
Quantity: 10 reels



PART No
QUANTITY
DATE

The second package
Quantity: 6 cases



Production name
Quantity
Weight

◆ **Storage Methods**

* The guaranteed period for solderability is 12 months (Under deliver package condition).

* Storage conditions：

Temperature 5~40℃ Relative Humidity 20~70%

◆ **Precautions For Use**

The Multi-layer Ceramic Capacitors (MLCC) may fail in a short circuit modern in an open circuit mode when subjected to severe conditions of electrical environment and / or mechanical stress beyond the specified “rating” and specified “conditions” in the specification, which will result in burn out, flaming or glowing in the worst case. Following “precautions for “safety” and Application Notes shall be taken in your major consideration. If you have a question about the precautions for handling, please contact our engineering section or factory.

* **Soldering Profile**

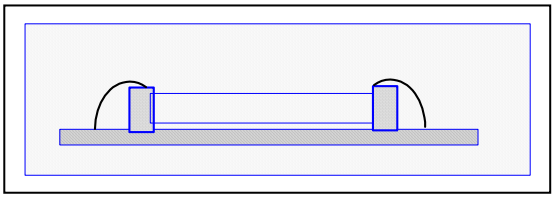
To avoid the crack problem by sudden temperature change, follow the temperature profile in the adjacent graph (refer to the graph in the enclosure page).

* **Manual Soldering**

Manual soldering can pose a great risk of creating thermal cracks in capacitors. The hot soldering iron tip comes into direct contact with the end terminations, and operator’s careless may cause the tip of the soldering iron to come into direct contact with the ceramic body of the capacitor. Therefore the soldering iron must be handled carefully, and pay much attention to the selection of the soldering iron tip and temperature contact of the tip.

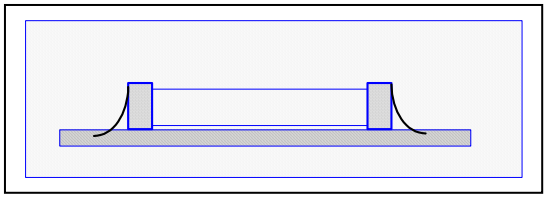
*Optimum Solder Amount for Reflow Soldering

Too much solder



Cracks tend to occur due to large stress.

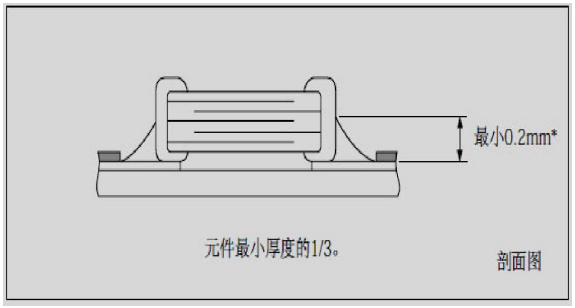
Not enough solder



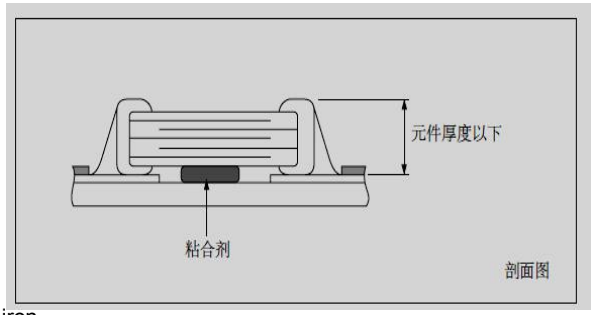
Weakholding force may cause badconnection between the capacitor and PCB.

* Recommended Soldering amounts

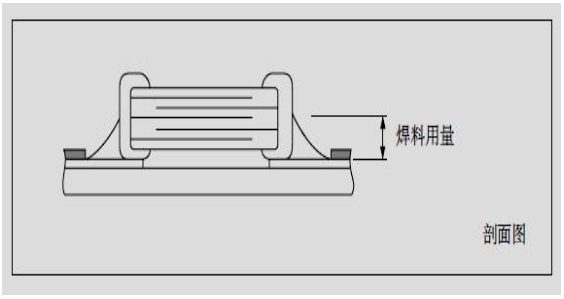
The optimal solder fillet amounts for re-flow soldering



The optimal solder fillet amounts for wave soldering



The optimal solder fillet amounts for reworking by using soldering iron



* Recommended Soldering Method

Size	Temperature Characteristics	RatedVoltage	Capacitance	Soldering Method
1005	C0G	/	/	R
	X7R/X5R/X7T/X6S	/	/	R
0201	C0G	/	/	R
	X7R/X5R/X7T/X6S	/	/	R

*Recommended Soldering Method

Size	Temperature Characteristics	RatedVoltage	Capacitance	Soldering Method
0402	C0G	/	/	R
	X7R/X5R/X7T/X6S	/	/	R
0603	C0G	/	/	R/W
	X7R/X5R/X7T/X6S	/	C≥1uf	R
			C < 1uf	R/W
0805	C0G	/	/	R/W
	X7R/X5R/X7T/X6S	/	C≥4.7uf	R
			C < 4.7uf	R/W
1206	C0G	/	/	R/W
	X7R/X5R/X7T/X6S	/	C≥10uf	R
			C < 10uf	R/W
≥1210	C0G	/	/	R
	X7R/X5R/X7T/X6S	/	/	R

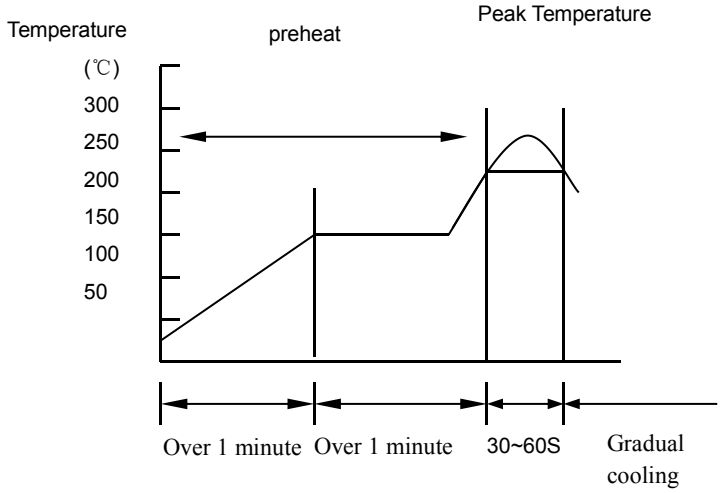
Soldering method：

Reflow Solering

Wave Soldering

◆ The temperature profile for soldering

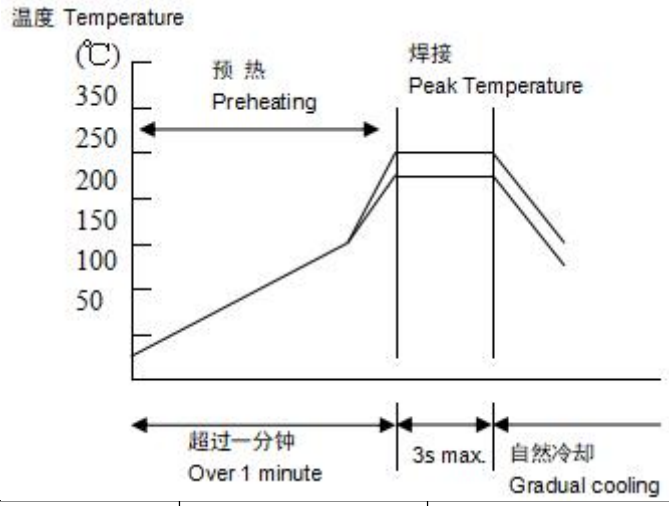
* Re-flow soldering



	Pb-Sn soldering	Lead-free soldering
Peak temperature	230℃～250℃	240℃～260℃

While in preheating,please keep the temperature difference between soldering temperature and surface temperature of chips as: T≤150℃.

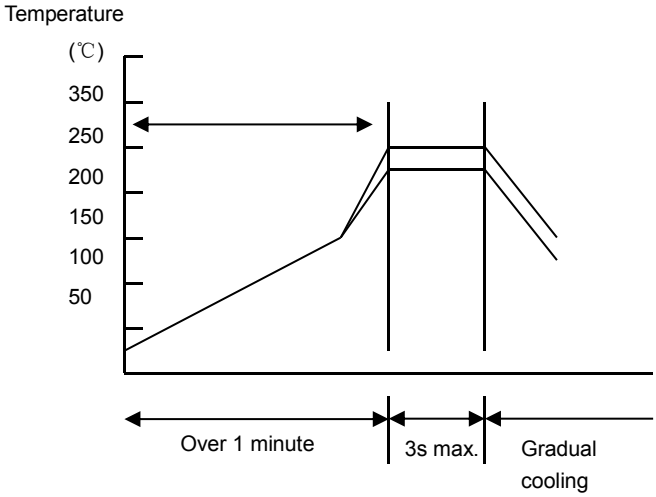
* Wave soldering



	Pb-Sn soldering	Lead-free soldering
Peak temperature	230℃～260℃	240℃～270℃

While in preheating,please keep the temperature difference between soldering temperature and surface temperature of chips as: T≤ 150℃.

* Hand soldering



Conditions：

Preheating	Temperature of soldering iron head	Power of soldering iron	Diameter of soldering iron head	Soldering time	Solder paste amount	Restricted conditions
△≤130℃	Highest temperature:350℃	20W at the highest	1mm recommended	3s at the longest	≤1/2 chip thickness	Please avoid the derect contact between soldering iron head and ceramic components

*The latest version of the content shall prevail

Multilayer Ceramic Capacitors – X7R

Features

- Miniature size
- Wide capacitance, TC, voltage and tolerance range
- Industry standard sizes
- Available for wave, reflow or vapor phase solder

How to Order

0805	B	104	K	500	N	T
↑	↑	↑	↑	↑	↑	↑
A	B	C	D	E	F	G

A

Size Code Inches	
0402	0.04×0.02
0603	0.06×0.03
0805	0.08×0.05
1206	0.12×0.06
1210	0.12×0.10
1812	0.18×0.12
2225	0.22×0.25
3035	0.30×0.35

B

Dielectric	
B	X7R
X	X5R

C

Normal Capacitance	
102	10×10^{2}
103	10×10^{3}

Express by three figures. Unit used is pF (pico-farad)

First two figures are significant digit, third figure expresses number of zeros which follow the two significant digit

If there is a decimal place it is represented by a “R”. In this scenario all figures are significant digit

D

Tolerance	
K	±10%
M	±20%

E

Rated Voltage	
160	16×10^{0}
250	25×10^{0}
500	50×10^{0}
630	63×10^{0}
101	10×10^{1}
201	20×10^{1}
501	50×10^{1}
102	10×10^{2}
202	20×10^{2}

F

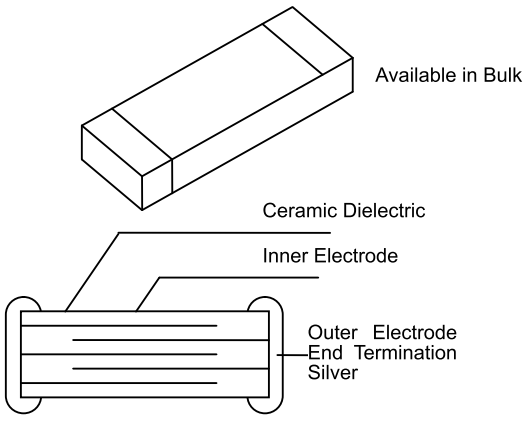
Termination	
S	Silver
N	Nickel Barrier Tin plating

G

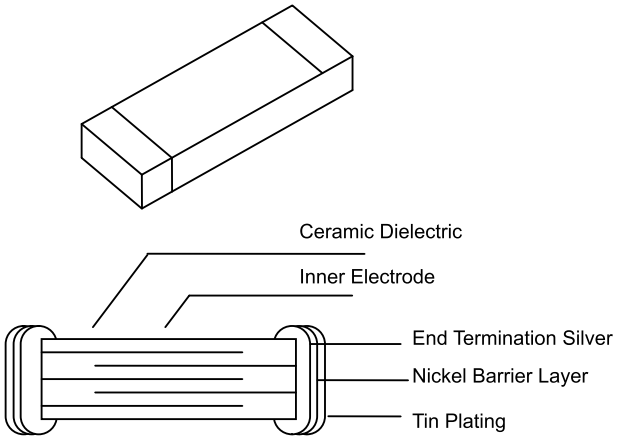
Packaging Style	
T	Tape & Reel
B	Bulk Package

Termination Diagrams

Standard



Barrier Layer



NOTE: Other Termination Available Upon Request (Contact Factory)

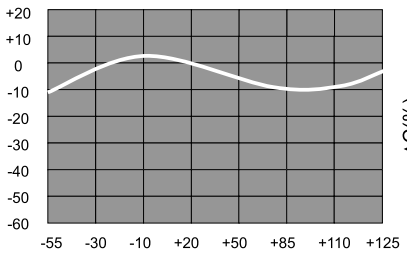
X7R - Dielectric Characteristic Introduction & Test Method (Table 1)

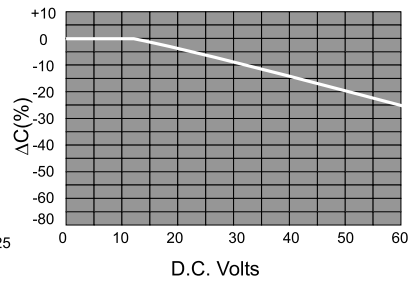
<table>
<tr><th>Item</th><th colspan="2">Specification</th><th>Test Method</th></tr>
<tr><td>Capacitance</td><td colspan="2">(100PF～2.2uF)</td><td rowspan="4">1KHz±10%,1.0±0.2Vrms</td></tr>
<tr><td>Capacitance Tolerance</td><td colspan="2">K=±10%
M=±20%
S=±50%/-20%</td></tr>
<tr><td>Rated Voltage</td><td colspan="2">16、25、50、63、100、200、
500、1000、2000VDC</td></tr>
<tr><td>Dissipation Factor
(DF)</td><td colspan="2">1000、2000VDC
DF:<0.25%(100V)
<3.0%(50V、25V）
<3.5%(16V)</td></tr>
<tr><td>Insulation Resistance
(IR)</td><td colspan="2">C≤25nF:R>4000MΩ
C>25nF:RxC>100S</td><td>Test Voltage: rating voltage
Charging time:1min
Temperture:18～25°C
Humidity:<80°C</td></tr>
<tr><td>Dielectric
Withstanding Voltage</td><td colspan="2">There shall be no evidence of damage
or flash
over during the test.</td><td>Apply 2.5 x rating voltages to both Terminations for 5 seconds. Charge and discharge current are less than 50mA.</td></tr>
<tr><td>Termination Adhesion</td><td colspan="2">There shall be no evidence of damage
during the test.</td><td>Test Condition:5N:10±1s</td></tr>
<tr><td>Bending Strength</td><td colspan="2">There shall be no evidence of damage
during the test; capacitance tolerance shall be
not more than 10%.</td><td>After soldering capacitor on the PCB, 1mm of bending shall be applied for 1 second as shown by Drawing.</td></tr>
<tr><td>Solderabillity</td><td colspan="2">Termination area shall be at least 80% covered with a new solder coating. There shall be no crack and ceramic exposure of terminated surface by melting.</td><td rowspan="6">The capacitors are completely immersed during 2 in the molten rosin, Then immersed 10mm during 2±1s in the molten solder with a temperature of 235±5°C.Pick up the capacitors-and cleaned with solvent, and put in on the> 10 times microscope.</td></tr>
<tr><td rowspan="5">Resistance to
Soldering Heat</td><td>Type</td><td>X7R(B)</td></tr>
<tr><td>Temp</td><td>265±5°C</td></tr>
<tr><td>Time</td><td>5±1s</td></tr>
<tr><td>Cover%</td><td>≥85%</td></tr>
<tr><td>△C/C</td><td>-5~+10%</td></tr>
</table>

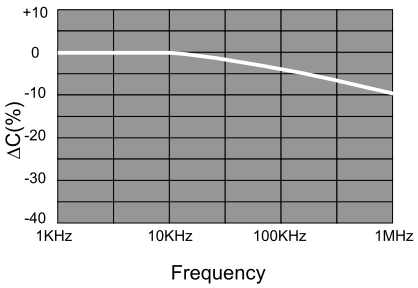
X7R - Dielectric Characteristic Introduction & Test Method (Table 2)

Item	Specification		Test Method	
Temperature Cycling	Type	X7R	Condition	X7R
	△C/C	≤1%	Temp.Oa	-55±3°C
			Temp.Ob	+125±3°C
	There shall be no evidence of damage during the test.		Cycle times	5 times 30min/time
			Resume time	24h
			Changing times	2～3min
Humidity & Moisture Resistance	Type	X7R	Permanent moisture: T=40±2°C t=21d Relative humidity：93+2%-3% Resume time：1～2h	
	△C/C	≤10%		
	DF	0.05		
	IR	RxC>25s		
	There shall be no evidence of damage during the test.			
T.C. Characteristics	Dielectric	△C/C	Dielectric	T.C
	X7R	±15°C	X7R	+20°C→-55°C→+20°C→+125°C
Vibration	There shall be no evidence of damage during the test.		Vibration frequency: f=10～500HZ Vibration range:0.75mm/s2 in 3 direction:2h/direction	
Bump	Type	X7R	4000 addeleration :390m/s2 Pulse duration:6ms	
	△C/C	≤2%		
	There shall be no evidence of damage during the test.			
Life test	Type	X7R	Condition	X7R
	△C/C	≤2%	Temp	+125°C
	DF	0.003	Time	T=100th
	IR	RxC>25s	Voltage	V=1.5Vr
	There shall be no evidence of damage during the test.		Resume time	24±1h
6 grade failure test	Type	X7R	Condition	X7R
	△C/C	≤10%	Creditability	60%
	DF	0.05	Temp	+125°C
	IR	RxC>25s	Voltage	Rating Voltage
	There shall be no evidence of damage during the test.		Time	1000h

Typical Characteristic







Size Code Capacitance And Voltage(Table 1)

Size Code	Dimension (mm)				Voltage	Capacitance (pF)
	L	W	T	Me		X7R
0402	1.0±0.05	0.5±0.05	0.5±0.05	0.1±0.05	10V	101~105
					16V	101～223
					25V	101～103
					50V	101～392
0603	1.6±0.1	0.8±0.10	0.8±0.1	0.3±0.1	25V	101～333
					50V	101～223
					100V	101～472
					200V	
0805	2.00±0.20	1.25±0.20	$0.7\pm^{0.3}_{0.2}$ 1.25±0.15 $1.0\pm^{0.3}_{0.2}$	0.5±0.25	25V	331～104
					50V	331～473
					100V	331～223
					200V	222～153
					500V	222～123
1206	3.20±0.30	1.60±0.20	$1.0\pm^{0.3}_{0.2}$ $1.25\pm^{0}_{0.2}$	0.5±0.25	25V	102～224
					50V	102～104
					100V	102～683
					200V	221～223
					500V	221～223
					1000V	221～472
					2000V	680～102
1210	3.20±0.30	2.50±0.30	$1.0\pm^{0.3}_{0.2}$ 1.25±0.3	0.70±0.25	25V	102～334
					50V	102～224
					100V	102～104
					200V	102～683
					500V	222～473
					1000V	102～153
					2000V	181～152
1812	4.50±0.40	3.20±0.30	2.5	1.00±0.25	25V	103～474
					50V	103～334
					100V	103～224
					200V	682～104
					500V	472～124
					1000V	222～273
					2000V	331～332

Size Code Capacitance and Voltage (Table 2)

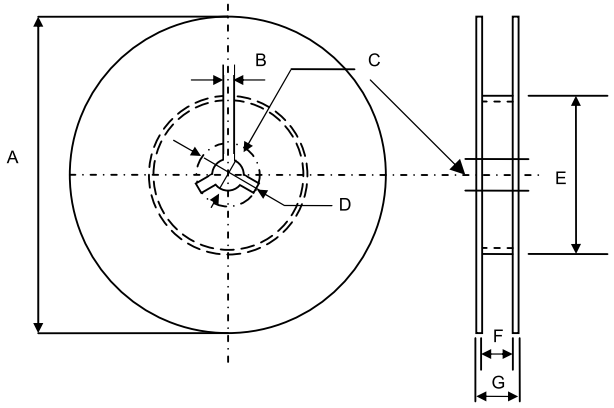
Size Code	Dimension (mm)				Voltage	Capacitance (pF)
	L	W	T	Me		X7R
2225	5.70±0.50	6.40±0.50	2.5	1.00±0.25	25V	103～105
					50V	103～105
					100V	103～474
					200V	153～424
					500V	183～394
					1000V	822～104
					2000V	122～103
3035	7.60±10.50	9.00±0.50	3.0	1.00±0.25	25V	103～225
					50V	103～225
					100V	103～105
					200V	103～125
					500V	682～105
					1000V	
					2000V	

Packaging

Structure and Dimension

Tape & Reel

A	B*	C	D*	E	F	G
178±2.0	3.0	13±0.5	φ32	50MIN	10.0±	14.9
				φ±1	1.5	12±2.0

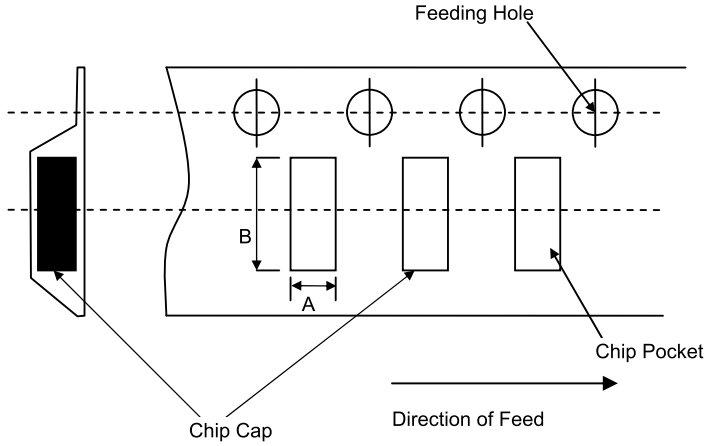


Paper Tape

Size	A	B
0402	0.6±0.2	1.1±0.2
0603	1.1±0.2	1.4±0.2
0805	1.45±0.2	2.3±0.2
1206	1.8±0.2	3.4±0.2

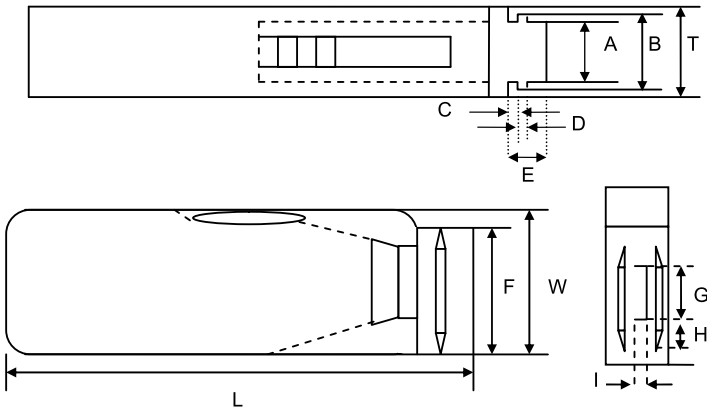
Plastic Tape (Te)

Size	A	B
0402	0.5±0.2	1.2±0.2
0603	0.8±0.2	2.0±0.2
0805	1.65±0.2	2.4±0.2
1206	2.0±0.2	3.6±0.2



Cartridge

Symbol	A	B	D	C	T	E
Dimension	6.8±0.1	8.8±0.1	12±0.1	15±0.1-0	2±0-0.1	4.7±0.1
Symbol	F	W	G	H	L	I
Dimension	31.5±0.2-0	36±0-0.2	19±0.35	7±0.35	110±0.7	5±0.35



Packaging Quantity

Size	Quantity		
	Paper Tape Taping	Plastic Embossed Tapping	Bulk Packaging
0402	10000		10000
0603	4000		4000
0805	4000	2000 / 3000	4000
1206	4000	2000 / 3000	4000
1210		2000 / 3000	2000
1808		2000 / 3000	2000
1812		1000	2000
2225			
3035			

Fenghua MLCC Product Classification

Fenghua Automotive MLCC--AM Series

There is high reliability on monolithic structure of laminated layers.

And its character of excellent soldering ability andsoldering resistance ability is suitable for reflow soldering and peak soldering. It includes high and stable capacitance.

This type of capacitor is a special electronic component for automobiles, which has passed all the experimentalconditions set by the AEC-Q200 standard, and is more stable and safe during automobile use. The materials used mainly include C0G with high temperature stability and X7R, X5R, X7S, and X7T with high dielectricconstant

Automotive MLCC--AE Series

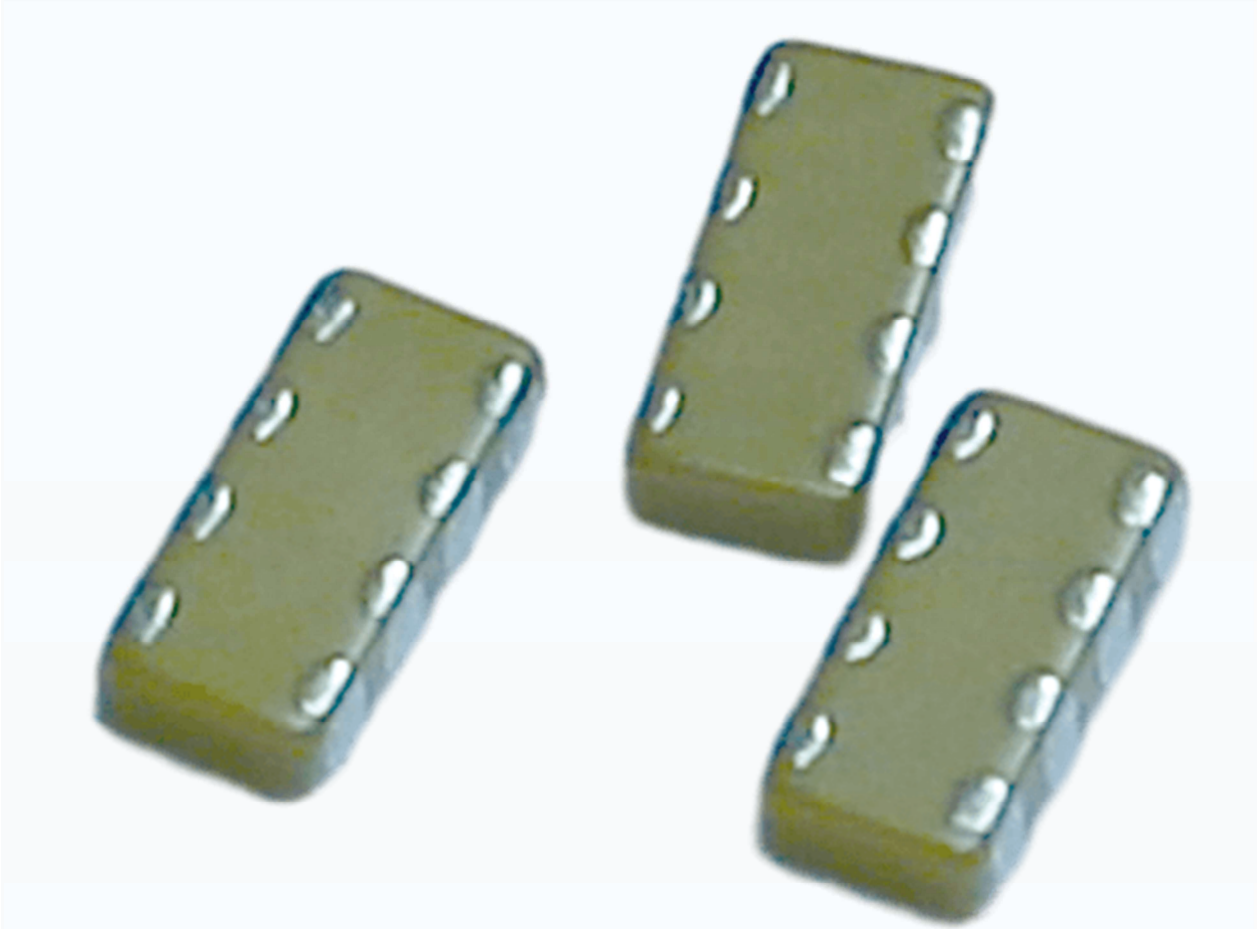
Automotive MLCC--AS Series

EMI Fliters MLCC

EMI has excellent performance in high current applications, non-polar and suitable for high-density surface mounting, superior filtering characteristics. It can absorb noise and restrain surge pulse, offering food solder-ability and leach-ability.

Arrays MLCC

C-array series MLCC can save 50% space of the PCB and improve the assembly density; the installation of a CA is equal to the installation of 4 pieces of 0603 capacitors, reducing the times of installation and improving installation efficiency; reduce the times of placement, easy to install and shorten production time, reduce equipment management costs and PCB costs; Improve the working efficiency of the printed board: Reduce the amount of printed circuits and promote the working speed of the printed circuit.



High Voltage Series

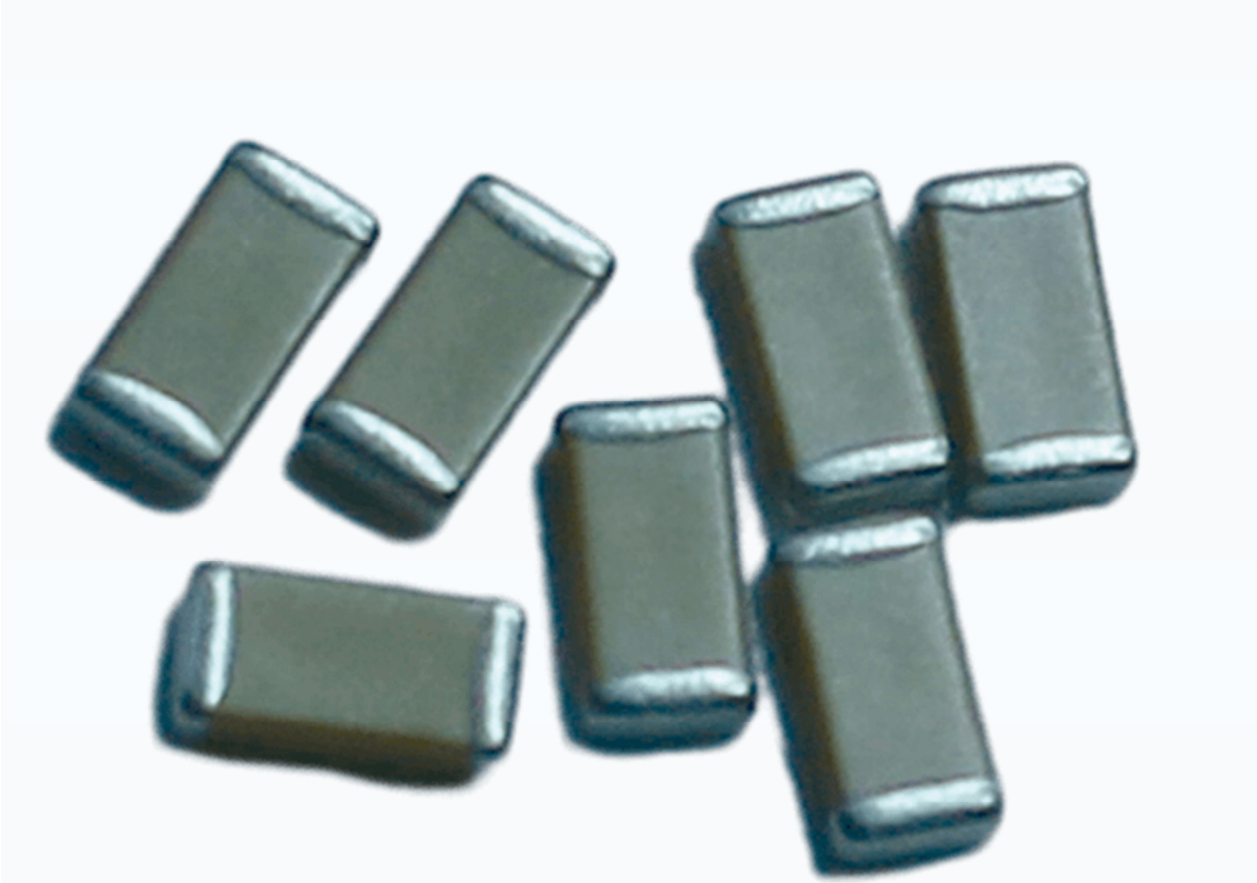
High voltage MLCC is a kind of special design MLCC that bases on the technology of general MLCC. This kind of MLCC has stable high voltage reliability and suitable to SMT. It is widely applicable for many direct high voltage circuits which can improve the performance of the circuit.

Safety MLCC

Safety MLCC-X1,Y2

Flexible Series

MLCC with flexiterm has high strength resistance to bending for 3mm, increasing the times of temperature cycle change, up to 3000 times. Flexible terminal system can reduce the failure of circuit board caused by bending. Applications for high - bending circuit boards, temperature - varying circuits and automotive propulsion systems.

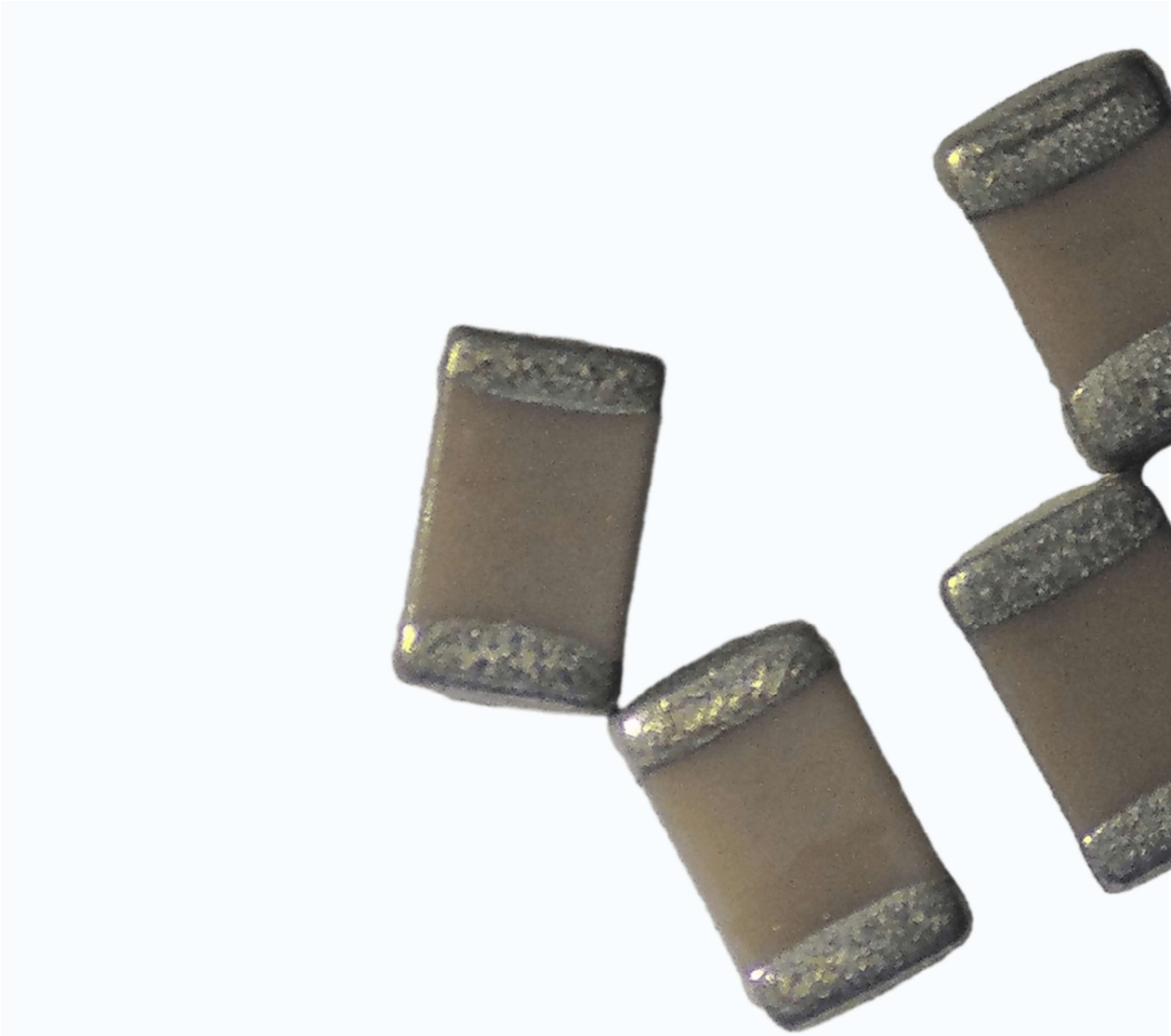


Microwave MLCC

Microwave MLCC (RF series) is characterized by high Q value, low equivalent series resistance and high self resonant frequency. Applicable to mobile communication base stations, wireless communication products, RF power amplifiers, impedance matching networks, filtering networks and VCO.

High Q MLCC

High Q MLCC (HQ series), characterized by high Q and low equivalent series resistance, are used in communication equipment, RF power amplifiers and filtering networks.



Open-Mode MLCC

MLCC with open mode design is characterized by protecting the circuit when MLCC cracks.

Chip ceramic structural parts

Industial Grade Series

Industrial MLCC is specially designed for industrial electronic automation equipment, network core equipment and related electronic products; It has high reliability, suitable for harsh application conditions, high quality requirements, low failure rate of all kinds of electronic products.

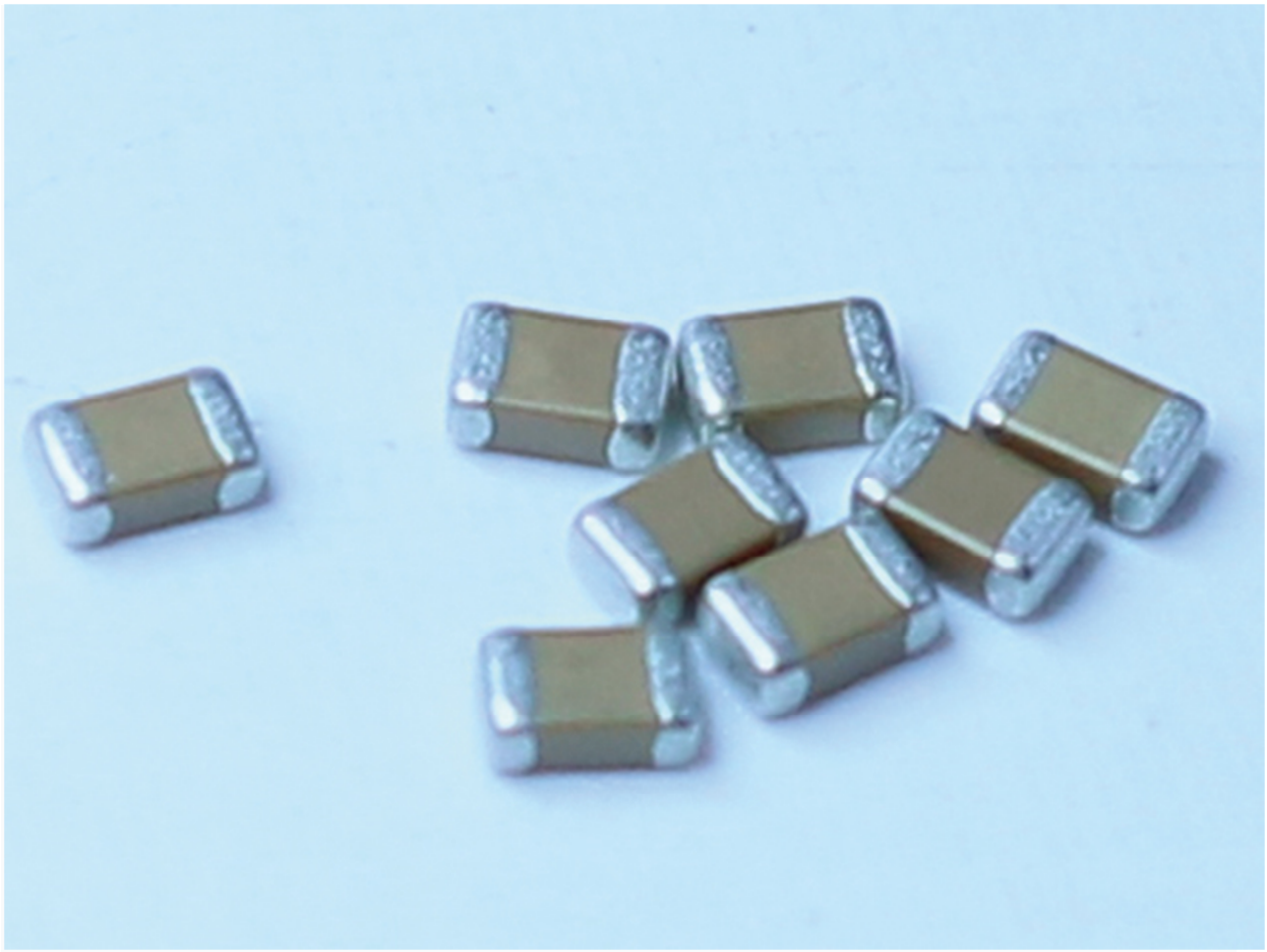
General MLCC

※HIGH FREQUENCY TYPE: The capacitor of this kind dielectric material is considered as ClassIcapacitor, including high frequency COG、COH capacitor and temperature compensating capacitor such as HG, LG, PH, RH,SH, TH, UJ, SL. The electrical properties of COG、COH capacitor are the most stable one and change invariablly with temperature, voltage and time. They are suited for applications where low-losses and high-stability are required, HG，LG，PH，RH，SH，TH，UJ，SL capacitor's capacitance changes with temperature.They are suited for applications where low-losses and temperature compensating circuits.

※X7R、X5R、X7S、X6S：X7R、X5R、X7S、X6S material is a kind of material has high dielectric constant. The capacitor made of this kind material is considered as Class II capacitor whose capacitance is higher than that of class I. These capacitors are classified as having a semi-stable temperature characteristic and used over a wide temperature range, such in these kinds of circuits, DC-blocking, decoupling, bypassing, frequency discriminating etc.

※Y5V：The capacitor made of this kind of material is the highest dielectric constant of all ceramic capacitors. They are used over a moderate temperature range in application where high capacitance is required because of its unstable temperature coefficient, but where moderate losses and capacitance changes can be tolerated. Its capacitance and dissipation factors are sensible to measuring conditions, such as temperature and voltage, etc.

※Z5U：The capacitor made of this kind of material is considered as ClassII capacitor, whose temperature characteristic is between that of X7R and Y5V. The capacitance of this kind of capacitor is unstable and sensible to temperature and voltage. Ideally suited for bypassing and decoupling application circuits operating with low DC bias in the environment approaches to room temperature.



MLCC Application

LCD TELEVISION WASHING MACHINE