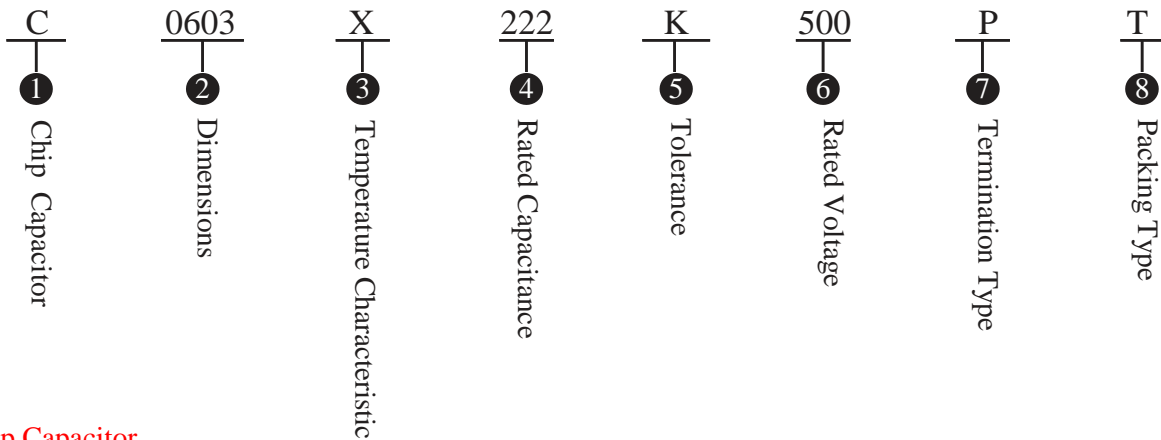


## X7R Dielectric Non-Magnetic Multilayer Ceramic Capacitors

### ◆ Product Features

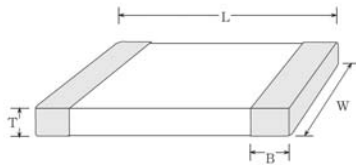
Non-Magnetism, Suitable for MRI

### ◆ Part Numbering



#### ① Chip Capacitor

#### ② Dimensions



Type	Dimensions (Unit:mm)				
	L	W	T (max)	B(min)	B(max)
0603	1.6±0.1	0.8±0.1	0.8±0.1	0.20	0.50
0805	2.0±0.2	1.2±0.2	1.40	0.25	0.70
1206	3.2±0.2	1.6±0.2	1.40	0.25	0.76
1210	3.2±0.2	2.5±0.2	2.00	0.25	0.76

#### ③ Temperature Characteristics

Code(EIA)	Temperature Coefficients	Operating Temperature Range
X(X7R)	±15%	-55°C~+125°C

#### ④ Rated Capacitance

Code	Capacitance
102	1000pF
222	2200pF

#### ⑤ Tolerance

Code	Tolerance
J	±5%
K	±10%
M	±20%

#### ⑥ Rated Voltage

Code	Rated Voltage (DC)	Code	Rated Voltage (DC)
25	25V	251	250V
50	50V	501	500V
101	100V	102	1000V
201	200V	202	2000V

⑦ Termination Type

Code	Termination Type
P	Non-magnetic Copper Plated 100% Sn(RoHS)

⑧ Packing Type

Code	Packing Type
T	Tape carrier packing
B	Bulk packing in a bag

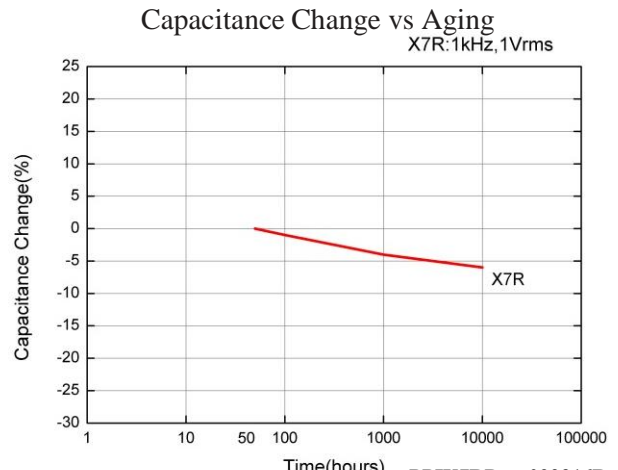
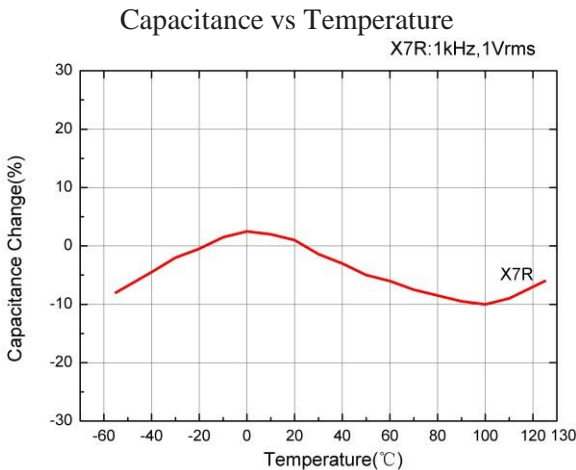
◆ Rated Capacitance Range Table

cap	code	0603					0805					1206						1210							
		25V	50V	100V	200V	250V	50V	100V	200V	250V	50V	100V	200V	250V	500V	1000V	2000V	50V	100V	200V	250V	500V	1000V	2000V	
330pF	331																								
470pF	471																								
680pF	681																								
1nF	102																								
1.5nF	152																								
2.2nF	222																								
3.3nF	332																								
4.7nF	472																								
6.8nF	682																								
10nF	103																								
15nF	153																								
22nF	223																								
33nF	333																								
47nF	473																								
68nF	683																								
0.1uF	104																								
0.15uF	154																								
0.22nF	224																								
0.33nF	334																								
0.47uF	474																								
0.68uF	684																								

◆ Tape & Reel Specifications

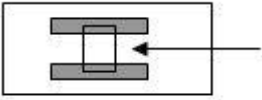
Orientation	EIA	A0	B0	K0	W	P0	P1	T	F	MIN /REEL	QTY/ REEL	TAPE MATERIAL
Horizontal	0603	1.05	1.80	0.90	8.00	4.00	4.00	0.90	3.50	1000	4000	Paper
Horizontal	0805	1.40	2.20	1.20	8.00	4.00	4.00	0.22	3.50	1000	3000	Plastic
Horizontal	1206	1.91	3.51	1.30	8.00	4.00	4.00	0.25	3.50	1000	3000	Plastic
Horizontal	1210	2.85	3.50	1.95	8.00	4.00	4.00	0.25	3.50	1000	3000	Plastic

◆ Characteristics Curve

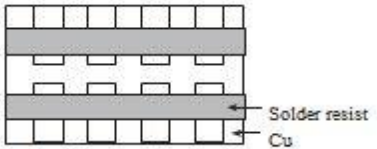
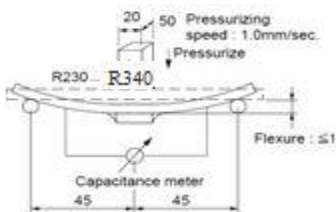
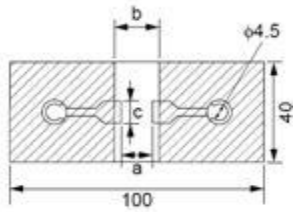


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◆ Specifications and Test Methods

NO.	Item	Specification	Test Method						
1	Operating Temperature Range	-55 °C ~ +125 °C							
2	Rated Voltage	See pages 73	The rated voltage means the maximum direct voltage or peak value of pulse voltage which may be applied continuously to a capacitor						
3	Appearance	No defects or abnormality	Visual inspection						
4	Dimensions	See the previous pages	Callipers inspection						
5	Dielectric Strength	No defects or abnormality	No failure shall be observed when the given coefficient of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.						
6	Insulation Resistance	More than 100MΩ·uF	The insulation resistance shall be measured with the testing voltage at normal temperature and with humidity, within 2 minute of charging.						
7	Capacitance	Within the specified tolerance	The capacitance D.F. shall be measured at 25 °C with the frequency and voltage shown in the table.						
8	Dissipation Factor (D.F. )	D.F ≤ 5%	<table border="1"> <thead> <tr> <th></th> <th>Frequency</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>X7R</td> <td>1 ± 0.1KHz</td> <td>1 ± 0.2Vrms</td> </tr> </tbody> </table>		Frequency	Voltage	X7R	1 ± 0.1KHz	1 ± 0.2Vrms
				Frequency	Voltage				
X7R	1 ± 0.1KHz	1 ± 0.2Vrms							
9	Temperature Coefficient	± 15%	Refer to the test methods of general ceramic Chip capacitors.						
10	Adhesive strength of Termination	No removal of the terminations or other defect shall occur	<p>Solder a capacitor to test jig (glass epoxy board) shown in fig below using a eutectic solder, then apply 10N force in the direction of the arrow.</p> <p>The soldering should be done either by hand iron or using the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock.</p>  <p style="text-align: right;">10Newton Glass Epoxy Resin</p> <p>Board</p>						

◆ Specifications and Test Methods

NO.	Item	Specification	Test Method												
11	Appearance	No defect or abnormality	<p>Solder the capacitor to test jig (glass epoxy board) shown in fig below. Soldering should be done either by hand iron or using the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock. The capacitor shall be subjected to a simple harmonic motion having a total amplitude of 1.5mm. The frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total 6 hours)</p>  <p style="text-align: center;">Glass Epoxy Board</p>												
	Capacitance	Within the specified tolerance													
	D.F.	D.F.≤5%													
12	Deflection	<p>No cracking or marking defects shall occur, <math>\Delta C/C &lt; 12.5\%</math></p> 	<p>Solder the capacitor to test jig ( glass epoxy board) direction shown in below fig.</p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Size</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>0603</td> <td>1.0</td> <td>3.0</td> <td>1.2</td> </tr> <tr> <td>0805</td> <td>1.2</td> <td>4.0</td> <td>1.65</td> </tr> </tbody> </table>	Size	a	b	c	0603	1.0	3.0	1.2	0805	1.2	4.0	1.65
Size	a	b	c												
0603	1.0	3.0	1.2												
0805	1.2	4.0	1.65												
13	Solderability of Termination	More than 75% of the terminations is to be soldered evenly and continuously.	<p>Immerse the capacitor first in a ethanol solution of rosin. Preheat at 80 °C to 120 °C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 250±5 °C.</p>												
14	Appearance	No marking defects	<p>Preheat capacitor at 120 °C to 200 °C for 1 minute. Then immerse the capacitor in a eutectic solder at 260 °C to 265 °C for 10±1 seconds, Set it for 24±2 hours at room temperature, then measure.</p>												
	Capacitance Range	Less than ±7.5%													
	D.F.	D.F.≤5%													
	Insulation Resistance	I.R: More than 100MΩ·uF													

◆ Specifications and Test Methods

NO.	Item		Specification	Test Method															
15	Temperature Cycle	Appearance	No marking defects	Fix the capacitor to the supporting jig in the same manner and under the same conditions as (11). Perform the five cycles according to the four heat treatments listed in the following table. Set it for 24 ± 2 hours at room temperature. <table border="1" data-bbox="792 596 1380 764"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> <th>Time(minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min.operating temp. -3 to 0</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>2to3</td> </tr> <tr> <td>3</td> <td>Max.operating temp. -3 to 0</td> <td>30 ± 3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>2to3</td> </tr> </tbody> </table>	Step	Temperature(°C)	Time(minutes)	1	Min.operating temp. -3 to 0	30 ± 3	2	Room temperature	2to3	3	Max.operating temp. -3 to 0	30 ± 3	4	Room temperature	2to3
		Step	Temperature(°C)		Time(minutes)														
		1	Min.operating temp. -3 to 0		30 ± 3														
		2	Room temperature		2to3														
3	Max.operating temp. -3 to 0	30 ± 3																	
4	Room temperature	2to3																	
Capacitance Range	≤7.5%																		
D.F	D.F≤5%																		
Insulation Resistance	More than 100MΩ·uF																		
16	Humidity Steady State	Appearance	No defect or abnormality	Sit the capacitor at 40 ± 2 °C and 90% to 95% humidity for 500 ± 12 hours.temperature, then measure.															
		Capacitance Range	≤12. %																
		D.F	D.F≤5%																
		Insulation Resistance	More than 50MΩ·uF																
17	High Temperature Load	Appearance	No marking defects	Apply a DC voltage of 150% of the rated voltage for 1000 hours at the maximun operating temperature, and set it for 48 hours at room temperature, then measure. The charge/discharge current is less than 50mA.															
		Capacitance Range	≤12.5%																
		D.F	D.F≤5%																
		Insulation Resistance	More than 50MΩ·uF																