

CT41 CHIP MULTILAYER CERAMIC CAPACITORS

General Purpose Series (4V to 100V)

DESCRIPTION

MLCC consists of a conducting material and electrodes. To manufacture a chip-type SMT and achieve miniaturization, high density and high efficiency, ceramic condensers are used.

MLCC is made by NP0, X7R, X6S, X5R and Y5V dielectric material and which provides product with high electrical precision, stability and reliability.

FEATURES

A wide selection of sizes is available (0201 to 2225).

High capacitance in given case size.

RoHS REACH Compliance

APPLICATIONS

For general digital circuit.

For power supply bypass capacitors.

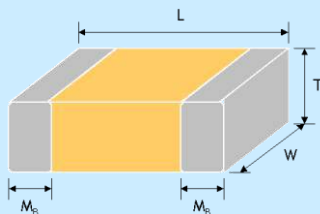
For consumer electronics.

For telecommunication.

HOW TO ORDER

<u>1206</u>	<u>X</u>	<u>104</u>	<u>K</u>	<u>500</u>	<u>C</u>	<u>R</u>
Size	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging style
Inch (mm) 0201 (0603) 0402 (1005) 0603 (1608) 0805 (2012) 1206 (3216) 1210 (3225) 1808 (4520) 1812 (4532) 1825 (4563) 2211 (5728) 2220 (5750) 2225 (5763)	N=NPO B=X7R C=X7S F=Y5V S=X6S X=X5R	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: 0R5=0.5pF 1R0=1.0pF 104=10x10 ⁴ =100nF	N=+/-0.03pF A=+/-0.05pF B=+/-0.1pF C=+/-0.25pF D=+/-0.5pF F=+/-1% G=+/-2% J=+/-5% K=+/-10% M=+/-20% Z=-20% ~ +80%	Two significant digits followed by no. of zeros. And R is in place of decimal point. 4R0=4 VDC 6R3=6.3 VDC 100=10 VDC 160=16 VDC 250=25 VDC 500=50 VDC 101=100 VDC 102=1000 VDC 202= 2000 VDC	C=Cu/Ni/Sn	R = T&R

The Outlines and External Dimensions of Capacitors

Outline	Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	Soldering Method *	M _B (mm)	
	01R5 (0402)	0.4±0.02	0.2±0.02	0.2±0.02	V	R	0.10±0.03
	0201 (0603)	0.6±0.03	0.3±0.03	0.3±0.03	L	R	0.15±0.05
		0.6±0.05 ^{#2}	0.3±0.05 ^{#2}	0.3±0.05 ^{#2}			0.15±0.1/-0.05
		0.6±0.09 ^{#3}	0.3±0.09 ^{#3}	0.3±0.09 ^{#3}			
	0402 (1005)	1.00±0.05	0.50±0.05	0.50±0.05	N	R	0.25 +0.05/-0.10
		1.00±0.20	0.50±0.20	0.50±0.02/-0.05	Q	R	
		1.60±0.10	0.80±0.10	0.5±0.20	E	R	
	0603 (1608)	1.60+0.15/-0.10	0.80+0.15/-0.10	0.80±0.07	S	R / W	0.40±0.15
				0.50±0.10	H	R / W	
				0.80+0.15/-0.10	X	R / W	
				1.60±0.20 ^{#1}	0.8±0.20 ^{#1}	0.8±0.20 ^{#1}	
	0805 (2012)	2.00±0.15	1.25±0.10	0.50±0.10	H	R / W	0.50±0.20
				0.60±0.10	A	R / W	
				0.80±0.10	B	R / W	
				1.25±0.10	D	R	
				0.85±0.10	T	R / W	
	1206 (3216)	3.20±0.15	1.60±0.15	1.25±0.20	I	R	0.60±0.20 (0.5±0.25) ^{***}
				0.80±0.10	B	R / W	
				0.95±0.10	C	R	
				1.25±0.10	D	R	
1.15±0.15				J	R		
1.60±0.20				G	R		
0.85±0.10				T	R / W		
3.20 +0.30/-0.10	1.60 +0.30/-0.10	1.60+0.30/-0.10	P	R			
1210 (3225)	3.20±0.30	2.50±0.20	0.95±0.10	C	R	0.75±0.25	
			0.85±0.10	T	R		
			1.25±0.10	D	R		
			1.60±0.20	G	R		
			2.00±0.20	K	R		
			2.50±0.30	M	R		
3.20±0.60 ^{#4}	2.50±0.50 ^{#4}	2.50±0.50 ^{#4}	M	R			
1808 (4520)	4.50±0.40 (4.5+0.5/-0.3) ^{**}	2.03±0.25	1.25±0.10	D	R	0.75±0.25 (0.5±0.25) ^{***}	
			1.40±0.15	F	R		
			1.60±0.20	G	R		
			2.00±0.20	K	R		
1812 (4532)	4.50±0.40 (4.5+0.5/-0.3) ^{**}	3.20±0.30	1.25±0.10	D	R	0.75±0.25 (0.5±0.25) ^{***}	
			1.60±0.20	G	R		
			2.00±0.20	K	R		
			2.50±0.30	M	R		
			2.80±0.30	U	R		
1825 (4563)	4.60±0.50	6.30±0.40	1.60±0.20 (G) 2.00±0.20 (K)	R	R	≥ 0.26	
2211 (5728)	5.70±0.50	2.80±0.30	2.50±0.30 (M)	R	R	≥ 0.30	
2220 (5750)	5.70±0.50	5.00±0.40	2.80±0.30 (U)	R	R	≥ 0.30	
2225 (5763)	5.70±0.50	6.30±0.40		R	R	≥ 0.30	

* R = Reflow soldering process ; W = Wave soldering process.

** For 1808_200V ~3kV, 1812_200V~3kV

*** For 1206_1000V ~3kV, 1808_200V ~3kV, 1812_200V~3kV

#1 : For 0603/Cap ≥ 10μF or 0603(≤ 6.3V)/Cap ≥ 4.7μF For 0603(>10V)/Cap > 1μF products.

#2 : For 0201/Cap ≥ 0.68μF products.

#3 : For 0201/Cap ≥ 1μF products.

#4 : For 1210(100V)/Cap > 1μF or 1210(250V)/Cap > 0.47μF or 1210(400V~630V)/Cap > 0.22μF.

GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R	X7S	X6S	X5R	Y5V
Size	0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225					
Capacitance range	0.1pF to 0.27μF	100pF to 47μF			100pF to 220μF	0.01μF to 100μF
Capacitance tolerance	Cap ≤ 5pF ^{#1} : A (±0.05pF), 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%)	K (±10%), M (±20%)	K (±10%), M (±20%)	K (±10%), M (±20%)	M (±20%), Z (-20/+80%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	4V, 6.3V, 10V, 16V, 25V, 50V, 100V				
Operating temperature	-55 to +125°C			-55 to +105°C	-55 to +85°C	-25 to +85°C
Capacitance characteristic	±30ppm	±15%	±22%	±10%~±20%	±15%	+30/-80%
Termination	Ni/Sn (lead-free termination)					

#1: NP0, 0.1pF product only provide B tolerance

X7R Dielectric

Dielectric	X7R																																			
	Size	0201				0402				0603				0805				1206				1210				1812	1825	2220	2225							
	Rated Voltage (VDC)	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	50 100	25 50	100	25 50	100				
100pF (101)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B																					
120pF (121)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B																					
150pF (151)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B											
180pF (181)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B												
220pF (221)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B												
270pF (271)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B												
330pF (331)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B												
390pF (391)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B												
470pF (471)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B												
560pF (561)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B												
680pF (681)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B												
820pF (821)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B												
1,000pF (102)	L	L	L	N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K
1,200pF (122)	L	L		N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K
1,500pF (152)	L	L		N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
1,800pF (182)	L	L		N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
2,200pF (222)	L	L		N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
2,700pF (272)	L	L		N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
3,300pF (332)	L	L		N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
3,900pF (392)	L	L		N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
4,700pF (472)	L	L		N	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
5,600pF (562)	L	L		N	N	N		S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
6,800pF (682)	L			N	N	N		S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
8,200pF (822)	L			N	N	N		S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
0.010uF (103)	L	L		N	N	N		S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K	
0.012uF (123)				N	N	E		S	S	S	X	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K		
0.015uF (153)				N	N	E		S	S	S	X	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K		
0.018uF (183)				N	N	E		S	S	S	X	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K		
0.022uF (223)	L			N	N	E		S	S	S	X	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K		
0.027uF (273)				N	N	E		S	S	S	X	B	B	B	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K		
0.033uF (333)				N	N	E		S	S	X	X	B	B	B	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K		
0.039uF (393)				N	N	E		S	S	X	X	B	B	B	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K		
0.047uF (473)				N	N	E		S	S	X	X	B	B	B	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K		
0.056uF (563)				N	N	E		S	S	X	X	B	B	B	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K		
0.068uF (683)				N	N	E		S	S	X	X	B	B	B	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	K	K	K	K	K		
0.082uF (823)				N	N	E		S	S	X	X	B	B	B	D	B	B	B	D	B	B	B	D	C	C	C	C	C	D	D	K	K	K	K	K	
0.10uF (104)				N	N	E		S	S	X	X	B	B	B	D	B	B	B	D	B	B	B	D	C	C	C	C	C	D	D	K	K	K	K	K	
0.12uF (124)								S	X			B	B	D	I	B	B	B	D	C	C	C	C	C	C	D	D	D	D	K	K	K	K	K		
0.15uF (154)								S	X			D	D	D	I	C	C	C	G	C	C	C	C	C	D	D	D	D	K	K	K	K	K			
0.18uF (184)								S	X			D	D	D	I	C	C	C	G	C	C	C	C	D	D	D	D	D	K	K	K	K	K			
0.22uF (224)				N	N			S	X	X		D	D	D	I	C	C	C	G	C	C	C	C	D	D	D	D	D	K	K	K	K	K			
0.27uF (274)								X	X			D	D	I		C	C	D	G	C	C	C	C	G	D	D	D	K	K	K	K	K	K			
0.33uF (334)								X	X	X		D	D	I		C	C	D	G	C	C	C	D	G	D	D	D	K	K	K	K	K	K			
0.39uF (394)								X	X			D	D	I		C	J	P	G	C	C	C	D	M	D	D	D	K	K	K	K	K	K			
0.47uF (474)				N				X	X	X		D	D	I	I	J	J	P	G	C	C	C	D	M	D	D	D	K	K	K	K	K	K			
0.56uF (564)								X				D	D			J	J	P	P	D	D	D	D	M	D	D	D	K	K	K	K	K	K			
0.68uF (684)								X				D	D			J	J	P	P	D	D	D	D	K	D	K	K	K	K	K	K	K	K			
0.82uF (824)								X				D	D			J	J	P	P	D	D	D	D	K	D	K	K	K	K	K	K	K	K			
1.0uF (105)				N				X	X	X		D	D	I		J	J	P	P	D	D	D	D	K	D	K	K	K	K	K	K	K	K			
1.5uF (155)												I	I			J	P						G	G	M	M		K	K	K	K	K	K			
2.2uF (225)								X				I	I	I		J	P	P	P				G	G	M	M		M	K	K	K	K	K			
3.3uF (335)																P	P						G	G	M				K	K	K	K	K			
4.7uF (475)								X				I	I			P	P	P					K	K	K	M	M			K	K	M	K			
6.8uF (685)																														M	U	M				
10uF (106)												I				P	P						K	K	K	M				U	U	U				
22uF (226)																P							M	M	M											
47uF (476)																							M	M												

1. The letter in cell is expressed the symbol of product thickness.
 2. 0402 size, Cap.1.0uF_6.3V only; 0603 size, Cap.4.7uF_6.3V only.

X7S Dielectric (0201, 0402, 0603, 0805, 1206, 1210 Size)

Dielectric		X7S																															
Size		0201					0402					0603					0805					1206					1210						
Rated Voltage (VDC)		6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	35	50	4	6.3	10	16	25	100
Capacitance	0.010uF (103)																																
	0.015uF (153)																																
	0.022uF (223)																																
	0.033uF (333)																																
	0.047uF (473)																																
	0.068uF (683)																																
	0.10uF (104)																																
	0.15uF (154)																																
	0.22uF (224)																																
	0.33uF (334)																																
	0.47uF (474)																																
	0.68uF (684)																																
	1.0uF (105)																																
	3.3uF (335)																																
4.7uF (475)												X																			M		

X6S Dielectric (0201, 0402, 0603 Size)

Dielectric		X6S																															
Size		0201					0402					0603					0805					1206					1210						
Rated Voltage (VDC)		6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	35	50	4	6.3	10	16	25	50
Capacitance	0.010uF (103)																																
	0.015uF (153)																																
	0.022uF (223)																																
	0.033uF (333)																																
	0.047uF (473)																																
	0.068uF (683)																																
	0.10uF (104)																																
	0.15uF (154)																																
	0.22uF (224)																																
	0.33uF (334)																																
	0.47uF (474)																																
	0.68uF (684)																																
	1.0uF (105)		L								N																						
	3.3uF (335)																																
4.7uF (475)							N																										
22uF (226)												X																					
47uF (476)																															M		

Y5V Dielectric (0402, 0603, 0805 Size)

Dielectric		Y5V																
Size		0402					0603					0805						
Rated Voltage (VDC)		6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	100	
Capacitance	0.010uF (103)		N	N	N	N		S	S	S	S			A	A	A	A	B
	0.015uF (153)		N	N	N	N		S	S	S	S			A	A	A	A	B
	0.022uF (223)		N	N	N	N		S	S	S	S			A	A	A	A	B
	0.033uF (333)		N	N	N	N		S	S	S	S			A	A	A	A	B
	0.047uF (473)		N	N	N			S	S	S	S			A	A	A	A	B
	0.068uF (683)		N	N	N			S	S	S	S			A	A	A	A	B
	0.10uF (104)		N	N	N			S	S	S	S			A	A	A	A	B
	0.15uF (154)			N	N				S	S	S	S			A	A	A	A
	0.22uF (224)		N	N	N			S	S	S	S				A	A	A	A
	0.33uF (334)		N	N	N				S	S	S	X			B	B	B	B
	0.47uF (474)		N	N	N				S	S	X	X			B	B	B	B/D
	0.68uF (684)		N						S	X	X				B	B	D	D
	1.0uF (105)		N	N					S	X	X				B	B	D	D
	1.5uF (155)								S						D	D		
	2.2uF (225)								S	S	X				D	D	I	
	3.3uF (335)														D	D		
	4.7uF (475)								X	X					D	D	I	
	6.8uF (685)														I			
10uF (106)														I	I	I		
22uF (226)														I	I			

Y5V Dielectric (1206, 1210, 1812 Size)

Dielectric		Y5V																	
Size		1206						1210						1812					
Rated Voltage (VDC)	6.3	10	16	25	35	50	100	6.3	10	16	25	35	50	100	10	16	25	50	100
0.010uF (103)		B	B	B		B	B							C					D
0.015uF (153)		B	B	B		B	B							C					D
0.022uF (223)		B	B	B		B	B							C					D
0.033uF (333)		B	B	B		B	B							C					D
0.047uF (473)		B	B	B		B	B							C					D
0.068uF (683)		B	B	B		B	B							C					D
0.10uF (104)		B	B	B		B	B							C					D
0.15uF (154)		B	B	B		B	C		C	C	C		C	C	D	D	D	D	D
0.22uF (224)		B	B	B		B	C		C	C	C		C	C	D	D	D	D	D
0.33uF (334)		B	B	B		B			C	C	C		C	C	D	D	D	D	D
0.47uF (474)		B	B	B		B			C	C	C		C		D	D	D	D	D
0.68uF (684)		B	B	B		B			C	C	C		C		D	D	D	D	D
1.0uF (105)		C	C	C		C/D			C	C	C		C		D	D	D	D	D
1.5uF (155)		C	C	C					C	C	C				D	D	D	D	
2.2uF (225)		C	C	C		J			C	C	C		G		D	D	D	D	
3.3uF (335)		J	J	J					C	C	C				D	D	D	D	
4.7uF (475)		J	J	J	J	P			C	C	D		G		D	D	D	D	
6.8uF (685)		J	J						C	C	D		K		D	D	D	D	
10uF (106)		J	J	P					D	D	G	K	K		D	D	D	K	
22uF (226)		P	P							K	K								
47uF (476)	P								K	K						M			
100uF (107)									M										

X5R Dielectric

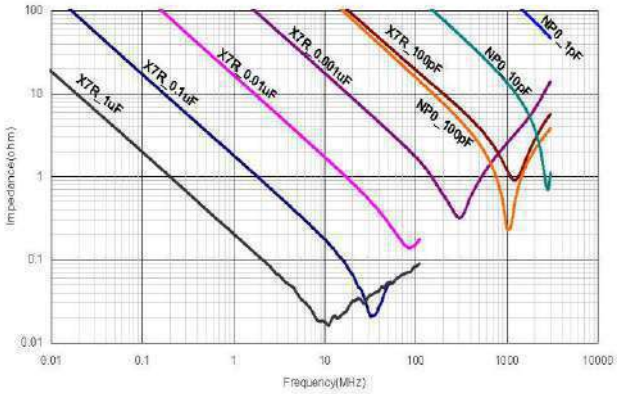
Dielectric		X5R																																			
Size		0201					0402					0603					0805					1206					1210										
Rated Voltage (VDC)	6.3	10	16	25	35	50	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	35	50	4	6.3	10	16	25	50				
100pF (101)	L	L	L	L	L																																
220pF (221)	L	L	L	L	L																																
470pF (471)	L	L	L	L	L																																
1000pF (102)	L	L	L	L	L																																
2200pF (222)	L	L	L	L	L																																
4700pF (472)	L	L	L	L	L																																
0.010uF (103)	L	L	L	L	L																																
0.027uF (273)	L	L									N																										
0.033uF (333)	L	L									N																										
0.039uF (393)	L	L									N																										
0.047uF (473)	L	L									N																										
0.056uF (563)	L	L									N	N																									
0.068uF (683)	L	L									N	N																									
0.082uF (823)	L	L									N	N	N																								
0.10uF (104)	L	L	L	L							N	N	N	N	E																						
0.15uF (154)											N	N	N	N																							
0.22uF (224)	L	L	L								N	N	N	N	N																						
0.27uF (274)																	X	X	X																		
0.33uF (334)	L	L									N	N					X	X	X	X																	
0.39uF (394)																	X	X	X																		
0.47uF (474)	L										N	N	E	E	E		X	X	X	X	X																
0.68uF (684)											N	N					X	X	X	X																	
0.82uF (824)																	X	X	X	X																	
1.0uF (105)	L	L	L								N	N	N	N			X	X	X	X	X			D	D	D	I										
1.5uF (155)																	X						I	I	I	I			J	J				K			
2.2uF (225)	L	L									N	N	E	E			X	X	X	X	X		I	I	I	I	I		J	J	P	P		K			
3.3uF (335)																	X	X					I	I	I	I			P	P	P						
4.7uF (475)											E	E	E				X	X	X	X			I	I	I	I	I		P	P	P	P		K	K		
6.8uF (685)																												P	P								
10uF (106)											E	E					X	X	X	X			I	I	I	I	I		P	P	P	P		K	K	K	M
22uF (226)																	X	X					I	I	I	I			P	P	P	P		M	M	M	
47uF (476)																	X						I	I					P	P	P			M	M	M	
68uF (686)																							I						P	G				M	M		
100uF (107)																							I						P	G				M	M		
220uF (227)																																		M	M		

1. The letter in cell is expressed the symbol of product thickness.

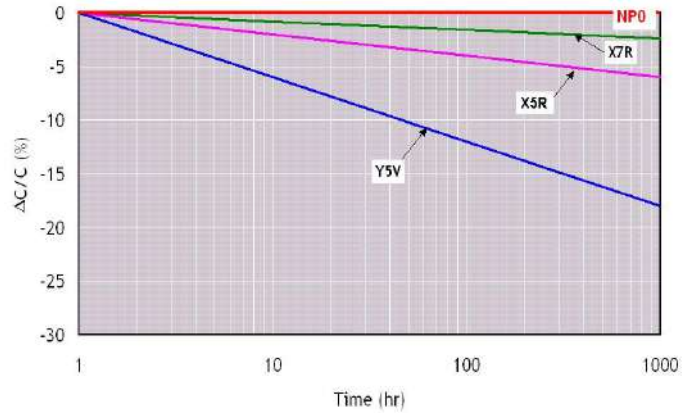
ELECTRICAL CHARACTERISTICS

1) Frequency characteristics

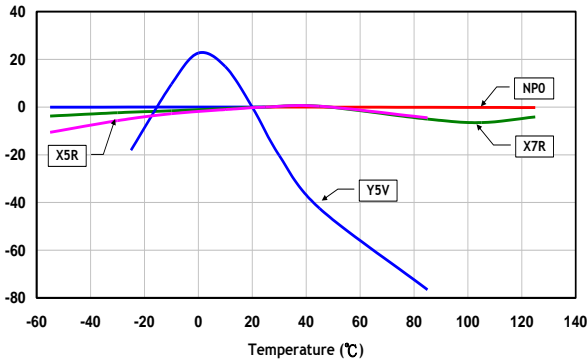
Typical Impedance vs. Frequency



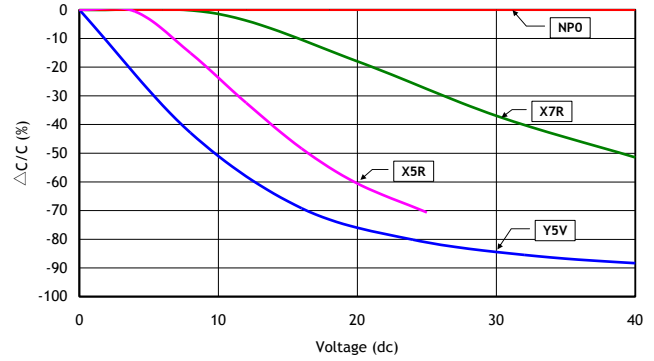
2) Capacitance Change - Typical aging rate



3) Temperature characteristics of capacitance (TCC)



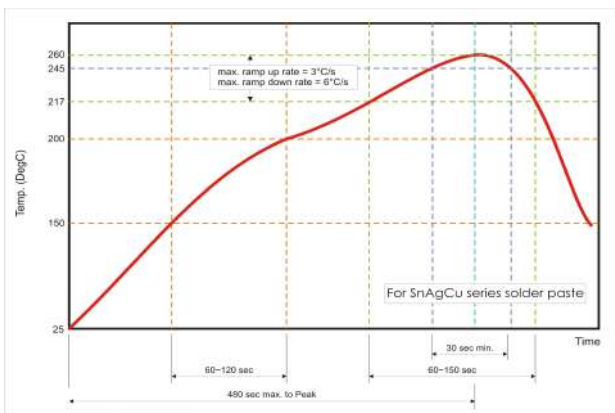
4) DC Bias characteristics



All above typical electronic characteristics are for reference only.

Recommended soldering conditions

1) Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.



2) Recommended wave soldering profile for SMT process with SnAgCu series solder.

