

APPROVAL SHEET

MULTILAYER CERAMIC CAPACITORS

Soft Termination Series

(SH_6.3V to 4000V)

NP0, X7R & X5R Dielectrics

0402 to 2225 Sizes

Halogen Free & RoHS Compliance

*Contents in this sheet are subject to change without prior notice.

1. INTRODUCTION

WTC soft termination series MLCC is designed and with a polymer layer within end terminations of product, which can absorb mechanical stress caused by PCB handling in SMT line and reduce the mechanical impact for product. It will offer more robust and reliable performance in applications.

2. FEATURES

- a. MLCC's termination are with a soft & flexible polymer layer to withstand high bending stress in SMT line.
- b. Available for any item in standard series range.

3. APPLICATIONS

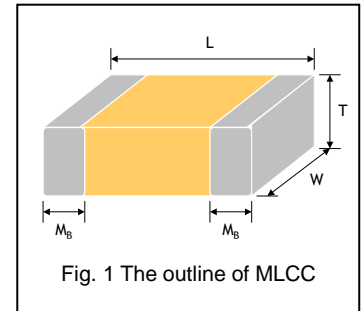
- a. Power supply and related industries.
- b. Lighting industry.
- c. The other mechanical stress concerned products.

4. HOW TO ORDER

<u>SH</u>	<u>31</u>	<u>B</u>	<u>104</u>	<u>K</u>	<u>500</u>	<u>C</u>	<u>I</u>
<u>Series</u>	<u>Size</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging</u>
SH=Soft termination	15=0402 (1005) 18=0603 (1608) 21=0805 (2012) 31=1206 (3216) 32=1210 (3225) 42=1808 (4520) 43=1812 (4532) 46=1825 (4563) 55=2220 (5750) 56=2225 (5763)	N=NP0 (COG) B=X7R X=X5R	Two significant digits followed by no. of zeros. And R is in place of decimal point. Eg. 104=10x10 ⁴ =100nF	B=±0.1pF C=±0.25pF D=±0.5pF F=±1% G=±2% J=±5% K=±10% M=±20%	Two significant digits followed by no. of zeros. And R is in place of decimal point. 6R3=6.3 VDC 100=10 VDC 160=16 VDC 250=25 VDC 500=50 VDC 101=100 VDC 201=200 VDC 251=250 VDC 401=400 VDC 451=450 VDC 501=500 VDC 631=630 VDC 102=1000 VDC 152=1500 VDC 202=2000 VDC 252=2500 VDC 302=3000 VDC 402=4000 VDC	C=Ag Polymer /Ni/Sn	T=7" reeled G=13" reeled

5. EXTERNAL DIMENSIONS & CONSTRUCTIONS

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	Remark	M _B (mm)
0402 (1005)	1.00±0.20	0.50±0.20	0.50±0.20	E #	0.15~0.35
0603 (1608)	1.60±0.20	0.80±0.10	0.80±0.07	S	0.25~0.60
	1.60±0.30	0.80±0.30	0.80±0.30	X	
0805 (2012)	2.00±0.20	1.25±0.10	0.60±0.10	A	0.30~0.70
			0.80±0.10	B	
			1.25±0.10	D #	
	2.00±0.30	1.25±0.30	1.25±0.30	I #	
1206 (3216)	3.20±0.4/-0.1	1.60±0.15	0.80±0.10	B	0.25~1.00 (0.50±0.25)*
			0.95±0.10	C #	
			1.15±0.15	J #	
			1.25±0.10	D #	
	3.30±0.30#2	1.60±0.20	1.60±0.20	G #	
	3.20±0.50	1.60±0.50	1.60±0.50	P #	
1210 (3225)	3.20±0.40	2.50±0.20	0.95±0.10	C #	0.50~1.00
			1.25±0.10	D #	
			1.60±0.20	G #	
	3.20±0.60	2.50±0.50	2.00±0.20	K #	
			2.50±0.50	M #	
			2.50±0.30#1	2.50±0.30#1	
1808 (4520)	4.50±0.6/-0.4	2.03±0.25	1.25±0.10	D #	0.25~1.10 (0.50±0.25)*
			2.00±0.20	K #	
1812 (4532)	4.50±0.6/-0.4	3.20±0.30	0.95±0.10	C #	0.25~1.10 (0.50±0.25)*
			1.25±0.10	D #	
			1.60±0.20	G #	
			2.00±0.20	K #	
		3.20±0.40	2.50±0.50	M #	
			2.80±0.30	U #	
1825 (4563)	4.50±0.6/-0.4	6.30±0.40	2.00±0.20 (K)	#	0.40~1.10
			2.50±0.30 (M)	#	0.50~1.20
2220 (5750)	5.70±0.50	5.00±0.40	2.80±0.30 (U)	#	0.50~1.20
2225 (5763)	5.70±0.50	6.30±0.40	3.10±0.30 (R)	#	0.50~1.20



Reflow soldering only is recommended.

* For 1206 ≥ 1000V, 1808/1812_200V~4000V products. Excluding: 1206B183~223/1000V

#1 For 1210N563 to 1210N104/200V~250V

#2 For 1206B183~223/1000V

6. GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R	X5R
Size	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225		
Capacitance range*	0.1pF to 0.1μF	100pF to 47μF	0.033μF to 10μF
Capacitance tolerance**	Cap ≤ 5pF#1: B (±0.1pF), C (±0.25pF) 5pF < Cap < 10pF#1: A (±0.05pF), B (±0.1pF), C (±0.25pF), D (±0.5pF) Cap ≥ 10pF: F (±1%), G (±2%), J (±5%), K (±10%)		
Rated voltage (WVDC)	6.3V to 4000V		
Operating temperature	-55 to +125°C	-55 to +125°C	-55 to +85°C
Capacitance characteristic	±30ppm	±15%	±15%
Termination	Ni/Sn (lead-free termination)		

#1: NP0, 0.1pF and 5pF < Cap < 10pF products need to check with sales if it can supply A (±0.05pF).

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

NP0: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap ≤ 1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap > 1000pF, 25°C at ambient temperature
 X7R, X5R: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.

** Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.

7. CAPACITANCE RANGE (NP0 Dielectric)

NP0 Dielectric 0402, 0603 Sizes

DIELECTRIC		NP0											
SIZE		0402					0603						
RATED VOLTAGE (VDC)		10	16	25	50	100	10	16	25	50	100	200	250
Capacitance	0.1pF (0R1)	E	E	E	E								
	0.2pF (0R2)	E	E	E	E								
	0.3pF (0R3)	E	E	E	E		S	S	S	S			
	0.4pF (0R4)	E	E	E	E		S	S	S	S			
	0.5pF (0R5)	E	E	E	E	E	S	S	S	S	S	S	S
	0.6pF (0R6)	E	E	E	E	E	S	S	S	S	S	S	S
	0.7pF (0R7)	E	E	E	E	E	S	S	S	S	S	S	S
	0.8pF (0R8)	E	E	E	E	E	S	S	S	S	S	S	S
	0.9pF (0R9)	E	E	E	E	E	S	S	S	S	S	S	S
	1.0pF (1R0)	E	E	E	E	E	S	S	S	S	S	S	S
	1.2pF (1R2)	E	E	E	E	E	S	S	S	S	S	S	S
	1.5pF (1R5)	E	E	E	E	E	S	S	S	S	S	S	S
	1.8pF (1R8)	E	E	E	E	E	S	S	S	S	S	S	S
	2.2pF (2R2)	E	E	E	E	E	S	S	S	S	S	S	S
	2.7pF (2R7)	E	E	E	E	E	S	S	S	S	S	S	S
	3.3pF (3R3)	E	E	E	E	E	S	S	S	S	S	S	S
	3.9pF (3R9)	E	E	E	E	E	S	S	S	S	S	S	S
	4.7pF (4R7)	E	E	E	E	E	S	S	S	S	S	S	S
	5.6pF (5R6)	E	E	E	E	E	S	S	S	S	S	S	S
	6.8pF (6R8)	E	E	E	E	E	S	S	S	S	S	S	S
	8.2pF (8R2)	E	E	E	E	E	S	S	S	S	S	S	S
	10pF (100)	E	E	E	E	E	S	S	S	S	S	S	S
	12pF (120)	E	E	E	E	E	S	S	S	S	S	S	S
	15pF (150)	E	E	E	E	E	S	S	S	S	S	S	S
	18pF (180)	E	E	E	E	E	S	S	S	S	S	S	S
	22pF (220)	E	E	E	E	E	S	S	S	S	S	S	S
	27pF (270)	E	E	E	E	E	S	S	S	S	S	S	S
	33pF (330)	E	E	E	E	E	S	S	S	S	S	S	S
	39pF (390)	E	E	E	E	E	S	S	S	S	S	S	S
	47pF (470)	E	E	E	E	E	S	S	S	S	S	S	S
	56pF (560)	E	E	E	E	E	S	S	S	S	S	S	S
	68pF (680)	E	E	E	E	E	S	S	S	S	S	S	S
	82pF (820)	E	E	E	E	E	S	S	S	S	S	S	S
	100pF (101)	E	E	E	E	E	S	S	S	S	S	S	S
	120pF (121)	E	E	E	E	E	S	S	S	S	S	S	S
	150pF (151)	E	E	E	E	E	S	S	S	S	S	S	S
	180pF (181)	E	E	E	E	E	S	S	S	S	S	S	S
	220pF (221)	E	E	E	E	E	S	S	S	S	S	S	S
	270pF (271)	E	E	E	E	E	S	S	S	S	S	X	X
	330pF (331)	E	E	E	E	E	S	S	S	S	S	X	X
	390pF (391)	E	E	E	E	E	S	S	S	S	S	X	X
	470pF (471)	E	E	E	E	E	S	S	S	S	S	X	X
560pF (561)	E	E	E	E	E	S	S	S	S	S			
680pF (681)	E	E	E	E	E	S	S	S	S	S			
820pF (821)	E	E	E	E	E	S	S	S	S	S			
1,000pF (102)	E	E	E	E	E	S	S	S	S	S			
1,200pF (122)						X	X	X	X				
1,500pF (152)						X	X	X	X				
1,800pF (182)						X	X	X	X				
2,200pF (222)						X	X	X	X				
2,700pF (272)						X	X	X	X				
3,300pF (332)						X	X	X	X				
3,900pF (392)													
4,700pF (472)													
5,600pF (562)													
6,800pF (682)													
8,200pF (822)													
0.010uF (103)													
0.012uF (123)													

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

Multilayer Ceramic Capacitors

Approval Sheet

NP0 Dielectric 0805 Size

DIELECTRIC		NP0									
SIZE		0805									
RATED VOLTAGE (VDC)		10	16	25	50	100	200	250	500	630	1000
Capacitance	0.5pF (0R5)	A	A	A	A	A	A	A	A	A	D
	0.6pF (0R6)	A	A	A	A	A	A	A	A	A	D
	0.7pF (0R7)	A	A	A	A	A	A	A	A	A	D
	0.8pF (0R8)	A	A	A	A	A	A	A	A	A	D
	0.9pF (0R9)	A	A	A	A	A	A	A	A	A	D
	1.0pF (1R0)	A	A	A	A	A	A	A	A	A	D
	1.2pF (1R2)	A	A	A	A	A	A	A	A	A	D
	1.5pF (1R5)	A	A	A	A	A	A	A	A	A	D
	1.8pF (1R8)	A	A	A	A	A	A	A	A	A	D
	2.2pF (2R2)	A	A	A	A	A	A	A	A	A	D
	2.7pF (2R7)	A	A	A	A	A	A	A	A	A	D
	3.3pF (3R3)	A	A	A	A	A	A	A	A	A	D
	3.9pF (3R9)	A	A	A	A	A	A	A	A	A	D
	4.7pF (4R7)	A	A	A	A	A	A	A	A	A	D
	5.6pF (5R6)	A	A	A	A	A	A	A	A	A	D
	6.8pF (6R8)	A	A	A	A	A	A	A	A	A	D
	8.2pF (8R2)	A	A	A	A	A	A	A	A	A	D
	10pF (100)	A	A	A	A	A	A	A	A	A	D
	12pF (120)	A	A	A	A	A	A	A	A	A	D
	15pF (150)	A	A	A	A	A	A	A	A	A	D
	18pF (180)	A	A	A	A	A	A	A	A	A	D
	22pF (220)	A	A	A	A	A	A	A	A	A	D
	27pF (270)	A	A	A	A	A	A	A	A	A	D
	33pF (330)	A	A	A	A	A	A	A	A	A	D
	39pF (390)	A	A	A	A	A	A	A	A	A	D
	47pF (470)	A	A	A	A	A	A	A	A	A	D
	56pF (560)	A	A	A	A	A	A	A	A	A	D
	68pF (680)	A	A	A	A	A	A	A	A	A	D
	82pF (820)	A	A	A	A	A	A	A	B	B	D
	100pF (101)	A	A	A	A	A	A	B	B	B	D
	120pF (121)	A	A	A	A	A	A	B	D	D	D
	150pF (151)	A	A	A	A	A	B	D	D	D	D
	180pF (181)	A	A	A	A	A	B	D	D	D	D
	220pF (221)	A	A	A	A	A	D	D	D	D	D
	270pF (271)	A	A	A	A	A	D	D	D	D	D
	330pF (331)	A	A	A	A	A	D	D	D	D	D
	390pF (391)	B	B	B	B	B	D	D	D	D	D
	470pF (471)	B	B	B	B	B	D	D	I	I	
	560pF (561)	B	B	B	B	B	D	D	I	I	
	680pF (681)	B	B	B	B	B	D	D	I	I	
820pF (821)	B	B	B	B	B	D	D	I	I		
1,000pF (102)	B	B	B	B	B	D	D	I	I		
1,200pF (122)	B	B	B	B	B	D	D				
1,500pF (152)	B	B	B	B	B	D	D				
1,800pF (182)	B	B	B	B	B	D	D				
2,200pF (222)	B	B	B	B	B	D	D				
2,700pF (272)	D	D	D	D	D						
3,300pF (332)	D	D	D	D	D						
3,900pF (392)	D	D	D	D	D						
4,700pF (472)	D	D	D	D	D						
5,600pF (562)	D	D	D	D	D						
6,800pF (682)	D	D	D	D	D						
8,200pF (822)	D	D	D	D	D						
0.010μF (103)	D	D	D	D	D						

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

Multilayer Ceramic Capacitors

Approval Sheet

NP0 Dielectric 1206 Size

DIELECTRIC		NP0											
SIZE		1206											
RATED VOLTAGE (VDC)		10	16	25	50	100	200	250	500	630	1000	1500	2000
Capacitance	1.0pF (1R0)												
	1.2pF (1R2)	B	B	B	B	B							
	1.5pF (1R5)	B	B	B	B	B	B	B	B	B	B	B	B
	1.8pF (1R8)	B	B	B	B	B	B	B	B	B	B	B	B
	2.2pF (2R2)	B	B	B	B	B	B	B	B	B	B	B	B
	2.7pF (2R7)	B	B	B	B	B	B	B	B	B	B	B	B
	3.3pF (3R3)	B	B	B	B	B	B	B	B	B	B	B	B
	3.9pF (3R9)	B	B	B	B	B	B	B	B	B	B	B	B
	4.7pF (4R7)	B	B	B	B	B	B	B	B	B	B	B	B
	5.6pF (5R6)	B	B	B	B	B	B	B	B	B	B	B	B
	6.8pF (6R8)	B	B	B	B	B	B	B	B	B	B	B	B
	8.2pF (8R2)	B	B	B	B	B	B	B	B	B	B	B	B
	10pF (100)	B	B	B	B	B	B	B	B	B	B	B	B
	12pF (120)	B	B	B	B	B	B	B	B	B	B	B	B
	15pF (150)	B	B	B	B	B	B	B	B	B	B	B	B
	18pF (180)	B	B	B	B	B	B	B	B	B	B	B	B
	22pF (220)	B	B	B	B	B	B	B	B	B	B	B	B
	27pF (270)	B	B	B	B	B	B	B	B	B	B	B	B
	33pF (330)	B	B	B	B	B	B	B	B	B	B	C	C
	39pF (390)	B	B	B	B	B	B	B	B	B	B	C	C
	47pF (470)	B	B	B	B	B	B	B	B	B	C	C	C
	56pF (560)	B	B	B	B	B	B	B	B	B	C	D	D
	68pF (680)	B	B	B	B	B	B	B	B	B	C	D	D
	82pF (820)	B	B	B	B	B	B	B	B	B	D	D	D
	100pF (101)	B	B	B	B	B	B	B	B	B	D	D	D
	120pF (121)	B	B	B	B	B	B	B	B	B	D	G	G
	150pF (151)	B	B	B	B	B	B	B	B	B	D	G	G
	180pF (181)	B	B	B	B	B	B	B	B	B	D	G	G
	220pF (221)	B	B	B	B	B	B	B	B	B	G	G	G
	270pF (271)	B	B	B	B	B	B	C	C	C	G	P	P
	330pF (331)	B	B	B	B	B	B	C	C	C	G	P	P
	390pF (391)	B	B	B	B	B	B	C	C	C	G	P	P
	470pF (471)	B	B	B	B	B	B	C	C	C	G		
	560pF (561)	B	B	B	B	B	B	C	D	D	D	G	
	680pF (681)	B	B	B	B	B	B	C	D	D	D	G	
	820pF (821)	B	B	B	B	B	B	C	G	G	G	G	
	1,000pF (102)	B	B	B	B	B	B	C	G	G	G	G	
	1,200pF (122)	B	B	B	B	B	B	C	G	G	G	G	
	1,500pF (152)	B	B	B	B	B	B	D	G	G	G	G	
	1,800pF (182)	B	B	B	B	B	B	D	G	G	G	G	
2,200pF (222)	B	B	B	B	B	B	D	G	G	G	G		
2,700pF (272)	B	B	B	B	B	B	D	G	G	G	G		
3,300pF (332)	B	B	B	B	B	B	D	G	G	G	G		
3,900pF (392)	B	B	B	B	B	B	D	G	G	G	G		
4,700pF (472)	B	B	B	B	B	B	D	G	P	P			
5,600pF (562)	B	B	B	B	B	B			P	P			
6,800pF (682)	C	C	C	C	C	C			P	P			
8,200pF (822)	D	D	D	D	D	D			P	P			
0.010μF (103)	D	D	D	D	D	D			P	P			
0.012μF (123)	P	P	P	P	P	P							
0.015μF (153)	P	P	P	P	P	P							
0.018μF (183)	P	P	P	P	P	P							
0.022μF (223)	P	P	P	P	P	P							
0.027μF (273)	P	P	P	P	P	P							
0.033μF (333)	P	P	P	P	P	P							
0.039μF (393)	P	P	P	P	P	P							

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

Multilayer Ceramic Capacitors

Approval Sheet

NP0 Dielectric 1210 Size

DIELECTRIC		NP0											
SIZE		1210											
RATED VOLTAGE (VDC)		10	16	25	50	100	200	250	500	630	1000	1500	2000
Capacitance	10pF (100)	C	C	C	C	C	C	C	C	C	C	C	C
	12pF (120)	C	C	C	C	C	C	C	C	C	C	C	C
	15pF (150)	C	C	C	C	C	C	C	C	C	C	C	C
	18pF (180)	C	C	C	C	C	C	C	C	C	C	C	C
	22pF (220)	C	C	C	C	C	C	C	C	C	C	C	C
	27pF (270)	C	C	C	C	C	C	C	C	C	C	C	C
	33pF (330)	C	C	C	C	C	C	C	C	C	C	C	C
	39pF (390)	C	C	C	C	C	C	C	C	C	C	C	C
	47pF (470)	C	C	C	C	C	C	C	C	C	C	C	C
	56pF (560)	C	C	C	C	C	C	C	C	C	C	D	D
	68pF (680)	C	C	C	C	C	C	C	C	C	C	D	D
	82pF (820)	C	C	C	C	C	C	C	C	C	C	D	D
	100pF (101)	C	C	C	C	C	C	C	C	C	D	D	D
	120pF (121)	C	C	C	C	C	C	C	C	C	D	D	D
	150pF (151)	C	C	C	C	C	C	C	C	C	D	G	G
	180pF (181)	C	C	C	C	C	C	C	C	C	D	G	G
	220pF (221)	C	C	C	C	C	C	C	C	C	G	G	G
	270pF (271)	C	C	C	C	C	C	C	C	C	G	K	K
	330pF (331)	C	C	C	C	C	C	C	C	C	G	K	K
	390pF (391)	C	C	C	C	C	C	C	C	C	G	M	M
	470pF (471)	C	C	C	C	C	C	C	C	C	G	M	M
	560pF (561)	C	C	C	C	C	C	C	C	C	G		
	680pF (681)	C	C	C	C	C	C	C	C	C	G		
	820pF (821)	C	C	C	C	C	C	C	C	C	G		
	1,000pF (102)	C	C	C	C	C	D	D	D	D	G		
	1,200pF (122)	C	C	C	C	C	D	D	D	D	G		
	1,500pF (152)	C	C	C	C	C	D	D	D	D	K		
	1,800pF (182)	C	C	C	C	C	D	D	D	D	M		
	2,200pF (222)	C	C	C	C	C	D	D	D	D	M		
	2,700pF (272)	C	C	C	C	C	D	D	D	D	M		
	3,300pF (332)	C	C	C	C	C	D	D	D	D	M		
	3,900pF (392)	C	C	C	C	C	D	D	D	D	M		
	4,700pF (472)	C	C	C	C	C	G	G	G	G	M		
	5,600pF (562)	C	C	C	C	C	G	G	G	G	M		
	6,800pF (682)	C	C	C	C	C	G	G	G	G	M		
	8,200pF (822)	C	C	C	C	C	G	G	G	G	M		
	0.010μF (103)	C	C	C	C	C	G	G	K	K	M		
	0.012μF (123)	D	D	D	D	D	K	K	M	M	M		
	0.015μF (153)	D	D	D	D	D	K	K	M	M	M		
	0.018μF (183)	K	K	K	K	K	K	K	M	M	M		
0.022μF (223)	K	K	K	K	K	K	K	M	M	M			
0.027μF (273)	K	K	K	K	K	K	K	M	M				
0.033μF (333)	K	K	K	K	K	K	K	M	M				
0.039μF (393)	K	K	K	K	K	K	K						
0.047μF (473)	K	K	K	K	K	K	K						
0.056μF (563)						M	M						
0.068μF (683)						M	M						
0.082μF (823)						M	M						
0.1μF (104)						M	M						

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

Multilayer Ceramic Capacitors

Approval Sheet

NP0 Dielectric 1808 Size

DIELECTRIC		NP0					
SIZE		1808					
RATED VOLTAGE (VDC)		500	630	1000	1500	2000	3000
Capacitance	2.0pF (2R0)						
	2.2pF (2R2)	D	D	D	D	D	D
	2.7pF (2R7)	D	D	D	D	D	D
	3.3pF (3R3)	D	D	D	D	D	D
	3.9pF (3R9)	D	D	D	D	D	D
	4.7pF (4R7)	D	D	D	D	D	D
	5.6pF (5R6)	D	D	D	D	D	D
	6.8pF (6R8)	D	D	D	D	D	D
	8.2pF (8R2)	D	D	D	D	D	D
	10pF (100)	D	D	D	D	D	D
	12pF (120)	D	D	D	D	D	D
	15pF (150)	D	D	D	D	D	D
	18pF (180)	D	D	D	D	D	D
	22pF (220)	D	D	D	D	D	D
	27pF (270)	D	D	D	D	D	D
	33pF (330)	D	D	D	D	D	D
	39pF (390)	D	D	D	D	D	D
	47pF (470)	D	D	D	D	D	D
	56pF (560)	D	D	D	D	D	D
	68pF (680)	D	D	D	D	D	D
	82pF (820)	D	D	D	D	D	D
	100pF (101)	D	D	D	D	D	K
	120pF (121)	D	D	D	D	D	K
	150pF (151)	D	D	D	K	K	K
	180pF (181)	D	D	D	K	K	K
	220pF (221)	D	D	D	K	K	K
	270pF (271)	K	K	K	K	K	K
	330pF (331)	K	K	K	K	K	K
	390pF (391)	K	K	K	K	K	K
	470pF (471)	K	K	K	K	K	K
	560pF (561)	K	K	K	K	K	
	680pF (681)	K	K	K	K	K	
820pF (821)	K	K	K	D	D		
1,000pF (102)	K	K	K	G	G		
1,200pF (122)	K	K	G				
1,500pF (152)	K	K	G				
1,800pF (182)	K	K	K				
2,200pF (222)	K	K	K				
2,700pF (272)	K	K					
3,300pF (332)	K	K					
3,900pF (392)							

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

Multilayer Ceramic Capacitors

Approval Sheet

NP0 Dielectric 1812 Size

DIELECTRIC SIZE		NP0 1812														
RATED VOLTAGE (VDC)		10	16	25	50	100	200	250	500	630	1000	1500	2000	3000	4000	
Capacitance	10pF (100)	D	D	D	D	D	D	D	D	D	D	D	D	D		
	12pF (120)	D	D	D	D	D	D	D	D	D	D	D	D	D		
	15pF (150)	D	D	D	D	D	D	D	D	D	D	D	D	D		
	18pF (180)	D	D	D	D	D	D	D	D	D	D	D	D	D		
	22pF (220)	D	D	D	D	D	D	D	D	D	D	D	D	D		
	27pF (270)	D	D	D	D	D	D	D	D	D	D	D	D	D		
	33pF (330)	D	D	D	D	D	D	D	D	D	D	D	D	D	D ⁺	
	39pF (390)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D ⁺
	47pF (470)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	G ⁺
	56pF (560)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	G ⁺
	68pF (680)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	K ⁺
	82pF (820)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	K ⁺
	100pF (101)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	K ⁺
	120pF (121)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	M ⁺
	150pF (151)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
	180pF (181)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	K
	220pF (221)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	K
	270pF (271)	D	D	D	D	D	D	D	D	D	D	D	K	K	K	
	330pF (331)	D	D	D	D	D	D	D	D	D	D	D	K	K	K	
	390pF (391)	D	D	D	D	D	D	D	D	D	D	D	K	K	K	
	470pF (471)	D	D	D	D	D	D	D	D	D	D	K	K	K	K	
	560pF (561)	D	D	D	D	D	D	D	D	D	D	K	K	K	G	
	680pF (681)	D	D	D	D	D	D	D	D	D	D	K	K	K	K	
	820pF (821)	D	D	D	D	D	D	D	D	D	D	K	K	K	M	
	1,000pF (102)	D	D	D	D	D	D	D	D	D	D	K	K	K	M	
	1,200pF (122)	D	D	D	D	D	D	D	D	D	D	K		K	U	
	1,500pF (152)	D	D	D	D	D	D	D	D	D	D	K		K		
	1,800pF (182)	D	D	D	D	D	D	D	D	D	D	K		K		
	2,200pF (222)	D	D	D	D	D	D	D	D	D	D	K		K		
	2,700pF (272)	D	D	D	D	D	D	D	D	D	D	K		M		
	3,300pF (332)	D	D	D	D	D	D	D	D	D	D	K		M		
	3,900pF (392)	D	D	D	D	D	D	D	D	D	D	M				
	4,700pF (472)	D	D	D	D	D	D	D	D	D	D	M				
	5,600pF (562)	D	D	D	D	D	D	D	D	D	D	M				
	6,800pF (682)	D	D	D	D	D	D	D	D	D	D					
	8,200pF (822)	D	D	D	D	D	C	C	C	D	D					
	0.010μF (103)	D	D	D	D	D	C	C	D	D	D					
	0.012μF (123)	D	D	D	D	D	G	G	G	G						
	0.015μF (153)	D	D	D	D	D	G	G	G	G						
	0.018μF (183)	D	D	D	D	D	K	K	K	K						
0.022μF (223)	D	D	D	D	D	K	K	K	K							
0.027μF (273)	D	D	D	D	D	M	M	K	K							
0.033μF (333)	D	D	D	D	D	M	M	M	M							
0.039μF (393)						M	M	M	M							
0.047μF (473)						M	M	U	U							
0.056μF (563)						M	M									
0.068μF (683)						M	M									
0.082μF (823)						U	U									
0.1μF (104)						R	R									

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.
3. "+" mark only supply "surface coating" products

Multilayer Ceramic Capacitors

Approval Sheet

NP0 Dielectric 1825 to 2225 Sizes

DIELECTRIC	NP0																				
	1825						2220						2225								
SIZE	100	200	500	1000	2000	3000	100	200	500	630	1000	2000	3000	100	200	500	630	1000	2000	3000	4000
RATED VOLTAGE (VDC)	100	250	630	1000	2000	3000	100	250	500	630	1000	2000	3000	100	250	500	630	1000	2000	3000	4000
10pF (100)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
12pF (120)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
15pF (150)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
18pF (180)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
22pF (220)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
27pF (270)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
33pF (330)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
39pF (390)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
47pF (470)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
56pF (560)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
68pF (680)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
82pF (820)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
100pF (101)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
120pF (121)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
150pF (151)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
180pF (181)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
220pF (221)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
270pF (271)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
330pF (331)	K	K	K	K	K	K	K	K	K	K	K	M	K	K	K	K	K	K	K	K	K
390pF (391)	K	K	K	K	K	K	K	K	K	K	K	M	K	K	K	K	K	K	K	K	K
470pF (471)	K	K	K	K	K	K	K	K	K	K	K	M	K	K	K	K	K	K	K	K	K
560pF (561)	K	K	K	K	K	K	K	K	K	K	K	M	K	K	K	K	K	K	K	K	K
680pF (681)	K	K	K	K	K	M	K	K	K	K	K	M	K	K	K	K	K	K	K	K	K
820pF (821)	K	K	K	K	K	M	K	K	K	K	K	M	K	K	K	K	K	M	M		
1,000pF (102)	K	K	K	K	K	M	K	K	K	K	K	M	K	K	K	K	K	M	M		
1,200pF (122)	K	K	K	K	K		K	K	K	K	M	M	M	K	K	K	K	K	M		
1,500pF (152)	K	K	K	K	M		K	K	K	K	M	M	M	M	K	K	K	K	M		
1,800pF (182)	K	K	K	K	M		K	K	K	K	M	M		K	K	K	K	K	M		
2,200pF (222)	K	K	K	K	M		K	K	K	K	M	M		K	K	K	K	K	M		
2,700pF (272)	K	K	K	K	M		K	K	K	K	M	M		K	K	K	K	K	M		
3,300pF (332)	K	K	K	K	M		K	K	K	K	M	M		K	K	K	K	K	M		
3,900pF (392)	K	K	K	M	M		K	K	K	K	M	M		K	K	K	K	K	M		
4,700pF (472)	K	K	K	M	M		K	K	K	K	M	M		K	K	K	K	K	M		
5,600pF (562)	K	K	K	M			K	K	K	K	M			K	K	K	K	M	M		
6,800pF (682)	K	K	K	M			K	K	K	K	M			K	K	K	K	M	M		
8,200pF (822)	K	K	K	M			K	K	K	K	M			K	K	K	K	M	M		
0.010uF (103)	K	K	K	M			K	K	K	K	M			K	K	K	K	M	M		
0.012uF (123)	K	K	K				K	K	K	K				K	K	K	K				
0.015uF (153)	K	K	K				K	K	K	K				K	K	K	K				
0.018uF (183)	K	K	K				K	K	K	K				K	K	K	K				
0.022uF (223)	K	K	K				K	K	K	K				K	K	K	K				
0.027uF (273)	K	K	K				K	K	K	K				K	K	K	K				
0.033uF (333)	K	K	K				K	K	K	K				K	K	K	K				
0.039uF (393)	K	K	K				K	K	K	K				K	K	K	K				
0.047uF (473)	K	K	K				K	M	M	M				K	K	K	K				
0.056uF (563)	K	M	K				K	M	M	M				K	M	M	M				
0.068uF (683)	K	M	K				K	M	U	U				K	M	M	M				
0.082uF (823)	M						M		U	U				K	M	M					
0.1uF (104)	M						M		U	U				M	M						
0.12uF (124)																					
0.15uF (154)																					
0.18uF (184)																					
0.22uF (224)																					
0.27uF (274)																					

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

7-1. CAPACITANCE RANGE (X7R Dielectric)

0402, 0603 Sizes

DIELECTRIC SIZE		X7R												
		0402					0603							
RATED VOLTAGE (VDC)		10	16	25	50	100	6.3	10	16	25	50	100	200	250
Capacitance	100pF (101)	E	E	E	E	E		S	S	S	S	S	X	X
	120pF (121)	E	E	E	E	E		S	S	S	S	S	X	X
	150pF (151)	E	E	E	E	E		S	S	S	S	S	X	X
	180pF (181)	E	E	E	E	E		S	S	S	S	S	X	X
	220pF (221)	E	E	E	E	E		S	S	S	S	S	X	X
	270pF (271)	E	E	E	E	E		S	S	S	S	S	X	X
	330pF (331)	E	E	E	E	E		S	S	S	S	S	X	X
	390pF (391)	E	E	E	E	E		S	S	S	S	S	X	X
	470pF (471)	E	E	E	E	E		S	S	S	S	S	X	X
	560pF (561)	E	E	E	E	E		S	S	S	S	S	X	X
	680pF (681)	E	E	E	E	E		S	S	S	S	S	X	X
	820pF (821)	E	E	E	E	E		S	S	S	S	S	X	X
	1,000pF (102)	E	E	E	E	E		S	S	S	S	S	X	X
	1,200pF (122)	E	E	E	E	E		S	S	S	S	S	X	X
	1,500pF (152)	E	E	E	E	E		S	S	S	S	S	X	X
	1,800pF (182)	E	E	E	E	E		S	S	S	S	S	X	X
	2,200pF (222)	E	E	E	E	E		S	S	S	S	S	X	X
	2,700pF (272)	E	E	E	E	E		S	S	S	S	S	X	X
	3,300pF (332)	E	E	E	E	E		S	S	S	S	S	X	X
	3,900pF (392)	E	E	E	E	E		S	S	S	S	S	X	X
	4,700pF (472)	E	E	E	E	E		S	S	S	S	S	X	X
	5,600pF (562)	E	E	E	E	E		S	S	S	S	S	X	X
	6,800pF (682)	E	E	E	E	E		S	S	S	S	S	X	X
	8,200pF (822)	E	E	E	E	E		S	S	S	S	S	X	X
	0.010μF (103)	E	E	E	E	E		S	S	S	S	S	X	X
	0.012μF (123)	E	E	E	E	E		S	S	S	S	X		
	0.015μF (153)	E	E	E	E	E		S	S	S	S	X		
	0.018μF (183)	E	E	E	E	E		S	S	S	S	X		
	0.022μF (223)	E	E	E	E	E		S	S	S	S	X		
	0.027μF (273)	E	E	E	E	E		S	S	S	S	X		
	0.033μF (333)	E	E	E	E	E		S	S	S	S	X	X	
	0.039μF (393)	E	E	E	E	E		S	S	S	S	X	X	
	0.047μF (473)	E	E	E	E	E		S	S	S	X	X		
	0.056μF (563)	E	E	E	E	E		S	S	S	X	X		
	0.068μF (683)	E	E	E	E	E		S	S	S	X	X		
	0.082μF (823)	E	E	E	E	E		S	S	S	X	X		
	0.10μF (104)	E	E	E	E	E		S	S	S	X	X		
	0.12μF (124)								S	S	X			
	0.15μF (154)								S	S	X			
	0.18μF (184)								S	S	X			
	0.22μF (224)								S	S	X	X		
	0.27μF (274)							X	X	X	X			
	0.33μF (334)								X	X	X	X		
	0.39μF (394)								X	X	X			
	0.47μF (474)							X	X	X	X	X		
	0.56μF (564)								X	X				
	0.68μF (684)							X	X	X				
0.82μF (824)								X	X					
1.0μF (105)							X	X	X	X	X			
1.5μF (155)														
2.2μF (225)							X	X	X					
4.7μF (475)														

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

Multilayer Ceramic Capacitors

Approval Sheet

X7R Dielectric 0805 Size

DIELECTRIC SIZE		X7R 0805									
RATED VOLTAGE (VDC)		10	16	25	50	100	200	250	500	630	1000
Capacitance	100pF (101)	D	D	D	D	D	D	D	B	B	B
	120pF (121)	D	D	D	D	D	D	D	B	B	B
	150pF (151)	D	D	D	D	D	D	D	B	B	B
	180pF (181)	D	D	D	D	D	D	D	B	B	B
	220pF (221)	D	D	D	D	D	D	D	B	B	B
	270pF (271)	D	D	D	D	D	D	D	B	B	B
	330pF (331)	D	D	D	D	D	D	D	B	B	B
	390pF (391)	D	D	D	D	D	D	D	B	B	B
	470pF (471)	D	D	D	D	D	D	D	B	B	B
	560pF (561)	D	D	D	D	D	D	D	B	B	B
	680pF (681)	D	D	D	D	D	D	D	B	B	B
	820pF (821)	D	D	D	D	D	D	D	B	B	B
	1,000pF (102)	D	D	D	D	D	D	D	B	B	B
	1,200pF (122)	D	D	D	D	D	D	D	B	B	B
	1,500pF (152)	D	D	D	D	D	D	D	B	B	D
	1,800pF (182)	D	D	D	D	D	D	D	B	B	D
	2,200pF (222)	D	D	D	D	D	D	D	B	B	D
	2,700pF (272)	D	D	D	D	D	D	D	B	B	
	3,300pF (332)	D	D	D	D	D	D	D	B	B	
	3,900pF (392)	D	D	D	D	D	D	D	B	B	
	4,700pF (472)	D	D	D	D	D	D	D	D	D	
	5,600pF (562)	D	D	D	D	D	D	D	D	D	
	6,800pF (682)	D	D	D	D	D	D	D	D	D	
	8,200pF (822)	D	D	D	D	D	D	D	D	D	
	0.010μF (103)	D	D	D	D	D	D	D	D	D	
	0.012μF (123)	D	D	D	D	D	D	D	D	D	
	0.015μF (153)	D	D	D	D	D	D	D	D	D	
	0.018μF (183)	D	D	D	D	D	D	D	D	D	
	0.022μF (223)	D	D	D	D	D	D	D	D	D	
	0.027μF (273)	D	D	D	D	D	D	D	D	D	
	0.033μF (333)	D	D	D	D	D	D	D	D		
	0.039μF (393)	D	D	D	D	D	D	D	D		
	0.047μF (473)	D	D	D	D	D	D	D	D		
	0.056μF (563)	D	D	D	D	D	D	D	D		
	0.068μF (683)	D	D	D	D	D	D	D	D		
	0.082μF (823)	D	D	D	D	D	D	D			
	0.10μF (104)	D	D	D	D	D	D	D			
	0.12μF (124)	D	D	D	D	D	I				
	0.15μF (154)	D	D	D	D	D	I				
	0.18μF (184)	D	D	D	D	D	I				
0.22μF (224)	D	D	D	D	D	I					
0.27μF (274)	I	I	I	I	I	I					
0.33μF (334)	I	I	I	I	I	I					
0.39μF (394)	I	I	I	I	I	I					
0.47μF (474)	I	I	I	I	I	I					
0.56μF (564)	I	I	I								
0.68μF (684)	I	I	I								
0.82μF (824)	I	I	I								
1.0μF (105)	I	I	I	I							
1.5μF (155)	I	I	I								
2.2μF (225)	I	I	I								
4.7μF (475)	I	I	I								
10μF (106)	I										

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

Multilayer Ceramic Capacitors

Approval Sheet

X7R Dielectric 1206 Size

DIELECTRIC		X7R														
SIZE		1206														
RATED VOLTAGE (VDC)		10	16	25	35	50	100	200	250	400	450	500	630	1000	1500	2000
Capacitance	100pF (101)							D	D			D	D	D	D	D
	120pF (121)							D	D			D	D	D	D	D
	150pF (151)	D	D	D		D	D	D	D			D	D	D	D	D
	180pF (181)	D	D	D		D	D	D	D			D	D	D	D	D
	220pF (221)	D	D	D		D	D	D	D			D	D	D	D	D
	270pF (271)	D	D	D		D	D	D	D			D	D	D	D	D
	330pF (331)	D	D	D		D	D	D	D			D	D	D	D	D
	390pF (391)	D	D	D		D	D	D	D			D	D	D	D	D
	470pF (471)	D	D	D		D	D	D	D			D	D	D	D	D
	560pF (561)	D	D	D		D	D	D	D			D	D	D	D	D
	680pF (681)	D	D	D		D	D	D	D			D	D	D	D	D
	820pF (821)	D	D	D		D	D	D	D			D	D	D	D	D
	1,000pF (102)	D	D	D		D	D	D	D			D	D	D	D	D
	1,200pF (122)	D	D	D		D	D	D	D			D	D	D	G	G
	1,500pF (152)	D	D	D		D	D	D	D			D	D	D	G	G
	1,800pF (182)	D	D	D		D	D	D	D			D	D	D	G	G
	2,200pF (222)	D	D	D		D	D	D	D			D	D	D	G	G
	2,700pF (272)	D	D	D		D	D	D	D			D	D	D	G	G
	3,300pF (332)	D	D	D		D	D	D	D			D	D	D	G	G
	3,900pF (392)	D	D	D		D	D	D	D			D	D	D	G	
	4,700pF (472)	D	D	D		D	D	D	D			D	D	D	G	
	5,600pF (562)	D	D	D		D	D	D	D			D	D	D	G	
	6,800pF (682)	D	D	D		D	D	D	D			D	D	D	G	
	8,200pF (822)	D	D	D		D	D	D	D			D	D	D	G	
	0.010μF (103)	D	D	D		D	D	D	D			D	D	D	G	
	0.012μF (123)	D	D	D		D	D	D	D			D	D	D	G	
	0.015μF (153)	D	D	D		D	D	D	D			D	D	D	G	
	0.018μF (183)	D	D	D		D	D	D	D			D	D	D	G	
	0.022μF (223)	D	D	D		D	D	D	D			D	D	D	G	
	0.027μF (273)	D	D	D		D	D	D	D			D	D	D	G	
	0.033μF (333)	D	D	D		D	D	G	G			D	D	D	G	
	0.039μF (393)	D	D	D		D	D	G	G			D	D	D	G	
	0.047μF (473)	D	D	D		D	D	G	G			D	D	D	G	
	0.056μF (563)	D	D	D		D	D	G	G			D	D	D	G	
	0.068μF (683)	D	D	D		D	D	G	G	G	G					
	0.082μF (823)	D	D	D		D	D	G	G	G	G					
	0.10μF (104)	D	D	D		D	D	G	G	G	G					
	0.12μF (124)	D	D	D		D	D									
	0.15μF (154)	C	C	C		C	G									
	0.18μF (184)	C	C	C		C	G									
	0.22μF (224)	C	C	C		C	G	G	G							
	0.27μF (274)	C	C	C		D	G									
	0.33μF (334)	C	C	C		D	G									
	0.39μF (394)	C	C	J		P	G									
	0.47μF (474)	J	J	J		P	G									
	0.56μF (564)	J	J	J		P	P									
	0.68μF (684)	J	J	J		P	P									
0.82μF (824)	J	J	J		P	P										
1.0μF (105)	J	J	J		P	P										
1.5μF (155)	J	J	P		P	P										
2.2μF (225)	J	J	P		P	P										
3.3μF (335)	P	P	P		P											
4.7μF (475)	P	P	P		P											
10μF (106)	P	P	P	P												
22μF (226)	P															
47μF (476)																

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

Multilayer Ceramic Capacitors

Approval Sheet

X7R Dielectric 1210 Size

DIELECTRIC		X7R															
SIZE		1210															
RATED VOLTAGE (VDC)		6.3	10	16	25	50	100	200	250	400	450	500	630	1000	1500	2000	
Capacitance	100pF (101)											D	D	D	D	D	
	120pF (121)											D	D	D	D	D	
	150pF (151)											D	D	D	D	D	
	180pF (181)											D	D	D	D	D	
	220pF (221)											D	D	D	D	D	
	270pF (271)											D	D	D	D	D	
	330pF (331)											D	D	D	D	D	
	390pF (391)											D	D	D	D	D	
	470pF (471)											D	D	D	D	D	
	560pF (561)											D	D	D	D	D	
	680pF (681)											D	D	D	D	D	
	820pF (821)											D	D	D	D	D	
	1,000pF (102)			C	C	C	C	C	C	C			D	D	D	D	D
	1,200pF (122)			C	C	C	C	C	C	C			D	D	D	M	M
	1,500pF (152)			C	C	C	C	C	C	C			D	D	D	M	M
	1,800pF (182)			C	C	C	C	C	C	C			D	D	D	M	M
	2,200pF (222)			C	C	C	C	C	C	C			D	D	D	M	M
	2,700pF (272)			C	C	C	C	C	C	C			D	D	D	M	M
	3,300pF (332)			C	C	C	C	C	C	C			D	D	D	M	M
	3,900pF (392)			C	C	C	C	C	C	C			D	D	G	M	M
	4,700pF (472)			C	C	C	C	C	C	C			D	D	G	M	M
	5,600pF (562)			C	C	C	C	C	C	C			D	D	G	M	M
	6,800pF (682)			C	C	C	C	C	C	C			D	D	G	M	M
	8,200pF (822)			C	C	C	C	C	C	C			D	D	G	M	M
	0.010μF (103)			C	C	C	C	C	C	C			D	D	G	M	M
	0.012μF (123)			C	C	C	C	C	C	C			D	D	G		
	0.015μF (153)			C	C	C	C	C	C	C			D	D	G		
	0.018μF (183)			C	C	C	C	C	C	C			D	D	G		
	0.022μF (223)			C	C	C	C	C	C	C			D	D	G		
	0.027μF (273)			C	C	C	C	C	C	C			G	G	G		
	0.033μF (333)			C	C	C	C	C	C	C			G	G	G		
	0.039μF (393)			C	C	C	C	C	C	C			G	G	K		
	0.047μF (473)			C	C	C	C	C	D	D			G	G	M		
	0.056μF (563)			C	C	C	C	C	D	D			G	G			
	0.068μF (683)			C	C	C	C	C	G	G			K	K			
	0.082μF (823)			C	C	C	C	C	G	G			K	K			
	0.10μF (104)			C	C	C	C	C	G	G			K	K			
	0.12μF (124)			C	C	C	C	C	G	G	M	M	M	M			
	0.15μF (154)			C	C	C	C	D	M	M	M	M	M	M			
	0.18μF (184)			C	C	C	C	D	M	M	M	M					
	0.22μF (224)			C	C	C	C	D	M	M	M	M					
	0.27μF (274)			C	C	C	C	G	M	M	M	M					
	0.33μF (334)			C	C	C	D	G	M	M	M	M					
	0.39μF (394)			C	C	C	D	M	M	M							
	0.47μF (474)			C	C	C	D	M	M	M							
	0.56μF (564)			D	D	D	D	M	M	M							
	0.68μF (684)			D	D	D	D	K	M	M							
0.82μF (824)			D	D	D	D	K										
1.0μF (105)			D	D	D	D	K										
1.5μF (155)				K	G	M	M										
2.2μF (225)				K	G	M	M										
3.3μF (335)				K	G	M											
4.7μF (475)			K	K	K	M	M										
10μF (106)			K	K	M	M											
22μF (226)			M	M	M												
47μF (476)		M															

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

X7R Dielectric 1808, 1812 Sizes

DIELECTRIC	X7R																			
	SIZE	1808						1812												
RATED VOLTAGE (VDC)	500	630	1000	1500	2000	2500 3000	10	16	25	50	100	200	250	500	630	1000	1500	2000	3000	
100pF (101)																				
150pF (151)	D	D	D	D	D	D														
180pF (181)	D	D	D	D	D	D														
220pF (221)	D	D	D	D	D	D														
270pF (271)	D	D	D	D	D	D						D	D	D	D	D	D	D	D	K
330pF (331)	D	D	D	D	D	K						D	D	D	D	D	D	D	D	K
390pF (391)	D	D	D	D	D	K						D	D	D	D	D	D	D	D	K
470pF (471)	D	D	D	D	D	K						D	D	D	D	D	D	D	D	K
560pF (561)	D	D	D	D	D	K						D	D	D	D	D	D	D	D	K
680pF (681)	D	D	D	D	D	K						D	D	D	D	D	D	D	D	K
820pF (821)	D	D	D	D	D	K						D	D	D	D	D	D	D	D	K
1,000pF (102)	D	D	D	K	K	K	D	D	D	D	D	D	D	D	D	D	D	D	D	K
1,200pF (122)	D	D	D	K	K	K	D	D	D	D	D	D	D	D	D	D	D	D	D	K
1,500pF (152)	D	D	D	K	K	K	D	D	D	D	D	D	D	D	D	D	D	D	D	K
1,800pF (182)	D	D	D	K	K	K	D	D	D	D	D	D	D	D	D	D	D	G	G	M
2,200pF (222)	D	D	D	K	K	K	D	D	D	D	D	D	D	D	D	D	D	G	G	M
2,700pF (272)	D	D	D	K	K	K	D	D	D	D	D	D	D	D	D	D	D	G	G	M
3,300pF (332)	D	D	D	K	K	K	D	D	D	D	D	D	D	D	D	D	D	K	K	M
3,900pF (392)	D	D	D	K	K		D	D	D	D	D	D	D	D	D	D	D	K	K	M
4,700pF (472)	D	D	D	K	K		D	D	D	D	D	D	D	D	D	D	D	K	K	M
5,600pF (562)	K	K	K	K	K		D	D	D	D	D	D	D	D	D	D	D	M	M	M
6,800pF (682)	K	K	K	K	K		D	D	D	D	D	D	D	D	D	D	D	M	M	M
8,200pF (822)	K	K	K				D	D	D	D	D	D	D	D	D	D	D	M	M	
0.010μF (103)	K	K	K				D	D	D	D	D	D	D	D	D	D	D	M	M	
0.012μF (123)	K	K	K				D	D	D	D	D	D	D	D	D	D	D	K		
0.015μF (153)	K	K	K				D	D	D	D	D	D	D	D	D	D	D	K		
0.018μF (183)	K	K	K				D	D	D	D	D	D	D	D	D	D	D	M		
0.022μF (223)	K	K	K				D	D	D	D	D	D	D	D	D	D	D	M		
0.027μF (273)	K	K	K				D	D	D	D	D	D	D	D	D	D	D	M		
0.033μF (333)	K	K	K				D	D	D	D	D	D	D	D	D	D	D	M		
0.039μF (393)	K	K	K				D	D	D	D	D	D	D	D	D	D	D	M		
0.047μF (473)	K	K	K				D	D	D	D	D	D	D	D	D	D	D	M		
0.056μF (563)	K	K	K				D	D	D	D	D	D	D	D	K	K	M			
0.068μF (683)	K	K					D	D	D	D	D	D	D	D	K	K	M			
0.082μF (823)	K	K					D	D	D	D	D	D	D	D	K	K	M			
0.10μF (104)							D	D	D	D	D	D	D	D	K	K	M			
0.12μF (124)							D	D	D	D	D	D	D	D	M	M				
0.15μF (154)							D	D	D	D	D	K	K	M	M					
0.18μF (184)							D	D	D	D	D	K	K	M	M					
0.22μF (224)							D	D	D	D	D	K	K	M	M					
0.27μF (274)							D	D	D	D	D	K	K	M						
0.33μF (334)							D	D	D	D	D	K	K	M						
0.39μF (394)							D	D	D	D	D	K	K	M						
0.47μF (474)							D	D	D	D	D	K	K	M						
0.56μF (564)							D	D	D	D	K	M	M							
0.68μF (684)							D	D	D	K	K	M	M							
0.82μF (824)							D	D	D	K	K	M	M							
1.0μF (105)							D	D	D	K	K	M	M							
1.5μF (155)							D	D	D	K	K									
2.2μF (225)							G	G	G	M	M									
3.3μF (335)							K	K	K	K										
4.7μF (475)							M	M	M	M										
6.8μF (685)							M	M	M	M										
10μF (106)							M	M	M	M										
15μF (156)							M	M	M											
22μF (226)							M	M	M											
47μF (476)																				

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

X7R Dielectric 1825 to 2225 Sizes

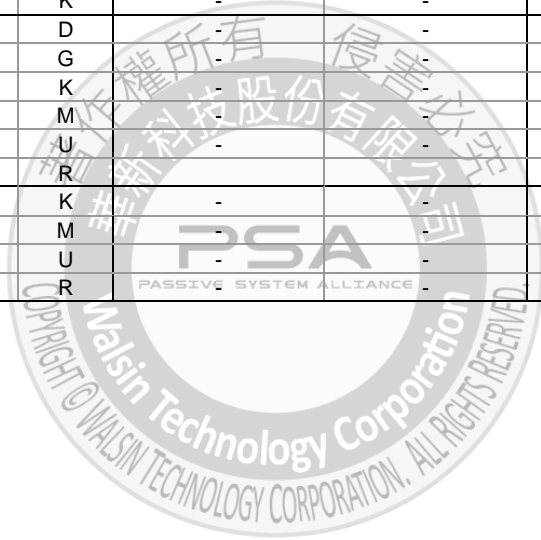
DIELECTRIC	X7R																					
	1825						2220									2225						
SIZE	250	500	630	1000	2000	3000	25	50	100	250	500	630	1000	1500	2000	3000	500	630	1000	1500	2000	3000
RATED VOLTAGE (VDC)																						
1,000pF (102)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	
1,200pF (122)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
1,500pF (152)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
1,800pF (182)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
2,200pF (222)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
2,700pF (272)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
3,300pF (332)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
3,900pF (392)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
4,700pF (472)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
5,600pF (562)	K	K	K	K	K	M	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	M
6,800pF (682)	K	K	K	K	K	M	K	K	K	K	K	K	K	K	M	M	K	K	K	K	K	M
8,200pF (822)	K	K	K	K	K	M	K	K	K	K	K	K	M	M	M	M	K	K	K	K	K	M
0.010μF (103)	K	K	K	K	K	M	K	K	K	K	K	K	M	M	M	M	K	K	K	K	K	M
0.012μF (123)	K	K	K	K	M	U	K	K	K	K	K	K	M	M	U	U	K	K	K	M	M	M
0.015μF (153)	K	K	K	K	M	U	K	K	K	K	K	K	M	M	U	U	K	K	K	M	M	M
0.018μF (183)	K	K	K	K	M	U	K	K	K	K	K	K	U	U	U	U	K	K	K	M	M	U
0.022μF (223)	K	K	K	K	M		K	K	K	K	K	K	U	U			K	K	K	M	M	
0.027μF (273)	K	K	K	K	U		K	K	K	K	K	K	U	U			K	K	K	M	M	
0.033μF (333)	K	K	K	K	U		K	K	K	K	K	K	U	U			K	K	K	M	M	
0.039μF (393)	K	K	K	K	U		K	K	K	K	K	K	U	U			K	K	K	M	U	
0.047μF (473)	K	K	K	K	U		K	K	K	K	K	K	U	U			K	K	K	M	U	
0.056μF (563)	K	K	K	K			K	K	K	K	K	K	U	U			K	K	K	M	U	
0.068μF (683)	K	K	K	K			K	K	K	K	K	K					K	K	K	M		
0.082μF (823)	K	K	K	M			K	K	K	K	K	K					K	K	K	M		
0.10μF (104)	K	K	K	M			K	K	K	K	K	K					K	K	K	M		
0.12μF (124)	K	K	K				K	K	K	K	K	M					K	K	U			
0.15μF (154)	K	K	K				K	K	K	K	K	U					K	K	U			
0.18μF (184)	K	K	K				K	K	K	K	K	U					K	K	U			
0.22μF (224)	K	K	K				K	K	K	K	K	U					K	K	U			
0.27μF (274)	K	K	K				K	K	K	K	K						K	K				
0.33μF (334)	K	K	K				K	K	K	K	K						K	K				
0.39μF (394)	K	K	K				K	K	K	K	K						K	K				
0.47μF (474)	K	K	K				K	K	K	K	K	U					K	K				
0.56μF (564)	K	M	M				K	K	K	M	M						K	K				
0.68μF (684)	K						K	K	K	M	M											
0.82μF (824)	K						K	K	K	U	U											
1.0μF (105)	K						K	K	K	U	U											
1.5μF (155)							K	K	K	M												
2.2μF (225)							K	K	K	M												
3.3μF (335)							K	K	K													
4.7μF (475)							K	K	M													
6.8μF (685)							M	M	M													
10μF (106)							M	M	M													
15μF (156)							U	U	U													
22μF (226)							U	U	R													
47μF (476)							R															

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

8. PACKAGING STYLE AND QUANTITY

Size	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0402 (1005)	0.50±0.20	E	10k	-	-	-
0603 (1608)	0.80±0.07	S	4k	15k	-	-
	0.80±0.30	X	4k	15k	-	-
0805 (2012)	0.60±0.10	A	4k	15k	-	-
	0.80±0.10	B	4k	15k	-	-
	1.25±0.10	D	-	-	3k	10k
	1.25±0.30	I	-	-	3k	10k
1206 (3216)	0.80±0.10	B	4k	15k	-	-
	0.95±0.10	C	-	-	3k	10k
	1.15±0.15	J	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	10k
1210 (3225)	1.60±0.50	P	-	-	2k	9k
	0.95±0.10	C	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	8k
	2.00±0.20	K	-	-	1k	6k
1808 (4520)	2.50±0.50	M	-	-	1k	6k
	1.25±0.10	D	-	-	2k	10k
	1.60±0.20	G	-	-	2k	8k
	2.00±0.20	K	-	-	1k	6k
1812 (4532)	1.25±0.10	D	-	-	1k	5k
	1.60±0.20	G	-	-	1k	4k
	2.00±0.20	K	-	-	1k	3k
	2.50±0.50	M	-	-	0.5k	3k
	2.80±0.30	U	-	-	0.5k	1.5k
	3.10±0.30	R	-	-	0.5k	-
1825 (4563)	2.00±0.20	K	-	-	1k	-
2220 (5750)	2.50±0.30	M	-	-	0.5k	-
2225 (5763)	2.80±0.30	U	-	-	0.5k	-
	3.10±0.30	R	-	-	-	1k

Unit: pieces



Multilayer Ceramic Capacitors

9. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Test Condition	Requirements			
1.	Visual and Mechanical	---	* No remarkable defect. * Dimensions to conform to individual specification sheet.			
2.	Capacitance	*Test temp.: Room Temperature.	* Shall not exceed the limits given in the detailed spec.			
3.	Q/ D.F. (Dissipation Factor)	*Class I: (NP0) ≤1000pF, 1.0±0.2Vrms · 1MHz±10% > 1000pF, 1.0±0.2Vrms · 1KHz±10%	NP0: Cap≥30pF, Q≥1000; Cap<30pF,Q≥400+20C X7R, X5R, X6S, X7S:			
		Class II: (X7R, X7E, X6S, X5R,X7S) C≤10μF, 1.0±0.2Vrms · 1KHz±10% ** C > 10μF, 0.5±0.2Vrms · 120Hz±20%				
		** Test condition: 0.5±0.2Vrms · 1KHz±10%				
		X7R: 0603/475(6.3V)				
		X5R: 0201 ≥ 224 (6.3V,10V,16V)#1, 0402 ≥ 475 (6.3V, 16V), 0402 ≥ 225(10V), 0603=106 (6.3V) TT18X ≥ 475(10V) , TT15X series				
		X6S: 0201/474(4V),0201>104 (6.3V,10V), 0402 ≥ 225 (6.3V),0402/475 (10V), 0603/106 (6.3V), X7S: 0402/225(6.3V)				
		#1 Excluding X5R/0201/105(6.3V);225(10V) , 0402X475M6R3 (1.0±0.2Vrms · 1KHz±10%)				
		*Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.				
				Rated vol.	D.F. ≤	Exception of D.F. ≤
				≥ 100V	≤ 2.5%	≤ 3% 1206 ≥ 0.47μF ≤ 3.5% 1812 ≥ 4.7μF;1825≥4.7μF;2220≥4.7μF;2225≥4.7μF ≤ 5% 0603 ≥ 0.068μF;0805 > 0.1μF;1206 ≥ 1μF;1210 ≥ 2.2μF;TT series ≤ 10% 0805 > 0.22μF;1210 ≥ 3.3μF
				50V	≤ 2.5%	≤ 3% 0201(50V);0603 ≥ 0.047μF;0805 ≥ 0.18μF;1206 ≥ 0.47μF ≤ 3.5% 1812 ≥ 4.7μF;1825≥4.7μF;2220≥4.7μF;2225≥4.7μF ≤ 5% 0201 ≥ 0.01μF; 0402≥0.012μF; 1210 ≥ 3.3μF ≤ 10% 0402 ≥ 0.047μF;0603>0.1μF;0805 ≥ 1μF(0805/X7R>0.47μF); 1206 ≥ 2.2μF;1210 ≥ 10μF;TT series ≤ 12.5% 1206/X5R=10μF
				35V	≤ 3.5%	≤ 10% 0603 ≥ 1μF;0805≥2.2μF;1206 ≥ 2.2μF;1210 ≥ 10μF ≤ 5% 0201 ≥ 0.01μF(0201/X5R=0.01μF);0805 ≥ 1μF;1210 ≥ 10μF*
				25V	≤ 3.5%	≤ 7% 0603 ≥ 0.33μF ≤ 10% 0201 ≥ 0.1μF(0201/X5R>0.01μF);0603 ≥ 0.47μF;TT series; 0402 ≥ 0.10μF(0402/X7R ≥ 0.056μF);0805 ≥ 2.2μF; 1206 ≥ 4.7μF;1210 ≥ 22μF(1210/X5R ≥ 10μF)* ≤ 12.5% 0402 ≥ 0.33μF;0805/X5R/X6S=10μF
				16V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF(0201/X5R=0.01μF);0402 ≥ 0.033μF; 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF ≤ 10% 0201 ≥ 0.1μ(0201/X5R>0.01μF;0201/X7R ≥ 0.022μF); 0402 ≥ 0.22μF(0402/X7R ≥ 0.15μF);0603>0.47μF;0805 ≥ 2.2μF; 1206 ≥ 4.7μF;1210 ≥ 22μF;TT series ≤ 12.5% 0402/X5R ≥ 1μF;0402/X6S=1μF;0805/X5R/X6S=10μF
				10V	≤ 5%	≤ 10% 0201 ≥ 0.012μF;0402 ≥ 0.22μF(0402/X7R ≥ 0.15μF);0603 ≥ 0.33μF; 0805 ≥ 2.2μF;1206 ≥ 2.2μF;1210 ≥ 22μF;01R5/X5R; TT series ≤ 12.5% 0805/X5R/X6S=10μF ≤ 15% 0201 ≥ 0.1μF(0201/X5R>0.1μF);0402 ≥ 1μF;0603/X5R ≥ 10μF
	6.3V	≤ 10%	≤ 15% 0201 ≥ 0.1μF(0201/X5R>0.1μF);0402 ≥ 1μF(0402/X6S ≥ 0.47μF); 0603 ≥ 10μF;0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF;TT series ≤ 20% 0402 ≥ 2.2μF			
	4V	≤ 15%	---			
4.	Dielectric Strength	*To apply voltage: ≤100V: 250% of rated voltage. 200V ~ 300V: 200% of rated voltage. 400V ~ 450V: 120% of rated voltage. 500V ~ 999V: 150% of rated voltage. 1000V ~ 3000V: 120% of rated voltage. 4000V: 110% of rated voltage. *Duration: 1 to 5 sec. *Charge & discharge current less than 50mA. * For high voltage product over 1000 Vdc, it is required to immerse the chip in an isolation fluid to prevent possible arcing while testing.	* No evidence of damage or flash over during test.			

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

Multilayer Ceramic Capacitors

No.	Item	Test Condition	Requirements																																																																																																																						
5.	Insulation Resistance	*Test temp.: Room Temperature.	10GΩ or RxC ≥ 500Ω-F whichever is smaller.																																																																																																																						
		*To apply rated voltage for MAX. 120sec.	Class II (X7R, X7E, X5R, X6S, X7S)																																																																																																																						
			<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R</td> <td rowspan="6">10GΩ or RxC ≥ 100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V ; 4V ; TT series; Size ≥ 1812</td> <td></td> </tr> <tr> <td></td> <td> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>All X6S items, All X7S items</td> <td rowspan="8">RxC ≥ 50 Ω-F.</td> </tr> <tr> <td>100V: 1210 ≥ 3.3μF</td> </tr> <tr> <td>50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF;</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF</td> </tr> <tr> <td>16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF</td> </tr> <tr> <td>10V: 0201 > 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 47μF; TT21 > 4.7μF</td> </tr> <tr> <td>6.3V: 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 > 4.7μF; 0805 ≥ 47μF; 1206 ≥ 10μF; 4V: 0603 ≥ 22μF; 0805 ≥ 47μF; 1206 ≥ 100μF</td> </tr> </tbody> </table> </td> </tr> <tr> <td></td> <td>Rated voltage: 200~630V</td> <td>To apply rated voltage (500V max.) for 60 sec.</td> <td>≥ 10GΩ or RxC ≥ 100Ω-F whichever is smaller</td> </tr> <tr> <td></td> <td>Rated voltage: >630V</td> <td>To apply 500V for 60 sec.</td> <td></td> </tr> <tr> <td rowspan="10">6.</td> <td rowspan="10">Temperature Coefficient</td> <td>With no electrical load.</td> <td></td> </tr> <tr> <td></td> <td> <table border="1"> <thead> <tr> <th>T.C.</th> <th>Operating Temp</th> </tr> </thead> <tbody> <tr> <td>NPO</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X7R</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X7S</td> <td>-55 ~ 125°C at 25°C</td> </tr> <tr> <td>X5R</td> <td>-55~ 85°C at 25°C</td> </tr> <tr> <td>X6S</td> <td>-55~105°C at 25°C</td> </tr> </tbody> </table> </td> <td></td> </tr> <tr> <td></td> <td></td> <td> <table border="1"> <thead> <tr> <th>T.C.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>NPO</td> <td>Within ±30ppm/°C</td> </tr> <tr> <td>X7R</td> <td>Within ±15%</td> </tr> <tr> <td>X7S</td> <td>Within ±22%</td> </tr> <tr> <td>X5R</td> <td>Within ±15%</td> </tr> <tr> <td>X6S</td> <td>Within ±22%</td> </tr> </tbody> </table> </td> <td></td> </tr> <tr> <td></td> <td>*Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</td> <td></td> <td></td> </tr> <tr> <td></td> <td>* Measurement voltage for Class II:</td> <td></td> <td></td> </tr> <tr> <td></td> <td> <table border="1"> <thead> <tr> <th>01005</th> <th>0201</th> </tr> </thead> <tbody> <tr> <td>Cap ≤ 0.01μF: 0.5V</td> <td>Cap < 0.1μF: 1V</td> </tr> <tr> <td>Cap > 0.01μF: 0.2V</td> <td>0.1μF ≤ Cap < 1μF: 0.2V[*]</td> </tr> <tr> <td></td> <td>Cap ≥ 1μF: 0.1V¹</td> </tr> <tr> <td>¹0201X104/6.3V~25V: 0.5V ²0201X224/10V~25V: 0.5V ³0201X334/474/6.3V&10V: 0.3V ⁴0201X105-6.3V&10V: 0.3V</td> <td>[*]0201B104/6.3V~10V: 0.3V 0201S104/6.3V~16V: 0.3V 0201S224/6.3V: 0.3V</td> </tr> </tbody> </table> </td> <td></td> </tr> <tr> <td></td> <td> <table border="1"> <thead> <tr> <th>0402</th> <th>0603</th> </tr> </thead> <tbody> <tr> <td>Cap < 1μF: 1V³</td> <td>Cap < 1μF: 1V</td> </tr> <tr> <td>Cap = 1μF: 0.5V²</td> <td></td> </tr> <tr> <td>³0402B224-16V: 0.5V 0402B334/474-6.3V&10V: 0.5V 0402S334/474-6.3V: 0.5V ⁴0402X225/475-6.3V: 0.5V</td> <td>1μF ≤ Cap ≤ 4.7μF: 0.5V ⁵0603X106-10V: 0.5V</td> </tr> <tr> <td>1μF < Cap < 10μF: 0.2V⁴</td> <td>Cap > 4.7μF: 0.2V⁵</td> </tr> <tr> <td>²0402B105M6R3V: 0.2V</td> <td></td> </tr> <tr> <td>Cap ≥ 10μF: 0.1V</td> <td></td> </tr> </tbody> </table> </td> <td></td> </tr> <tr> <td></td> <td> <table border="1"> <thead> <tr> <th>0805</th> <th>1206/1210</th> </tr> </thead> <tbody> <tr> <td>Cap < 10μF: 1V⁶</td> <td>Cap ≤ 10μF: 1V</td> </tr> <tr> <td>Cap = 10μF: 0.5V</td> <td></td> </tr> <tr> <td>⁶0805B475/6.3V~25V: 0.5V</td> <td>10μF < Cap ≤ 100μF: 0.5V⁸</td> </tr> <tr> <td>Cap > 10μF: 0.2V</td> <td>Cap > 100μF: 0.2V ⁷1206X107-6.3V: 0.2V 1206A476-6.3V: 0.1V 1210S107-6.3V: 0.2V</td> </tr> </tbody> </table> </td> <td></td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R	10GΩ or RxC ≥ 100 Ω-F whichever is smaller.	50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF	6.3V ; 4V ; TT series; Size ≥ 1812			<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>All X6S items, All X7S items</td> <td rowspan="8">RxC ≥ 50 Ω-F.</td> </tr> <tr> <td>100V: 1210 ≥ 3.3μF</td> </tr> <tr> <td>50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF;</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF</td> </tr> <tr> <td>16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF</td> </tr> <tr> <td>10V: 0201 > 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 47μF; TT21 > 4.7μF</td> </tr> <tr> <td>6.3V: 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 > 4.7μF; 0805 ≥ 47μF; 1206 ≥ 10μF; 4V: 0603 ≥ 22μF; 0805 ≥ 47μF; 1206 ≥ 100μF</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	All X6S items, All X7S items	RxC ≥ 50 Ω-F.	100V: 1210 ≥ 3.3μF	50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF	35V: 0603 ≥ 1μF;	25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF	16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF	10V: 0201 > 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 47μF; TT21 > 4.7μF	6.3V: 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 > 4.7μF; 0805 ≥ 47μF; 1206 ≥ 10μF; 4V: 0603 ≥ 22μF; 0805 ≥ 47μF; 1206 ≥ 100μF		Rated voltage: 200~630V	To apply rated voltage (500V max.) for 60 sec.	≥ 10GΩ or RxC ≥ 100Ω-F whichever is smaller		Rated voltage: >630V	To apply 500V for 60 sec.		6.	Temperature Coefficient	With no electrical load.			<table border="1"> <thead> <tr> <th>T.C.</th> <th>Operating Temp</th> </tr> </thead> <tbody> <tr> <td>NPO</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X7R</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X7S</td> <td>-55 ~ 125°C at 25°C</td> </tr> <tr> <td>X5R</td> <td>-55~ 85°C at 25°C</td> </tr> <tr> <td>X6S</td> <td>-55~105°C at 25°C</td> </tr> </tbody> </table>	T.C.	Operating Temp	NPO	-55~125°C at 25°C	X7R	-55~125°C at 25°C	X7S	-55 ~ 125°C at 25°C	X5R	-55~ 85°C at 25°C	X6S	-55~105°C at 25°C				<table border="1"> <thead> <tr> <th>T.C.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>NPO</td> <td>Within ±30ppm/°C</td> </tr> <tr> <td>X7R</td> <td>Within ±15%</td> </tr> <tr> <td>X7S</td> <td>Within ±22%</td> </tr> <tr> <td>X5R</td> <td>Within ±15%</td> </tr> <tr> <td>X6S</td> <td>Within ±22%</td> </tr> </tbody> </table>	T.C.	Capacitance Change	NPO	Within ±30ppm/°C	X7R	Within ±15%	X7S	Within ±22%	X5R	Within ±15%	X6S	Within ±22%			*Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.				* Measurement voltage for Class II:				<table border="1"> <thead> <tr> <th>01005</th> <th>0201</th> </tr> </thead> <tbody> <tr> <td>Cap ≤ 0.01μF: 0.5V</td> <td>Cap < 0.1μF: 1V</td> </tr> <tr> <td>Cap > 0.01μF: 0.2V</td> <td>0.1μF ≤ Cap < 1μF: 0.2V[*]</td> </tr> <tr> <td></td> <td>Cap ≥ 1μF: 0.1V¹</td> </tr> <tr> <td>¹0201X104/6.3V~25V: 0.5V ²0201X224/10V~25V: 0.5V ³0201X334/474/6.3V&10V: 0.3V ⁴0201X105-6.3V&10V: 0.3V</td> <td>[*]0201B104/6.3V~10V: 0.3V 0201S104/6.3V~16V: 0.3V 0201S224/6.3V: 0.3V</td> </tr> </tbody> </table>	01005	0201	Cap ≤ 0.01μF: 0.5V	Cap < 0.1μF: 1V	Cap > 0.01μF: 0.2V	0.1μF ≤ Cap < 1μF: 0.2V [*]		Cap ≥ 1μF: 0.1V ¹	¹ 0201X104/6.3V~25V: 0.5V ² 0201X224/10V~25V: 0.5V ³ 0201X334/474/6.3V&10V: 0.3V ⁴ 0201X105-6.3V&10V: 0.3V	[*] 0201B104/6.3V~10V: 0.3V 0201S104/6.3V~16V: 0.3V 0201S224/6.3V: 0.3V			<table border="1"> <thead> <tr> <th>0402</th> <th>0603</th> </tr> </thead> <tbody> <tr> <td>Cap < 1μF: 1V³</td> <td>Cap < 1μF: 1V</td> </tr> <tr> <td>Cap = 1μF: 0.5V²</td> <td></td> </tr> <tr> <td>³0402B224-16V: 0.5V 0402B334/474-6.3V&10V: 0.5V 0402S334/474-6.3V: 0.5V ⁴0402X225/475-6.3V: 0.5V</td> <td>1μF ≤ Cap ≤ 4.7μF: 0.5V ⁵0603X106-10V: 0.5V</td> </tr> <tr> <td>1μF < Cap < 10μF: 0.2V⁴</td> <td>Cap > 4.7μF: 0.2V⁵</td> </tr> <tr> <td>²0402B105M6R3V: 0.2V</td> <td></td> </tr> <tr> <td>Cap ≥ 10μF: 0.1V</td> <td></td> </tr> </tbody> </table>	0402	0603	Cap < 1μF: 1V ³	Cap < 1μF: 1V	Cap = 1μF: 0.5V ²		³ 0402B224-16V: 0.5V 0402B334/474-6.3V&10V: 0.5V 0402S334/474-6.3V: 0.5V ⁴ 0402X225/475-6.3V: 0.5V	1μF ≤ Cap ≤ 4.7μF: 0.5V ⁵ 0603X106-10V: 0.5V	1μF < Cap < 10μF: 0.2V ⁴	Cap > 4.7μF: 0.2V ⁵	² 0402B105M6R3V: 0.2V		Cap ≥ 10μF: 0.1V				<table border="1"> <thead> <tr> <th>0805</th> <th>1206/1210</th> </tr> </thead> <tbody> <tr> <td>Cap < 10μF: 1V⁶</td> <td>Cap ≤ 10μF: 1V</td> </tr> <tr> <td>Cap = 10μF: 0.5V</td> <td></td> </tr> <tr> <td>⁶0805B475/6.3V~25V: 0.5V</td> <td>10μF < Cap ≤ 100μF: 0.5V⁸</td> </tr> <tr> <td>Cap > 10μF: 0.2V</td> <td>Cap > 100μF: 0.2V ⁷1206X107-6.3V: 0.2V 1206A476-6.3V: 0.1V 1210S107-6.3V: 0.2V</td> </tr> </tbody> </table>	0805	1206/1210	Cap < 10μF: 1V ⁶	Cap ≤ 10μF: 1V	Cap = 10μF: 0.5V		⁶ 0805B475/6.3V~25V: 0.5V	10μF < Cap ≤ 100μF: 0.5V ⁸	Cap > 10μF: 0.2V	Cap > 100μF: 0.2V ⁷ 1206X107-6.3V: 0.2V 1206A476-6.3V: 0.1V 1210S107-6.3V: 0.2V	
		Rated voltage	Insulation Resistance																																																																																																																						
100V: All X7R	10GΩ or RxC ≥ 100 Ω-F whichever is smaller.																																																																																																																								
50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																																																																																																									
35V: 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																																																																																									
25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																																																																																																									
16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF																																																																																																																									
10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF																																																																																																																									
6.3V ; 4V ; TT series; Size ≥ 1812																																																																																																																									
	<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>All X6S items, All X7S items</td> <td rowspan="8">RxC ≥ 50 Ω-F.</td> </tr> <tr> <td>100V: 1210 ≥ 3.3μF</td> </tr> <tr> <td>50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF;</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF</td> </tr> <tr> <td>16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF</td> </tr> <tr> <td>10V: 0201 > 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 47μF; TT21 > 4.7μF</td> </tr> <tr> <td>6.3V: 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 > 4.7μF; 0805 ≥ 47μF; 1206 ≥ 10μF; 4V: 0603 ≥ 22μF; 0805 ≥ 47μF; 1206 ≥ 100μF</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	All X6S items, All X7S items	RxC ≥ 50 Ω-F.	100V: 1210 ≥ 3.3μF	50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF	35V: 0603 ≥ 1μF;	25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF	16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF	10V: 0201 > 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 47μF; TT21 > 4.7μF	6.3V: 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 > 4.7μF; 0805 ≥ 47μF; 1206 ≥ 10μF; 4V: 0603 ≥ 22μF; 0805 ≥ 47μF; 1206 ≥ 100μF																																																																																																													
Rated voltage	Insulation Resistance																																																																																																																								
All X6S items, All X7S items	RxC ≥ 50 Ω-F.																																																																																																																								
100V: 1210 ≥ 3.3μF																																																																																																																									
50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF																																																																																																																									
35V: 0603 ≥ 1μF;																																																																																																																									
25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF																																																																																																																									
16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF																																																																																																																									
10V: 0201 > 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 47μF; TT21 > 4.7μF																																																																																																																									
6.3V: 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 > 4.7μF; 0805 ≥ 47μF; 1206 ≥ 10μF; 4V: 0603 ≥ 22μF; 0805 ≥ 47μF; 1206 ≥ 100μF																																																																																																																									
	Rated voltage: 200~630V	To apply rated voltage (500V max.) for 60 sec.	≥ 10GΩ or RxC ≥ 100Ω-F whichever is smaller																																																																																																																						
	Rated voltage: >630V	To apply 500V for 60 sec.																																																																																																																							
6.	Temperature Coefficient	With no electrical load.																																																																																																																							
			<table border="1"> <thead> <tr> <th>T.C.</th> <th>Operating Temp</th> </tr> </thead> <tbody> <tr> <td>NPO</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X7R</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X7S</td> <td>-55 ~ 125°C at 25°C</td> </tr> <tr> <td>X5R</td> <td>-55~ 85°C at 25°C</td> </tr> <tr> <td>X6S</td> <td>-55~105°C at 25°C</td> </tr> </tbody> </table>	T.C.	Operating Temp	NPO	-55~125°C at 25°C	X7R	-55~125°C at 25°C	X7S	-55 ~ 125°C at 25°C	X5R	-55~ 85°C at 25°C	X6S	-55~105°C at 25°C																																																																																																										
		T.C.	Operating Temp																																																																																																																						
		NPO	-55~125°C at 25°C																																																																																																																						
		X7R	-55~125°C at 25°C																																																																																																																						
		X7S	-55 ~ 125°C at 25°C																																																																																																																						
		X5R	-55~ 85°C at 25°C																																																																																																																						
		X6S	-55~105°C at 25°C																																																																																																																						
				<table border="1"> <thead> <tr> <th>T.C.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>NPO</td> <td>Within ±30ppm/°C</td> </tr> <tr> <td>X7R</td> <td>Within ±15%</td> </tr> <tr> <td>X7S</td> <td>Within ±22%</td> </tr> <tr> <td>X5R</td> <td>Within ±15%</td> </tr> <tr> <td>X6S</td> <td>Within ±22%</td> </tr> </tbody> </table>	T.C.	Capacitance Change	NPO	Within ±30ppm/°C	X7R	Within ±15%	X7S	Within ±22%	X5R	Within ±15%	X6S	Within ±22%																																																																																																									
		T.C.	Capacitance Change																																																																																																																						
NPO	Within ±30ppm/°C																																																																																																																								
X7R	Within ±15%																																																																																																																								
X7S	Within ±22%																																																																																																																								
X5R	Within ±15%																																																																																																																								
X6S	Within ±22%																																																																																																																								
	*Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.																																																																																																																								
	* Measurement voltage for Class II:																																																																																																																								
	<table border="1"> <thead> <tr> <th>01005</th> <th>0201</th> </tr> </thead> <tbody> <tr> <td>Cap ≤ 0.01μF: 0.5V</td> <td>Cap < 0.1μF: 1V</td> </tr> <tr> <td>Cap > 0.01μF: 0.2V</td> <td>0.1μF ≤ Cap < 1μF: 0.2V[*]</td> </tr> <tr> <td></td> <td>Cap ≥ 1μF: 0.1V¹</td> </tr> <tr> <td>¹0201X104/6.3V~25V: 0.5V ²0201X224/10V~25V: 0.5V ³0201X334/474/6.3V&10V: 0.3V ⁴0201X105-6.3V&10V: 0.3V</td> <td>[*]0201B104/6.3V~10V: 0.3V 0201S104/6.3V~16V: 0.3V 0201S224/6.3V: 0.3V</td> </tr> </tbody> </table>	01005	0201	Cap ≤ 0.01μF: 0.5V	Cap < 0.1μF: 1V	Cap > 0.01μF: 0.2V	0.1μF ≤ Cap < 1μF: 0.2V [*]		Cap ≥ 1μF: 0.1V ¹	¹ 0201X104/6.3V~25V: 0.5V ² 0201X224/10V~25V: 0.5V ³ 0201X334/474/6.3V&10V: 0.3V ⁴ 0201X105-6.3V&10V: 0.3V	[*] 0201B104/6.3V~10V: 0.3V 0201S104/6.3V~16V: 0.3V 0201S224/6.3V: 0.3V																																																																																																														
01005	0201																																																																																																																								
Cap ≤ 0.01μF: 0.5V	Cap < 0.1μF: 1V																																																																																																																								
Cap > 0.01μF: 0.2V	0.1μF ≤ Cap < 1μF: 0.2V [*]																																																																																																																								
	Cap ≥ 1μF: 0.1V ¹																																																																																																																								
¹ 0201X104/6.3V~25V: 0.5V ² 0201X224/10V~25V: 0.5V ³ 0201X334/474/6.3V&10V: 0.3V ⁴ 0201X105-6.3V&10V: 0.3V	[*] 0201B104/6.3V~10V: 0.3V 0201S104/6.3V~16V: 0.3V 0201S224/6.3V: 0.3V																																																																																																																								
	<table border="1"> <thead> <tr> <th>0402</th> <th>0603</th> </tr> </thead> <tbody> <tr> <td>Cap < 1μF: 1V³</td> <td>Cap < 1μF: 1V</td> </tr> <tr> <td>Cap = 1μF: 0.5V²</td> <td></td> </tr> <tr> <td>³0402B224-16V: 0.5V 0402B334/474-6.3V&10V: 0.5V 0402S334/474-6.3V: 0.5V ⁴0402X225/475-6.3V: 0.5V</td> <td>1μF ≤ Cap ≤ 4.7μF: 0.5V ⁵0603X106-10V: 0.5V</td> </tr> <tr> <td>1μF < Cap < 10μF: 0.2V⁴</td> <td>Cap > 4.7μF: 0.2V⁵</td> </tr> <tr> <td>²0402B105M6R3V: 0.2V</td> <td></td> </tr> <tr> <td>Cap ≥ 10μF: 0.1V</td> <td></td> </tr> </tbody> </table>	0402	0603	Cap < 1μF: 1V ³	Cap < 1μF: 1V	Cap = 1μF: 0.5V ²		³ 0402B224-16V: 0.5V 0402B334/474-6.3V&10V: 0.5V 0402S334/474-6.3V: 0.5V ⁴ 0402X225/475-6.3V: 0.5V	1μF ≤ Cap ≤ 4.7μF: 0.5V ⁵ 0603X106-10V: 0.5V	1μF < Cap < 10μF: 0.2V ⁴	Cap > 4.7μF: 0.2V ⁵	² 0402B105M6R3V: 0.2V		Cap ≥ 10μF: 0.1V																																																																																																											
0402	0603																																																																																																																								
Cap < 1μF: 1V ³	Cap < 1μF: 1V																																																																																																																								
Cap = 1μF: 0.5V ²																																																																																																																									
³ 0402B224-16V: 0.5V 0402B334/474-6.3V&10V: 0.5V 0402S334/474-6.3V: 0.5V ⁴ 0402X225/475-6.3V: 0.5V	1μF ≤ Cap ≤ 4.7μF: 0.5V ⁵ 0603X106-10V: 0.5V																																																																																																																								
1μF < Cap < 10μF: 0.2V ⁴	Cap > 4.7μF: 0.2V ⁵																																																																																																																								
² 0402B105M6R3V: 0.2V																																																																																																																									
Cap ≥ 10μF: 0.1V																																																																																																																									
	<table border="1"> <thead> <tr> <th>0805</th> <th>1206/1210</th> </tr> </thead> <tbody> <tr> <td>Cap < 10μF: 1V⁶</td> <td>Cap ≤ 10μF: 1V</td> </tr> <tr> <td>Cap = 10μF: 0.5V</td> <td></td> </tr> <tr> <td>⁶0805B475/6.3V~25V: 0.5V</td> <td>10μF < Cap ≤ 100μF: 0.5V⁸</td> </tr> <tr> <td>Cap > 10μF: 0.2V</td> <td>Cap > 100μF: 0.2V ⁷1206X107-6.3V: 0.2V 1206A476-6.3V: 0.1V 1210S107-6.3V: 0.2V</td> </tr> </tbody> </table>	0805	1206/1210	Cap < 10μF: 1V ⁶	Cap ≤ 10μF: 1V	Cap = 10μF: 0.5V		⁶ 0805B475/6.3V~25V: 0.5V	10μF < Cap ≤ 100μF: 0.5V ⁸	Cap > 10μF: 0.2V	Cap > 100μF: 0.2V ⁷ 1206X107-6.3V: 0.2V 1206A476-6.3V: 0.1V 1210S107-6.3V: 0.2V																																																																																																														
0805	1206/1210																																																																																																																								
Cap < 10μF: 1V ⁶	Cap ≤ 10μF: 1V																																																																																																																								
Cap = 10μF: 0.5V																																																																																																																									
⁶ 0805B475/6.3V~25V: 0.5V	10μF < Cap ≤ 100μF: 0.5V ⁸																																																																																																																								
Cap > 10μF: 0.2V	Cap > 100μF: 0.2V ⁷ 1206X107-6.3V: 0.2V 1206A476-6.3V: 0.1V 1210S107-6.3V: 0.2V																																																																																																																								

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

Multilayer Ceramic Capacitors

Approval Sheet

No.	Item	Test Condition	Requirements															
7.	Adhesive Strength of Termination	* Pressurizing force : 2N (0201) and 5N (≤0603) and 10N (>0603) * Test time: 10±1 sec.	* No remarkable damage or removal of the terminations.															
8.	Vibration Resistance	* Vibration frequency: 10~55 Hz/min. * Total amplitude: 1.5mm * Test time: 6 hrs. (Two hrs each in three mutually perpendicular directions.) *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. *Cap./DF(Q) Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	* No remarkable damage. * Cap change and Q/D.F.: To meet initial spec.															
9.	Solderability	* Solder temperature: 235±5°C(0201~1210). * Solder temperature: 245±5°C(1808~2225). * Dipping time: 2±0.5 sec.	* 95% min. coverage of all metalized area.															
10.	Bending Test	* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 5 mm and then the pressure shall be maintained for 5±1 sec. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change : NP0: within ±5% or 0.5pF whichever is larger X7R, X5R, X6S, X7S: within ±12.5% (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)															
11.	Resistance to Soldering Heat	* Solder temperature: 260±5°C * Dipping time: 10±1 sec * Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. *Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	* No remarkable damage. * Cap change: NP0: within ±2.5% or 0.25pF whichever is larger X7R, X5R, X6S, X7S: within ±7.5% * Q/D.F., I.R. and dielectric strength: To meet initial requirements. * 25% max. leaching on each edge.															
12.	Temperature Cycle	* Conduct the five cycles according to the temperatures and time. <table border="1" data-bbox="391 1160 831 1294"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. operating temp. +0/-3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>Max. operating temp. +3/-0</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>2~3</td> </tr> </tbody> </table> *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	Step	Temp. (°C)	Time (min.)	1	Min. operating temp. +0/-3	30±3	2	Room temp.	2~3	3	Max. operating temp. +3/-0	30±3	4	Room temp.	2~3	* No remarkable damage. * Cap change : NP0: within ±2.5% or 0.25pF whichever is larger X7R, X5R, X6S, X7S: within ±7.5% * Q/D.F., I.R. and dielectric strength: To meet initial requirements.
Step	Temp. (°C)	Time (min.)																
1	Min. operating temp. +0/-3	30±3																
2	Room temp.	2~3																
3	Max. operating temp. +3/-0	30±3																
4	Room temp.	2~3																

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

Multilayer Ceramic Capacitors

Approval Sheet

No.	Item	Test Condition	Requirements																																							
13.	Humidity (Damp Heat) Steady State	*Test temp.: 40±2°C *Humidity: 90~95%RH *Test time: 500+24/-0hrs. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	* No remarkable damage. * Cap change: NP0: within ±5% or 0.5pF whichever is larger X7R, X5R, X6S, X7S: ≥10V**, within ±12.5%; ≤6.3V within ±25%; TT series & C≥ 1uF, within ±25% **10V: 0603 ≥ 4.7μF; 0402 ≥ 1μF; 0201 ≥ 0.1μF, within ±25%; * Q/D.F. value: NP0: More than 30pF Q≥350, 10pF≤C<30pF, Q≥275+2.5C Less than 10pF Q≥200+10C X7R, X5R, X6S, X7S:																																							
			<table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F. ≤</th> <th>Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="4">≥ 100V</td> <td rowspan="4">≤ 3%</td> <td>≤ 6% 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td> </tr> <tr> <td>≤ 7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF; TT series</td> </tr> <tr> <td>≤ 20% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="4">50V</td> <td rowspan="4">≤ 3%</td> <td>≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>0402 ≥ 0.047μF; 0603 > 0.1μF; 0805 ≥ 1μF(0805/X7R > 0.47μF); 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td rowspan="2">35V</td> <td rowspan="2">≤ 5%</td> <td>≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.01μF(0201/X5R = 0.01μF); 0805 ≥ 1μF; 1210 ≥ 10μF*</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤ 5%</td> <td>≤ 14% 0603 ≥ 0.33μF</td> </tr> <tr> <td>0201 ≥ 0.1μF(0201/X5R > 0.01μF); 0603 ≥ 0.47μF; TT series</td> </tr> <tr> <td>≤ 15% 0402 ≥ 0.10μF(0402/X7R ≥ 0.056μF); 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF(1210/X5R ≥ 10μF)*</td> </tr> <tr> <td>≤ 20% 0402 ≥ 0.33μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤ 5%</td> <td>≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.01μF(0201/X7R ≥ 0.022μF); 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤ 7.5%</td> <td>≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.22μF(0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R</td> </tr> <tr> <td>6.3V</td> <td>≤ 15%</td> <td>≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF(0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td>4V</td> <td>≤ 20%</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF	≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF; TT series	≤ 20% 0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 10% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF	0402 ≥ 0.047μF; 0603 > 0.1μF; 0805 ≥ 1μF(0805/X7R > 0.47μF); 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤ 10% 0201 ≥ 0.01μF(0201/X5R = 0.01μF); 0805 ≥ 1μF; 1210 ≥ 10μF*	25V	≤ 5%	≤ 14% 0603 ≥ 0.33μF	0201 ≥ 0.1μF(0201/X5R > 0.01μF); 0603 ≥ 0.47μF; TT series	≤ 15% 0402 ≥ 0.10μF(0402/X7R ≥ 0.056μF); 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF(1210/X5R ≥ 10μF)*	≤ 20% 0402 ≥ 0.33μF	16V	≤ 5%	≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤ 15% 0201 ≥ 0.01μF(0201/X7R ≥ 0.022μF); 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.22μF(0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R	6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF(0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	4V	≤ 20%	---
Rated vol.	D.F. ≤	Exception of D.F. ≤																																								
≥ 100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF																																								
		≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF																																								
		≤ 7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF; TT series																																								
		≤ 20% 0805 > 0.22μF; 1210 ≥ 3.3μF																																								
50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																								
		≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF																																								
		≤ 10% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF																																								
		0402 ≥ 0.047μF; 0603 > 0.1μF; 0805 ≥ 1μF(0805/X7R > 0.47μF); 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																																								
35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																								
		≤ 10% 0201 ≥ 0.01μF(0201/X5R = 0.01μF); 0805 ≥ 1μF; 1210 ≥ 10μF*																																								
25V	≤ 5%	≤ 14% 0603 ≥ 0.33μF																																								
		0201 ≥ 0.1μF(0201/X5R > 0.01μF); 0603 ≥ 0.47μF; TT series																																								
		≤ 15% 0402 ≥ 0.10μF(0402/X7R ≥ 0.056μF); 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF(1210/X5R ≥ 10μF)*																																								
		≤ 20% 0402 ≥ 0.33μF																																								
16V	≤ 5%	≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																								
		≤ 15% 0201 ≥ 0.01μF(0201/X7R ≥ 0.022μF); 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																																								
10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.22μF(0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																								
		≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R																																								
6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF(0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																								
4V	≤ 20%	---																																								
			*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller. Class II (X7R, X5R, X6S, X7S)																																							
			<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="7">1GΩ or RxC ≥ 10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; TT series; All X6S/X7S items; Size ≥ 1812</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.	50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF	6.3V; 4V; TT series; All X6S/X7S items; Size ≥ 1812																													
Rated voltage	Insulation Resistance																																									
100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.																																									
50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																										
35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																										
25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																										
16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF																																										
10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF																																										
6.3V; 4V; TT series; All X6S/X7S items; Size ≥ 1812																																										

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

Multilayer Ceramic Capacitors

Approval Sheet

No	Item	Test Condition	Requirements																																							
14	Humidity (Damp Heat) Load	*Test temp. : 40±2°C *Humidity : 90~95%RH *Test time : 500+24/-0 hrs. *To apply voltage : Rated voltage (MAX. 500V) *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	* No remarkable damage. Cap change: NP0: ±7.5% or 0.75pF whichever is larger. X7R, X5R, X6S, X7S: ≥10V**, within ±12.5%; ≤6.3V within ±25%; TT series & C≥ 1uF, within ±25% **10V: 0603 ≥ 4.7µF; 0402 ≥ 1µF; 0201 ≥ 0.1µF, within ±25%; Q/D.F. value: NP0: C≥30pF, Q≥200; C<30pF, Q≥100+10/3C X7R, X5R, X6S, X7S:																																							
			<table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F. ≤</th> <th>Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="4">100V</td> <td rowspan="4">≤ 3%</td> <td>≤ 6% 1206 ≥ 0.47µF</td> </tr> <tr> <td>≤ 7% 1812 ≥ 4.7µF; 1825 ≥ 4.7µF; 2220 ≥ 4.7µF; 2225 ≥ 4.7µF</td> </tr> <tr> <td>≤ 7.5% 0603 ≥ 0.068µF; 0805 > 0.1µF; 1206 ≥ 1µF; 1210 ≥ 2.2µF; TT series</td> </tr> <tr> <td>≤ 20% 0805 > 0.22µF; 1210 ≥ 3.3µF</td> </tr> <tr> <td rowspan="4">50V</td> <td rowspan="4">≤ 3%</td> <td>≤ 6% 0201(50V); 0603 ≥ 0.047µF; 0805 ≥ 0.18µF; 1206 ≥ 0.47µF</td> </tr> <tr> <td>≤ 7% 1812 ≥ 4.7µF; 1825 ≥ 4.7µF; 2220 ≥ 4.7µF; 2225 ≥ 4.7µF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.01µF; 0402 ≥ 0.012µF; 1210 ≥ 3.3µF</td> </tr> <tr> <td>≤ 20% 0402 ≥ 0.047µF; 0603 > 0.1µF; 0805 ≥ 1µF(0805/X7R > 0.47µF); 1206 ≥ 2.2µF; 1210 ≥ 10µF; TT series</td> </tr> <tr> <td rowspan="2">35V</td> <td rowspan="2">≤ 5%</td> <td>≤ 20% 0603 ≥ 1µF; 0805 ≥ 2.2µF; 1206 ≥ 2.2µF; 1210 ≥ 10µF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.01µF(0201/X5R = 0.01µF); 0805 ≥ 1µF; 1210 ≥ 10µF*</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 5%</td> <td>≤ 14% 0603 ≥ 0.33µF</td> </tr> <tr> <td>0201 ≥ 0.1µF(0201/X5R > 0.01µF); 0603 ≥ 0.47µF; TT series</td> </tr> <tr> <td>≤ 15% 0402 ≥ 0.10µF(0402/X7R ≥ 0.056µF); 0805 ≥ 2.2µF; 1206 ≥ 4.7µF; 1210 ≥ 22µF(1210/X5R ≥ 10µF)*</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤ 5%</td> <td>≤ 10% 0603 ≥ 0.15µF; 0805 ≥ 0.68µF; 1206 ≥ 2.2µF; 1210 ≥ 4.7µF</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.01µF(0201/X7R ≥ 0.022µF); 0402 ≥ 0.033µF; 0603 > 0.47µF; 0805 ≥ 2.2µF; 1206 ≥ 4.7µF; 1210 ≥ 22µF; TT series</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤ 7.5%</td> <td>≤ 15% 0201 ≥ 0.012µF; 0402 ≥ 0.22µF(0402/X7R ≥ 0.15µF); 0603 ≥ 0.33µF; 0805 ≥ 2.2µF; 1206 ≥ 2.2µF; 1210 ≥ 22µF</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1µF; 0402 ≥ 1µF; 0603/X5R ≥ 10µF; TT series; 01R5/X5R</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤ 15%</td> <td>≤ 30% 0201 ≥ 0.1µF; 0402 ≥ 1µF(0402/X6S ≥ 0.47µF); 0603 ≥ 10µF; 0805 ≥ 4.7µF; 1206 ≥ 47µF; 1210 ≥ 100µF; TT series</td> </tr> <tr> <td>---</td> </tr> <tr> <td>4V</td> <td>≤ 20%</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	100V	≤ 3%	≤ 6% 1206 ≥ 0.47µF	≤ 7% 1812 ≥ 4.7µF; 1825 ≥ 4.7µF; 2220 ≥ 4.7µF; 2225 ≥ 4.7µF	≤ 7.5% 0603 ≥ 0.068µF; 0805 > 0.1µF; 1206 ≥ 1µF; 1210 ≥ 2.2µF; TT series	≤ 20% 0805 > 0.22µF; 1210 ≥ 3.3µF	50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047µF; 0805 ≥ 0.18µF; 1206 ≥ 0.47µF	≤ 7% 1812 ≥ 4.7µF; 1825 ≥ 4.7µF; 2220 ≥ 4.7µF; 2225 ≥ 4.7µF	≤ 10% 0201 ≥ 0.01µF; 0402 ≥ 0.012µF; 1210 ≥ 3.3µF	≤ 20% 0402 ≥ 0.047µF; 0603 > 0.1µF; 0805 ≥ 1µF(0805/X7R > 0.47µF); 1206 ≥ 2.2µF; 1210 ≥ 10µF; TT series	35V	≤ 5%	≤ 20% 0603 ≥ 1µF; 0805 ≥ 2.2µF; 1206 ≥ 2.2µF; 1210 ≥ 10µF	≤ 10% 0201 ≥ 0.01µF(0201/X5R = 0.01µF); 0805 ≥ 1µF; 1210 ≥ 10µF*	25V	≤ 5%	≤ 14% 0603 ≥ 0.33µF	0201 ≥ 0.1µF(0201/X5R > 0.01µF); 0603 ≥ 0.47µF; TT series	≤ 15% 0402 ≥ 0.10µF(0402/X7R ≥ 0.056µF); 0805 ≥ 2.2µF; 1206 ≥ 4.7µF; 1210 ≥ 22µF(1210/X5R ≥ 10µF)*	16V	≤ 5%	≤ 10% 0603 ≥ 0.15µF; 0805 ≥ 0.68µF; 1206 ≥ 2.2µF; 1210 ≥ 4.7µF	≤ 15% 0201 ≥ 0.01µF(0201/X7R ≥ 0.022µF); 0402 ≥ 0.033µF; 0603 > 0.47µF; 0805 ≥ 2.2µF; 1206 ≥ 4.7µF; 1210 ≥ 22µF; TT series	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012µF; 0402 ≥ 0.22µF(0402/X7R ≥ 0.15µF); 0603 ≥ 0.33µF; 0805 ≥ 2.2µF; 1206 ≥ 2.2µF; 1210 ≥ 22µF	≤ 20% 0201 ≥ 0.1µF; 0402 ≥ 1µF; 0603/X5R ≥ 10µF; TT series; 01R5/X5R	6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1µF; 0402 ≥ 1µF(0402/X6S ≥ 0.47µF); 0603 ≥ 10µF; 0805 ≥ 4.7µF; 1206 ≥ 47µF; 1210 ≥ 100µF; TT series	---	4V	≤ 20%	---
			Rated vol.	D.F. ≤	Exception of D.F. ≤																																					
			100V	≤ 3%	≤ 6% 1206 ≥ 0.47µF																																					
					≤ 7% 1812 ≥ 4.7µF; 1825 ≥ 4.7µF; 2220 ≥ 4.7µF; 2225 ≥ 4.7µF																																					
					≤ 7.5% 0603 ≥ 0.068µF; 0805 > 0.1µF; 1206 ≥ 1µF; 1210 ≥ 2.2µF; TT series																																					
					≤ 20% 0805 > 0.22µF; 1210 ≥ 3.3µF																																					
			50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047µF; 0805 ≥ 0.18µF; 1206 ≥ 0.47µF																																					
					≤ 7% 1812 ≥ 4.7µF; 1825 ≥ 4.7µF; 2220 ≥ 4.7µF; 2225 ≥ 4.7µF																																					
					≤ 10% 0201 ≥ 0.01µF; 0402 ≥ 0.012µF; 1210 ≥ 3.3µF																																					
					≤ 20% 0402 ≥ 0.047µF; 0603 > 0.1µF; 0805 ≥ 1µF(0805/X7R > 0.47µF); 1206 ≥ 2.2µF; 1210 ≥ 10µF; TT series																																					
			35V	≤ 5%	≤ 20% 0603 ≥ 1µF; 0805 ≥ 2.2µF; 1206 ≥ 2.2µF; 1210 ≥ 10µF																																					
					≤ 10% 0201 ≥ 0.01µF(0201/X5R = 0.01µF); 0805 ≥ 1µF; 1210 ≥ 10µF*																																					
			25V	≤ 5%	≤ 14% 0603 ≥ 0.33µF																																					
0201 ≥ 0.1µF(0201/X5R > 0.01µF); 0603 ≥ 0.47µF; TT series																																										
≤ 15% 0402 ≥ 0.10µF(0402/X7R ≥ 0.056µF); 0805 ≥ 2.2µF; 1206 ≥ 4.7µF; 1210 ≥ 22µF(1210/X5R ≥ 10µF)*																																										
16V	≤ 5%	≤ 10% 0603 ≥ 0.15µF; 0805 ≥ 0.68µF; 1206 ≥ 2.2µF; 1210 ≥ 4.7µF																																								
		≤ 15% 0201 ≥ 0.01µF(0201/X7R ≥ 0.022µF); 0402 ≥ 0.033µF; 0603 > 0.47µF; 0805 ≥ 2.2µF; 1206 ≥ 4.7µF; 1210 ≥ 22µF; TT series																																								
10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012µF; 0402 ≥ 0.22µF(0402/X7R ≥ 0.15µF); 0603 ≥ 0.33µF; 0805 ≥ 2.2µF; 1206 ≥ 2.2µF; 1210 ≥ 22µF																																								
		≤ 20% 0201 ≥ 0.1µF; 0402 ≥ 1µF; 0603/X5R ≥ 10µF; TT series; 01R5/X5R																																								
6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1µF; 0402 ≥ 1µF(0402/X6S ≥ 0.47µF); 0603 ≥ 10µF; 0805 ≥ 4.7µF; 1206 ≥ 47µF; 1210 ≥ 100µF; TT series																																								

4V	≤ 20%	---																																								
*I.R.: ≥10V, 500MΩ or 25 Ω·F whichever is smaller. Class II (X7R, X5R, X6S, X7S)																																										
<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 ≥ 3.3µF</td> <td rowspan="7">500MΩ or RxC ≥ 5 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 > 0.01µF; 0603 ≥ 1µF; 0805 ≥ 1µF; 1206 ≥ 4.7µF; 1210 ≥ 4.7µF</td> </tr> <tr> <td>35V: 0603 ≥ 1µF; 0805 ≥ 2.2µF; 1206 ≥ 2.2µF; 1210 ≥ 10µF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1µF; 0402 ≥ 0.22µF; 0603 ≥ 2.2µF; 0805 ≥ 2.2µF; 1206 ≥ 10µF; 1210 ≥ 10µF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1µF; 0402 ≥ 0.22µF; 0603 ≥ 1µF; 0805 ≥ 2.2µF; 1206 ≥ 10µF; 1210 ≥ 47µF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47µF; 0603 ≥ 0.47µF; 0805 ≥ 2.2µF; 1206 ≥ 4.7µF; 1210 ≥ 47µF</td> </tr> <tr> <td>6.3V ; 4V ; TT series ; All X6S/X7S items; Size ≥ 1812</td> </tr> </tbody> </table>			Rated voltage	Insulation Resistance	100V: All X7R; 1210 ≥ 3.3µF	500MΩ or RxC ≥ 5 Ω·F whichever is smaller.	50V: 0402 > 0.01µF; 0603 ≥ 1µF; 0805 ≥ 1µF; 1206 ≥ 4.7µF; 1210 ≥ 4.7µF	35V: 0603 ≥ 1µF; 0805 ≥ 2.2µF; 1206 ≥ 2.2µF; 1210 ≥ 10µF	25V: 0201 ≥ 0.1µF; 0402 ≥ 0.22µF; 0603 ≥ 2.2µF; 0805 ≥ 2.2µF; 1206 ≥ 10µF; 1210 ≥ 10µF	16V: 0201 ≥ 0.1µF; 0402 ≥ 0.22µF; 0603 ≥ 1µF; 0805 ≥ 2.2µF; 1206 ≥ 10µF; 1210 ≥ 47µF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47µF; 0603 ≥ 0.47µF; 0805 ≥ 2.2µF; 1206 ≥ 4.7µF; 1210 ≥ 47µF	6.3V ; 4V ; TT series ; All X6S/X7S items; Size ≥ 1812																														
Rated voltage	Insulation Resistance																																									
100V: All X7R; 1210 ≥ 3.3µF	500MΩ or RxC ≥ 5 Ω·F whichever is smaller.																																									
50V: 0402 > 0.01µF; 0603 ≥ 1µF; 0805 ≥ 1µF; 1206 ≥ 4.7µF; 1210 ≥ 4.7µF																																										
35V: 0603 ≥ 1µF; 0805 ≥ 2.2µF; 1206 ≥ 2.2µF; 1210 ≥ 10µF																																										
25V: 0201 ≥ 0.1µF; 0402 ≥ 0.22µF; 0603 ≥ 2.2µF; 0805 ≥ 2.2µF; 1206 ≥ 10µF; 1210 ≥ 10µF																																										
16V: 0201 ≥ 0.1µF; 0402 ≥ 0.22µF; 0603 ≥ 1µF; 0805 ≥ 2.2µF; 1206 ≥ 10µF; 1210 ≥ 47µF																																										
10V: 0201 ≥ 47nF; 0402 ≥ 0.47µF; 0603 ≥ 0.47µF; 0805 ≥ 2.2µF; 1206 ≥ 4.7µF; 1210 ≥ 47µF																																										
6.3V ; 4V ; TT series ; All X6S/X7S items; Size ≥ 1812																																										

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

Multilayer Ceramic Capacitors

Approval Sheet

No	Item	Test Condition	Requirements																																																																																																																															
15.	High Temperature Load (Endurance)	* Test temp. : NP0, X7R/X7S: 125±3°C X6S: 105±3°C X5R: 85±3°C * Test time: 1000+24/-0 hrs. * To apply voltage: (1) 100% of rated voltage for below range.	** No remarkable damage. Cap change: NP0: ±3.0% or ±0.3pF whichever is larger X7R, X5R, X6S, X7S: ≥10V**, within ±12.5%; ≤6.3V within ±25%; TT series & C ≥ 1uF, within ±25% **10V: 0603 ≥ 4.7μF; 0402 ≥ 1μF; 0201 ≥ 0.1μF, within ±25%; Q/D.F. value: NP0: More than 30pF, Q ≥ 350 10pF ≤ C < 30pF, Q ≥ 275+2.5C Less than 10pF, Q ≥ 200+10C X7R, X5R, X6S, X7S:																																																																																																																															
		<table border="1"> <thead> <tr> <th>Size</th> <th>Dielectric</th> <th>Rated voltage</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td>01R5</td> <td>X5R</td> <td>=10V</td> <td>C ≥ 0.1μF</td> </tr> <tr> <td rowspan="2">0201</td> <td rowspan="2">X5R/X7R/ X6S/X7S</td> <td>≤ 10V</td> <td>C ≥ 0.1μF</td> </tr> <tr> <td>≤ 16V</td> <td>C ≥ 0.1μF</td> </tr> <tr> <td rowspan="4">0402</td> <td rowspan="2">X5R</td> <td>≤ 16V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td>25V, 50V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td rowspan="2">X6S</td> <td>6.3V, 10V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td>16V, 25V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td rowspan="2">X7R/X7S</td> <td>6.3V, 10V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td>6.3V, 10V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td rowspan="4">0603</td> <td rowspan="2">X5R/X7R/ X6S/X7S</td> <td>4V</td> <td>C ≥ 22μF</td> </tr> <tr> <td>6.3V, 10V</td> <td>C ≥ 4.7μF#1</td> </tr> <tr> <td rowspan="2">X5R/X6S/X7S</td> <td>25V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td>35V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td rowspan="4">0805</td> <td rowspan="2">X5R/X7R/ X6S/X7S</td> <td>4V</td> <td>C ≥ 47μF</td> </tr> <tr> <td>6.3V</td> <td>C ≥ 22μF</td> </tr> <tr> <td rowspan="2">X6S</td> <td>10V, 50V</td> <td>C ≥ 10μF</td> </tr> <tr> <td>16V</td> <td>C ≥ 10μF</td> </tr> <tr> <td rowspan="2">X7R/X7S</td> <td>16V, 25V</td> <td>C ≥ 10μF</td> </tr> <tr> <td>X5R</td> <td>C ≥ 22μF</td> </tr> <tr> <td>1206</td> <td>X5R/X7R/X6S</td> <td>≤ 6.3V</td> <td>C ≥ 47μF</td> </tr> <tr> <td rowspan="2">1210</td> <td rowspan="2">X5R/X7R/X6S</td> <td>16V</td> <td>C ≥ 47μF</td> </tr> <tr> <td>X7R</td> <td>100V</td> <td>C ≥ 3.3μF</td> </tr> <tr> <td>TT15</td> <td>X5R</td> <td>6.3V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td>TT21</td> <td>X5R/X7R/X6S</td> <td>≤ 10V</td> <td>C ≥ 10μF</td> </tr> </tbody> </table>	Size	Dielectric	Rated voltage	Capacitance	01R5	X5R	=10V	C ≥ 0.1μF	0201	X5R/X7R/ X6S/X7S	≤ 10V	C ≥ 0.1μF	≤ 16V	C ≥ 0.1μF	0402	X5R	≤ 16V	C ≥ 1.0μF	25V, 50V	C ≥ 1.0μF	X6S	6.3V, 10V	C ≥ 1.0μF	16V, 25V	C ≥ 1.0μF	X7R/X7S	6.3V, 10V	C ≥ 1.0μF	6.3V, 10V	C ≥ 1.0μF	0603	X5R/X7R/ X6S/X7S	4V	C ≥ 22μF	6.3V, 10V	C ≥ 4.7μF#1	X5R/X6S/X7S	25V	C ≥ 1.0μF	35V	C ≥ 1.0μF	0805	X5R/X7R/ X6S/X7S	4V	C ≥ 47μF	6.3V	C ≥ 22μF	X6S	10V, 50V	C ≥ 10μF	16V	C ≥ 10μF	X7R/X7S	16V, 25V	C ≥ 10μF	X5R	C ≥ 22μF	1206	X5R/X7R/X6S	≤ 6.3V	C ≥ 47μF	1210	X5R/X7R/X6S	16V	C ≥ 47μF	X7R	100V	C ≥ 3.3μF	TT15	X5R	6.3V	C ≥ 1.0μF	TT21	X5R/X7R/X6S	≤ 10V	C ≥ 10μF	<table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F. ≤</th> <th>Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="4">100V</td> <td rowspan="4">≤ 3%</td> <td>≤ 6% 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td> </tr> <tr> <td>≤ 7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF; TT series</td> </tr> <tr> <td>≤ 20% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="4">50V</td> <td rowspan="4">≤ 3%</td> <td>≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.01μF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤ 20% 0402 ≥ 0.047μF; 0603 > 0.1μF; 0805 ≥ 1μF (0805/X7R > 0.47μF); 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td rowspan="4">35V</td> <td rowspan="4">≤ 5%</td> <td>≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.01μF (0201/X5R = 0.01μF); 0805 ≥ 1μF; 1210 ≥ 10μF*</td> </tr> <tr> <td>≤ 14% 0603 ≥ 0.33μF</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.1μF (0201/X5R > 0.01μF); 0603 ≥ 0.47μF; TT series</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤ 5%</td> <td>≤ 15% 0402 ≥ 0.10μF (0402/X7R = 0.056μF); 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF (1210/X5R ≥ 10μF)*</td> </tr> <tr> <td>≤ 20% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.01μF (0201/X7R = 0.022μF); 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td rowspan="4">16V</td> <td rowspan="4">≤ 5%</td> <td>≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.22μF (0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td>≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td rowspan="4">10V</td> <td rowspan="4">≤ 7.5%</td> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td>≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td rowspan="4">6.3V</td> <td rowspan="4">≤ 15%</td> <td>≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td>≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td rowspan="4">4V</td> <td rowspan="4">≤ 20%</td> <td>---</td> </tr> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF	≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF; TT series	≤ 20% 0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 10% 0201 ≥ 0.01μF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF	≤ 20% 0402 ≥ 0.047μF; 0603 > 0.1μF; 0805 ≥ 1μF (0805/X7R > 0.47μF); 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤ 10% 0201 ≥ 0.01μF (0201/X5R = 0.01μF); 0805 ≥ 1μF; 1210 ≥ 10μF*	≤ 14% 0603 ≥ 0.33μF	≤ 15% 0201 ≥ 0.1μF (0201/X5R > 0.01μF); 0603 ≥ 0.47μF; TT series	25V	≤ 5%	≤ 15% 0402 ≥ 0.10μF (0402/X7R = 0.056μF); 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF (1210/X5R ≥ 10μF)*	≤ 20% 0402 ≥ 0.33μF	≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤ 15% 0201 ≥ 0.01μF (0201/X7R = 0.022μF); 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	16V	≤ 5%	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.22μF (0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	4V	≤ 20%	---	---	---	---
		Size	Dielectric	Rated voltage	Capacitance																																																																																																																													
		01R5	X5R	=10V	C ≥ 0.1μF																																																																																																																													
		0201	X5R/X7R/ X6S/X7S	≤ 10V	C ≥ 0.1μF																																																																																																																													
				≤ 16V	C ≥ 0.1μF																																																																																																																													
		0402	X5R	≤ 16V	C ≥ 1.0μF																																																																																																																													
				25V, 50V	C ≥ 1.0μF																																																																																																																													
			X6S	6.3V, 10V	C ≥ 1.0μF																																																																																																																													
				16V, 25V	C ≥ 1.0μF																																																																																																																													
		X7R/X7S	6.3V, 10V	C ≥ 1.0μF																																																																																																																														
			6.3V, 10V	C ≥ 1.0μF																																																																																																																														
		0603	X5R/X7R/ X6S/X7S	4V	C ≥ 22μF																																																																																																																													
				6.3V, 10V	C ≥ 4.7μF#1																																																																																																																													
			X5R/X6S/X7S	25V	C ≥ 1.0μF																																																																																																																													
35V	C ≥ 1.0μF																																																																																																																																	
0805	X5R/X7R/ X6S/X7S	4V	C ≥ 47μF																																																																																																																															
		6.3V	C ≥ 22μF																																																																																																																															
	X6S	10V, 50V	C ≥ 10μF																																																																																																																															
		16V	C ≥ 10μF																																																																																																																															
X7R/X7S	16V, 25V	C ≥ 10μF																																																																																																																																
	X5R	C ≥ 22μF																																																																																																																																
1206	X5R/X7R/X6S	≤ 6.3V	C ≥ 47μF																																																																																																																															
1210	X5R/X7R/X6S	16V	C ≥ 47μF																																																																																																																															
		X7R	100V	C ≥ 3.3μF																																																																																																																														
TT15	X5R	6.3V	C ≥ 1.0μF																																																																																																																															
TT21	X5R/X7R/X6S	≤ 10V	C ≥ 10μF																																																																																																																															
Rated vol.	D.F. ≤	Exception of D.F. ≤																																																																																																																																
100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF																																																																																																																																
		≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF																																																																																																																																
		≤ 7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF; TT series																																																																																																																																
		≤ 20% 0805 > 0.22μF; 1210 ≥ 3.3μF																																																																																																																																
50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																																																																																																
		≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF																																																																																																																																
		≤ 10% 0201 ≥ 0.01μF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF																																																																																																																																
		≤ 20% 0402 ≥ 0.047μF; 0603 > 0.1μF; 0805 ≥ 1μF (0805/X7R > 0.47μF); 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																																																																																																																																
35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																																																																																																
		≤ 10% 0201 ≥ 0.01μF (0201/X5R = 0.01μF); 0805 ≥ 1μF; 1210 ≥ 10μF*																																																																																																																																
		≤ 14% 0603 ≥ 0.33μF																																																																																																																																
		≤ 15% 0201 ≥ 0.1μF (0201/X5R > 0.01μF); 0603 ≥ 0.47μF; TT series																																																																																																																																
25V	≤ 5%	≤ 15% 0402 ≥ 0.10μF (0402/X7R = 0.056μF); 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF (1210/X5R ≥ 10μF)*																																																																																																																																
		≤ 20% 0402 ≥ 0.33μF																																																																																																																																
		≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																																																																																																																
		≤ 15% 0201 ≥ 0.01μF (0201/X7R = 0.022μF); 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																																																																																																																																
16V	≤ 5%	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.22μF (0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																																																																																																
		≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R																																																																																																																																
		≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																																																																																																																
		≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																																																																																																																
10V	≤ 7.5%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																																																																																																																
		≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R																																																																																																																																
		≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																																																																																																																
		≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																																																																																																																
6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																																																																																																																
		≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; TT series; 01R5/X5R																																																																																																																																
		≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																																																																																																																
		≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																																																																																																																
4V	≤ 20%	---																																																																																																																																

**1WV items must follow de-rating conditions. #1. 0603X106/475(10V)&0603S106(4V&6.3V); 150% of rated voltage (2) 150% of rated voltage for below range.	*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller. Class II (X7R, X5R, X6S, X7S)																																																																																																																																	
<table border="1"> <thead> <tr> <th>Size</th> <th>Dielectric</th> <th>Rated voltage</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td rowspan="2">0201</td> <td rowspan="2">X5R/X6S</td> <td>16V, 25V</td> <td>C ≥ 0.1μF</td> </tr> <tr> <td>16V</td> <td>C ≥ 0.022μF</td> </tr> <tr> <td rowspan="2">0402</td> <td rowspan="2">X7R/X5R/ X6S</td> <td>50V</td> <td>C > 0.01μF</td> </tr> <tr> <td>10-25V</td> <td>C ≥ 0.22μF</td> </tr> <tr> <td rowspan="4">0603</td> <td rowspan="2">X7S</td> <td>50V-100V</td> <td>C > 0.22μF</td> </tr> <tr> <td>50V</td> <td>C > 0.1μF</td> </tr> <tr> <td rowspan="2">X5R</td> <td>25V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td>50V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td rowspan="2">X5R/X7R/ X6S/X7S</td> <td>10V, 16V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td>100V</td> <td>C ≥ 0.47μF</td> </tr> <tr> <td rowspan="4">0805</td> <td rowspan="2">X5R/X7R/ X6S/X7S</td> <td>50V</td> <td>C ≥ 0.68μF</td> </tr> <tr> <td>35V</td> <td>C ≥ 2.2μF</td> </tr> <tr> <td rowspan="2">X7R</td> <td>10-25V</td> <td>C ≥ 4.7μF</td> </tr> <tr> <td>100V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td rowspan="2">1206</td> <td rowspan="2">X5R/X6S/ X7S</td> <td>50V</td> <td>C ≥ 2.2μF</td> </tr> <tr> <td>100V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td rowspan="2">1210</td> <td rowspan="2">X5R/X7R/ X6S/X7S</td> <td>50V-100V</td> <td>C ≥ 2.2μF</td> </tr> <tr> <td>≤ 50V</td> <td>C ≥ 4.7μF</td> </tr> <tr> <td>1812</td> <td>X7R</td> <td>100V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td>1825</td> <td rowspan="3">X7R</td> <td rowspan="3">100V-250V</td> <td rowspan="3">C ≥ 1.0μF#2</td> </tr> <tr> <td>2220</td> </tr> <tr> <td>2225</td> </tr> </tbody> </table>	Size	Dielectric	Rated voltage	Capacitance	0201	X5R/X6S	16V, 25V	C ≥ 0.1μF	16V	C ≥ 0.022μF	0402	X7R/X5R/ X6S	50V	C > 0.01μF	10-25V	C ≥ 0.22μF	0603	X7S	50V-100V	C > 0.22μF	50V	C > 0.1μF	X5R	25V	C ≥ 1.0μF	50V	C ≥ 1.0μF	X5R/X7R/ X6S/X7S	10V, 16V	C ≥ 1.0μF	100V	C ≥ 0.47μF	0805	X5R/X7R/ X6S/X7S	50V	C ≥ 0.68μF	35V	C ≥ 2.2μF	X7R	10-25V	C ≥ 4.7μF	100V	C ≥ 1.0μF	1206	X5R/X6S/ X7S	50V	C ≥ 2.2μF	100V	C ≥ 1.0μF	1210	X5R/X7R/ X6S/X7S	50V-100V	C ≥ 2.2μF	≤ 50V	C ≥ 4.7μF	1812	X7R	100V	C ≥ 1.0μF	1825	X7R	100V-250V	C ≥ 1.0μF#2	2220	2225	<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="10">1GΩ or RxC ≥ 10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; TT series; All X6S/X7S items; Size ≥ 1812</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.	50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF	6.3V; 4V; TT series; All X6S/X7S items; Size ≥ 1812																																																						
Size	Dielectric	Rated voltage	Capacitance																																																																																																																															
0201	X5R/X6S	16V, 25V	C ≥ 0.1μF																																																																																																																															
		16V	C ≥ 0.022μF																																																																																																																															
0402	X7R/X5R/ X6S	50V	C > 0.01μF																																																																																																																															
		10-25V	C ≥ 0.22μF																																																																																																																															
0603	X7S	50V-100V	C > 0.22μF																																																																																																																															
		50V	C > 0.1μF																																																																																																																															
	X5R	25V	C ≥ 1.0μF																																																																																																																															
		50V	C ≥ 1.0μF																																																																																																																															
X5R/X7R/ X6S/X7S	10V, 16V	C ≥ 1.0μF																																																																																																																																
	100V	C ≥ 0.47μF																																																																																																																																
0805	X5R/X7R/ X6S/X7S	50V	C ≥ 0.68μF																																																																																																																															
		35V	C ≥ 2.2μF																																																																																																																															
	X7R	10-25V	C ≥ 4.7μF																																																																																																																															
		100V	C ≥ 1.0μF																																																																																																																															
1206	X5R/X6S/ X7S	50V	C ≥ 2.2μF																																																																																																																															
		100V	C ≥ 1.0μF																																																																																																																															
1210	X5R/X7R/ X6S/X7S	50V-100V	C ≥ 2.2μF																																																																																																																															
		≤ 50V	C ≥ 4.7μF																																																																																																																															
1812	X7R	100V	C ≥ 1.0μF																																																																																																																															
1825	X7R	100V-250V	C ≥ 1.0μF#2																																																																																																																															
2220																																																																																																																																		
2225																																																																																																																																		
Rated voltage	Insulation Resistance																																																																																																																																	
100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.																																																																																																																																	
50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																																																																																																																		
35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																																																																																																		
25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																																																																																																																		
16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF																																																																																																																																		
10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF																																																																																																																																		
6.3V; 4V; TT series; All X6S/X7S items; Size ≥ 1812																																																																																																																																		
#2. 2220/X7R/126-226(100V): 120% of rated voltage. (3) ≤ 6.3V or C ≥ 10μF: 150% of rated voltage. (4) 10V-250V: 200% of rated voltage. Excluding 1210/NP0(200V&250V)/104: 100% of rated voltage. 1210/NP0(200V&250V)/563-823: 150% of rated voltage. 1812/NP0(200V&250V)/822-104: 150% of rated voltage. (5) 400V-450V: 120% of rated voltage. (6) 500V: 150% of rated voltage. (7) 630V-3kV: 120% of rated voltage. Excluding 1210/NP0(1kV)/333: 100% of rated voltage. 1812/NP0(1kV)/472-562: 100% of rated voltage. 1812/NP0(2kV)/122-332: 100% of rated voltage. 2220/X7R(1kV)/474: 100% of rated voltage. 1206/NP0(1kV)/122-332/183-223: 110% of rated voltage. 1210/X7R(2kV)/103: 110% of rated voltage. 1812/X7R(2kV)/103: 110% of rated voltage. 1808/X7R(3kV)/102(T: 1.25mm): 110% of rated voltage. 1812/NP0(4kV)/330-121: 100% of rated voltage. (8) Ur=3.5kV & 4kV: 110% of rated voltage. * Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.		**De-rating conditions: 																																																																																																																																

Multilayer Ceramic Capacitors

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.



Multilayer Ceramic Capacitors

APPENDIXES

■ Tape & reel dimensions

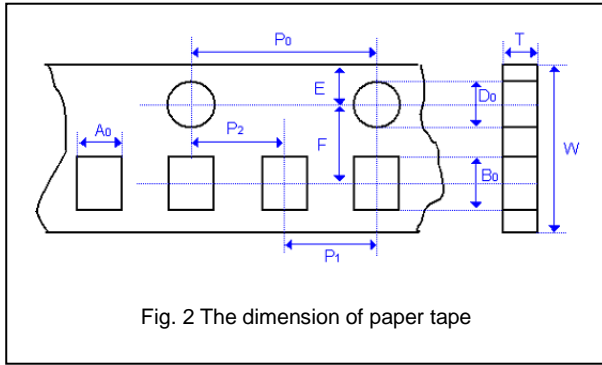


Fig. 2 The dimension of paper tape

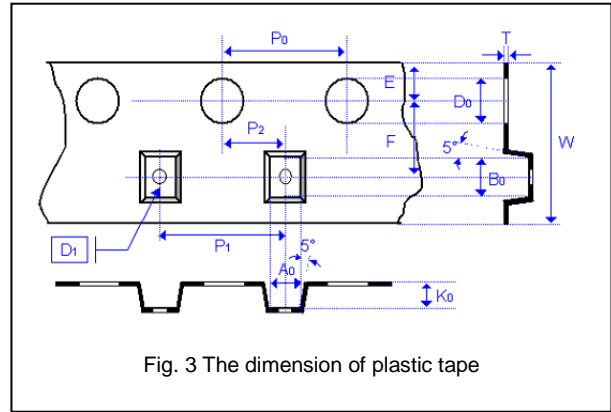


Fig. 3 The dimension of plastic tape

Size	0402	0603	0805			1206			1210	1808	1812	1825	2220			2225				
Thickness	N,E	S,X	A,H	B,T	D,I	B,T	C,J,D	G,P	C,D,G,K	M	D,F,G,K	D,F,G,K	M,U	K	M,U	K	M,U	R	K	M,U
A ₀	0.70 +/-0.20	1.05 +/-0.30	1.50 +/-0.20	1.50 +/-0.20	< 1.80	1.90 +/-0.50	< 2.00	< 2.30	< 3.05	< 3.20	< 2.50	< 3.90	< 3.90	< 6.80	< 6.80	< 5.80	< 5.80	< 5.80	< 6.80	< 6.80
B ₀	1.20 +/-0.20	1.80 +/-0.30	2.30 +/-0.20	2.30 +/-0.20	< 2.70	3.50 +/-0.50	< 3.70	< 4.00	< 3.80	< 4.00	< 5.30	< 5.30	< 5.30	< 5.30	< 5.30	< 6.50	< 6.50	< 6.50	< 6.50	< 6.50
T	≤ 0.80	≤ 1.20	≤ 1.15	≤ 1.20	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.25 +/-0.1	0.25 +/-0.1	0.25 +/-0.1	0.25 +/-0.1	0.25 +/-0.1	0.30 +/-0.1	0.30 +/-0.1	0.30 +/-0.1	0.30 +/-0.1	0.30 +/-0.1	0.30 +/-0.1	0.30 +/-0.1
K ₀	-	-	-	-	< 2.50	-	< 2.50	< 2.50	< 2.50	< 3.20	< 2.50	< 2.50	< 3.50	< 2.50	< 3.50	< 2.50	< 3.50	< 4.20	< 2.50	< 3.50
W	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00	8.00	8.00	8.00	8.00	8.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
P ₀	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
10xP ₀	40.00 +/-0.10	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
P ₁	2.00 +/-0.05	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00	4.00	4.00	4.00	4.00	4.00	4.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
P ₂	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
D ₀	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
D ₁	-	-	-	-	1.00 +/-0.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
E	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
F	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50	3.50	3.50	3.50	3.50	3.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50

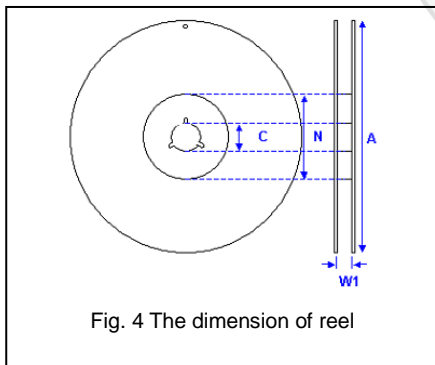
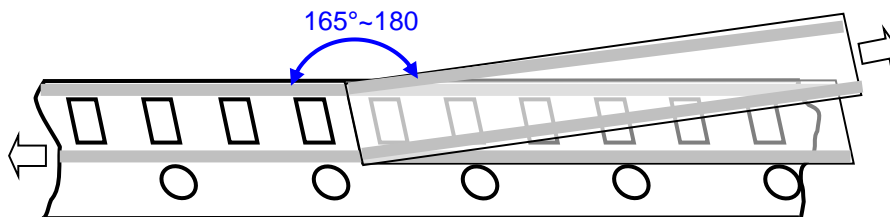


Fig. 4 The dimension of reel

Size	0402, 0603, 0805, 1206, 1210			1808 to 2225	
Reel size	7"	10"	13"	7"	13"
C	13.0±0.5	13.0±0.5	13.0±0.5	13.0±0.5	13.0±0.5
W ₁	10.0±1.5	10.0±1.5	10.0±1.5	12.4+2.0/-0	12.4+2.0/-0
A	178.0±2.0	250.0±2.0	330.0±2.0	178.0±2.0	330.0±2.0
N	60.0+1.0/-0	50 min	50 min	60.0+1.0/-0	100.0±2.0

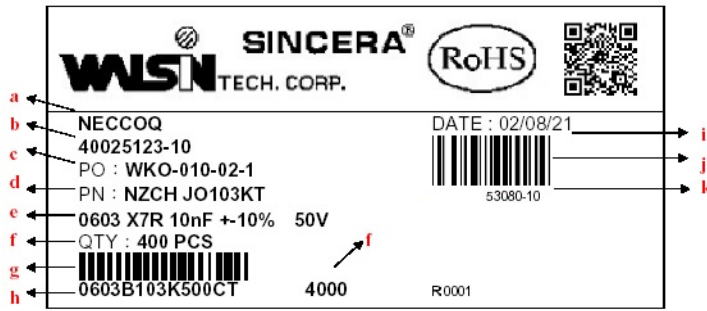
■ Peeling force (EIA-481)

Peel-off force should be in the range of 10 grams to 100 grams at a peel-off speed of 300±10 mm/min.



Multilayer Ceramic Capacitors

Example of customer label



- a. Customer name
- b. WTC order series and item number
- c. Customer P/O
- d. Customer P/N
- e. Description of product
- f. Quantity
- g. Bar code including quantity & WTC P/N or customer
- h. WTC P/N
- i. Shipping date
- j. Order bar code including series and item numbers
- k. Serial number of label

*Customized label is available upon request

Constructions

No.	Name	NPO	X7R, X5R
①	Ceramic material	CaZrO ₃ based	BaTiO ₃ based
②	Inner electrode	Ni	
③	Termination	Inner layer	Cu + Ag Polymer
④		Middle layer	Ni
⑤		Outer layer	Sn

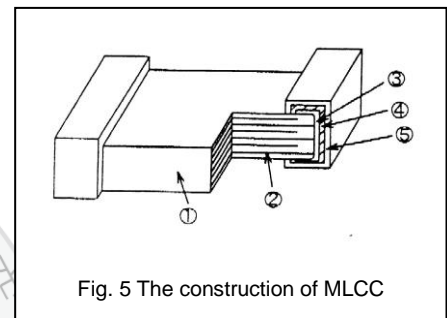


Fig. 5 The construction of MLCC

Storage and handling conditions

- (1) To store products at 5 to 40°C ambient temperature and 20 to 70% related humidity conditions; MSL Level 1.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- b. In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.
- c. Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sunlight, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or dewing condition. To store products on the shelf and avoid exposure to moisture.

Caution for SOFT TERMINATION Products

Since the middle layer of the terminal electrode contains Ag (silver), when chip capacitors on printed circuit board (PCB), it should be protected by moisture proof-sealing to prevent electromigration of Ag under high temperature, high humidity and failure due to corrosive gas.

Recommended soldering conditions

The lead-free termination MLCCs are not only to be used on SMT against lead-free solder paste, but also suitable against lead-containing solder paste. If the optimized solder joint is requested, increasing soldering time, temperature and concentration of N₂ within oven are recommended.

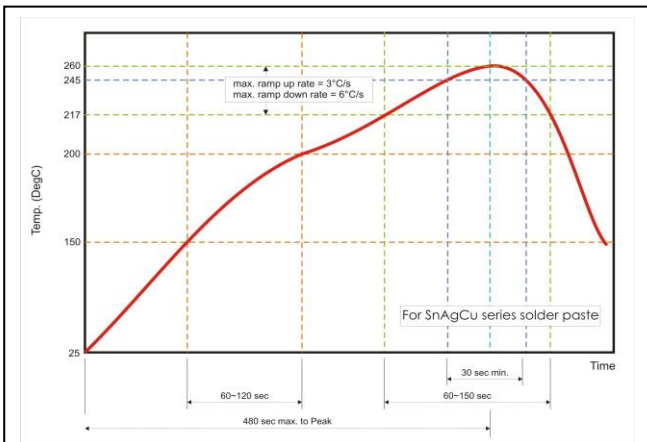


Fig. 6 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.

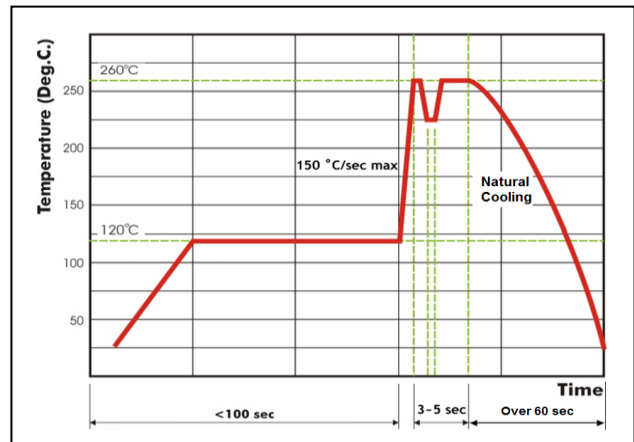


Fig. 7 Recommended wave soldering profile for SMT process with SnAgCu series solder.

