

# APPROVAL SHEET

## MULTILAYER CERAMIC CAPACITORS

Automotive Capacitors Series (MT)

Qualified to AEC-Q200

0201 to 1210 Sizes (10V to 1000V)

NP0, X7R Dielectrics

Halogen Free & RoHS Compliance



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

**Multilayer Ceramic Capacitors**

**1. DESCRIPTION**

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

WTC's MT series MLCC is made by NP0,X7R dielectrics and which provides product with high electrical precision, stability and reliability. Besides, MT series MLCC is tighten controlling in quality in line to assure quality performance in automotive applications.

**2. FEATURES**

- a. A wide selection of sizes is available (0201 to 0805).
- b. High capacitance in given case size.
- c. Capacitor with lead-free termination (pure Tin).
- d. The MT series meet AEC-Q200 requirement.

**3. APPLICATIONS**

- a. For Navigation & Information equipments.
- b. For entertainment equipments
- c. For comfortable equipments.
- d. For Automotive electronic equipment.

**4. HOW TO ORDER**

<b>MT</b>	<b>18</b>	<b>N</b>	<b>102</b>	<b>J</b>	<b>500</b>	<b>C</b>	<b>I</b>
<b>Series</b>	<b>Size</b>	<b>Dielectric</b>	<b>Capacitance</b>	<b>Tolerance</b>	<b>Rated voltage</b>	<b>Termination</b>	<b>Packaging style</b>
MT= Automotive safe concern (with AEC-Q200 qualification)	03=0201 (0603) 15=0402 (1005) 18=0603 (1608) 21=0805 (2012) 31=1206 (3216) 32=1210 (3225)	N=NP0 (COG) B=X7R	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: 0R5=0.5pF 1R0=1.0pF 102=10x10 <sup>2</sup> =1000pF	A=±0.05pF 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. <b>100</b> =10 VDC <b>160</b> =16 VDC <b>250</b> =25 VDC <b>500</b> =50 VDC <b>101</b> =100 VDC <b>201</b> =200 VDC <b>251</b> =250 VDC <b>501</b> =500 VDC <b>631</b> =630 VDC <b>102</b> =1000 VDC	C=Cu/Ni/Sn	T=7" reeled G=13" reeled

Multilayer Ceramic Capacitors

**5. EXTERNAL DIMENSIONS**

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	Remark	M <sub>B</sub> (mm)
0201 (0603)	0.60±0.03	0.30±0.03	0.30±0.03	L #	0.15±0.05
0402 (1005)	1.00±0.05	0.50±0.05	0.50±0.05	N #	0.25 +0.05/-0.10
0603 (1608)	1.60±0.10	0.80±0.10	0.80±0.07	S	0.40±0.15
	1.60 +0.15/-0.10	0.80 +0.15/-0.10	0.80 +0.15/-0.10	X	
0805 (2012)	2.00±0.15	1.25±0.10	0.60±0.10	A	0.50±0.20
			0.80±0.10	B	
	1.25±0.10	D #			
	1.25±0.20	I #			
1206 (3216)	3.20±0.15	1.60±0.15	0.80±0.10	B	0.60±0.20
			0.95±0.10	C	
			1.25±0.10	D #	
	3.20±0.20	1.60±0.20	1.15±0.15	J #	
	1.60±0.20		G #		
	3.20+0.3/-0.1		1.60+0.30/-0.10	P #	
1210 (3225)	3.20±0.30	2.50±0.20	0.95±0.10	C #	0.75±0.25
			1.25±0.10	D #	
	3.20±0.40	2.50±0.30	1.60±0.20	G #	
			2.00±0.20	K #	
			2.50±0.30	M #	



# Reflow soldering only is recommended.

**6. GENERAL ELECTRICAL DATA**

<b>Dielectric</b>	NP0	X7R
<b>Size</b>	0201, 0402, 0603, 0805, 1206, 1210	0402, 0603, 0805, 1206
<b>Capacitance range*</b>	0.1pF to 0.033uF	100pF to 2.2uF
<b>Capacitance tolerance**</b>	Cap≤5pF <sup>#1</sup> : A (±0.05pF), B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: B (±0.1pF), C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%)	J (±5%), K (±10%), M (±20%)
<b>Rated voltage (WVDC)</b>	10V, 16V, 25V, 50V, 100V, 200V, 250, 500, 630, 1000	
<b>Operating temperature</b>	-55 to +125°C	
<b>Capacitance characteristic</b>	±30ppm/°C	±15%
<b>Termination</b>	Ni/Sn (lead-free termination)	

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

\* 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  
Measured at 1.0±0.2Vrms, 1.0kHz±10% for C≤10μF; 0.5±0.2Vrms, 120Hz±20% for C>10μF, 30~70% related humidity, 25°C ambient temperature for X7R.

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

Multilayer Ceramic Capacitors

**7. CAPACITANCE RANGE**

**NP0 Dielectric**

DIELECTRIC	NP0																
	SIZE	0201				0402					0603						
	RATED VOLTAGE	10	16	25	50	10	16	25	50	100	10	16	25	50	100	200	250
Capacitance	0.1pF (0R1)	L	L	L	L	N	N	N	N	N							
	0.2pF (0R2)	L	L	L	L	N	N	N	N	N							
	0.3pF (0R3)	L	L	L	L	N	N	N	N	N							
	0.4pF (0R4)	L	L	L	L	N	N	N	N	N							
	0.5pF (0R5)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.6pF (0R6)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.7pF (0R7)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.8pF (0R8)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.9pF (0R9)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.0pF (1R0)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.2pF (1R2)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.5pF (1R5)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.8pF (1R8)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	2.0pF (2R0)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	2.2pF (2R2)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	2.7pF (2R7)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	3.0pF (3R0)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	3.3pF (3R3)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	3.9pF (3R9)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	4.0pF (4R0)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	4.7pF (4R7)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	5.0pF (5R0)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	5.6pF (5R6)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	6.0pF (6R0)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	6.8pF (6R8)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	7.0pF (7R0)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	8.0pF (8R0)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	8.2pF (8R2)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	9.0pF (9R0)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	10pF (100)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	12pF (120)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	15pF (150)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	18pF (180)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	22pF (220)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	27pF (270)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	33pF (330)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	39pF (390)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	47pF (470)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	56pF (560)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	68pF (680)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	82pF (820)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	100pF (101)	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	120pF (121)					N	N	N	N	N	S	S	S	S	S	S	S
	150pF (151)					N	N	N	N	N	S	S	S	S	S	S	S
	180pF (181)					N	N	N	N	N	S	S	S	S	S	S	S
	220pF (221)					N	N	N	N	N	S	S	S	S	S	S	S
	270pF (271)					N	N	N	N	N	S	S	S	S	S	X	X
	330pF (331)					N	N	N	N	N	S	S	S	S	S	X	X
	390pF (391)					N	N	N	N	N	S	S	S	S	S	X	X
	470pF (471)					N	N	N	N	N	S	S	S	S	S	X	X
560pF (561)					N	N	N	N	N	S	S	S	S	S			
680pF (681)					N	N	N	N	N	S	S	S	S	S			
820pF (821)					N	N	N	N	N	S	S	S	S	S			
1,000pF (102)					N	N	N	N	N	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)																	
0.01μF (103)																	

\* NP0, 0.1pF product only provide B tolerance.

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

**NP0 Dielectric**

DIELECTRIC		NP0								
SIZE		0805								
RATED VOLTAGE		10	16	25	50	100	200	250	500	630
Capacitance	0.5pF (0R5)	A	A	A	A	A	A	A	A	A
	0.6pF (0R6)	A	A	A	A	A	A	A	A	A
	0.7pF (0R7)	A	A	A	A	A	A	A	A	A
	0.8pF (0R8)	A	A	A	A	A	A	A	A	A
	0.9pF (0R9)	A	A	A	A	A	A	A	A	A
	1.0pF (1R0)	A	A	A	A	A	A	A	A	A
	1.2pF (1R2)	A	A	A	A	A	A	A	A	A
	1.5pF (1R5)	A	A	A	A	A	A	A	A	A
	1.8pF (1R8)	A	A	A	A	A	A	A	A	A
	2.2pF (2R2)	A	A	A	A	A	A	A	A	A
	2.7pF (2R7)	A	A	A	A	A	A	A	A	A
	3.3pF (3R3)	A	A	A	A	A	A	A	A	A
	3.9pF (3R9)	A	A	A	A	A	A	A	A	A
	4.7pF (4R7)	A	A	A	A	A	A	A	A	A
	5.6pF (5R6)	A	A	A	A	A	A	A	A	A
	6.8pF (6R8)	A	A	A	A	A	A	A	A	A
	8.2pF (8R2)	A	A	A	A	A	A	A	A	A
	10pF (100)	A	A	A	A	A	A	A	A	A
	12pF (120)	A	A	A	A	A	A	A	A	A
	15pF (150)	A	A	A	A	A	A	A	A	A
	18pF (180)	A	A	A	A	A	A	A	A	A
	22pF (220)	A	A	A	A	A	A	A	A	A
	27pF (270)	A	A	A	A	A	A	A	A	A
	33pF (330)	A	A	A	A	A	A	A	A	A
	39pF (390)	A	A	A	A	A	A	A	A	A
	47pF (470)	A	A	A	A	A	A	A	A	A
	56pF (560)	A	A	A	A	A	A	A	A	A
	68pF (680)	A	A	A	A	A	A	A	A	A
	82pF (820)	A	A	A	A	A	A	A	B	B
	100pF (101)	A	A	A	A	A	B	B	B	B
	120pF (121)	A	A	A	A	A	B	B	D	D
	150pF (151)	A	A	A	A	A	D	D	D	D
	180pF (181)	A	A	A	A	A	D	D	D	D
	220pF (221)	A	A	A	A	A	D	D	D	D
	270pF (271)	A	A	A	A	A	D	D	D	D
	330pF (331)	A	A	A	A	A	D	D	D	D
	390pF (391)	B	B	B	B	B	D	D	D	D
	470pF (471)	B	B	B	B	B	D	D		
	560pF (561)	B	B	B	B	B	D	D		
	680pF (681)	B	B	B	B	B	D	D		
820pF (821)	B	B	B	B	B	D	D			
1,000pF (102)	B	B	B	B	B	D	D			
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					
0.01μF (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

**NP0 Dielectric**

DIELECTRIC		NP0									
SIZE		1206									
RATED VOLTAGE		10	16	25	50	100	200	250	500	630	1000
Capacitance	1.0pF (1R0)										
	1.2pF (1R2)	B	B	B	B	B	B	B	B	B	
	1.5pF (1R5)	B	B	B	B	B	B	B	B	B	B
	1.8pF (1R8)	B	B	B	B	B	B	B	B	B	B
	2.2pF (2R2)	B	B	B	B	B	B	B	B	B	B
	2.7pF (2R7)	B	B	B	B	B	B	B	B	B	B
	3.3pF (3R3)	B	B	B	B	B	B	B	B	B	B
	3.9pF (3R9)	B	B	B	B	B	B	B	B	B	B
	4.7pF (4R7)	B	B	B	B	B	B	B	B	B	B
	5.6pF (5R6)	B	B	B	B	B	B	B	B	B	B
	6.8pF (6R8)	B	B	B	B	B	B	B	B	B	B
	8.2pF (8R2)	B	B	B	B	B	B	B	B	B	B
	10pF (100)	B	B	B	B	B	B	B	B	B	B
	12pF (120)	B	B	B	B	B	B	B	B	B	B
	15pF (150)	B	B	B	B	B	B	B	B	B	B
	18pF (180)	B	B	B	B	B	B	B	B	B	B
	22pF (220)	B	B	B	B	B	B	B	B	B	D
	27pF (270)	B	B	B	B	B	B	B	B	B	D
	33pF (330)	B	B	B	B	B	B	B	B	B	D
	39pF (390)	B	B	B	B	B	B	B	B	B	D
	47pF (470)	B	B	B	B	B	B	B	B	B	D
	56pF (560)	B	B	B	B	B	B	B	B	B	D
	68pF (680)	B	B	B	B	B	B	B	B	B	D
	82pF (820)	B	B	B	B	B	B	B	B	B	D
	100pF (101)	B	B	B	B	B	B	B	B	B	D
	120pF (121)	B	B	B	B	B	B	B	B	B	D
	150pF (151)	B	B	B	B	B	B	B	B	B	D
	180pF (181)	B	B	B	B	B	B	B	B	B	G
	220pF (221)	B	B	B	B	B	B	B	B	B	G
	270pF (271)	B	B	B	B	B	B	C	C	C	G
	330pF (331)	B	B	B	B	B	B	C	C	C	G
	390pF (391)	B	B	B	B	B	B	C	C	C	G
	470pF (471)	B	B	B	B	B	C	C	C	C	G
	560pF (561)	B	B	B	B	B	C	D	D	D	G
	680pF (681)	B	B	B	B	B	C	D	D	D	G
	820pF (821)	B	B	B	B	B	C	G	G	G	G
	1,000pF (102)	B	B	B	B	B	C	G	G	G	G
	1,200pF (122)	B	B	B	B	B	C	G	G	G	
	1,500pF (152)	B	B	B	B	B	D	G	G	G	
	1,800pF (182)	B	B	B	B	B	D	G	G	G	
2,200pF (222)	B	B	B	B	B	D	G	G	G		
2,700pF (272)	B	B	B	B	B	D	G				
3,300pF (332)	B	B	B	B	B	D	G				
3,900pF (392)	B	B	B	B	B	D	G				
4,700pF (472)	B	B	B	B	B	D	G				
5,600pF (562)	B	B	B	B	B						
6,800pF (682)	C	C	C	C	C						
8,200pF (822)	D	D	D	D	D						
0.01μF (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

**NP0 Dielectric**

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

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

**X7R Dielectric**

DIELECTRIC		X7R												
SIZE		0201				0402				0603				
RATED VOLTAGE		10	16	25	50	10	16	25	50	10	16	25	50	100
Capacitance	100pF (101)	L	L	L	L	N	N	N	N	S	S	S	S	S
	120pF (121)	L	L	L	L	N	N	N	N	S	S	S	S	S
	150pF (151)	L	L	L	L	N	N	N	N	S	S	S	S	S
	180pF (181)	L	L	L	L	N	N	N	N	S	S	S	S	S
	220pF (221)	L	L	L	L	N	N	N	N	S	S	S	S	S
	270pF (271)	L	L	L	L	N	N	N	N	S	S	S	S	S
	330pF (331)	L	L	L	L	N	N	N	N	S	S	S	S	S
	390pF (391)	L	L	L	L	N	N	N	N	S	S	S	S	S
	470pF (471)	L	L	L	L	N	N	N	N	S	S	S	S	S
	560pF (561)	L	L	L	L	N	N	N	N	S	S	S	S	S
	680pF (681)	L	L	L	L	N	N	N	N	S	S	S	S	S
	820pF (821)	L	L	L	L	N	N	N	N	S	S	S	S	S
	1,000pF (102)	L	L	L	L	N	N	N	N	S	S	S	S	S
	1,200pF (122)	L	L	L		N	N	N	N	S	S	S	S	S
	1,500pF (152)	L	L	L		N	N	N	N	S	S	S	S	S
	1,800pF (182)	L	L	L		N	N	N	N	S	S	S	S	S
	2,200pF (222)	L	L	L		N	N	N	N	S	S	S	S	S
	2,700pF (272)	L	L	L		N	N	N	N	S	S	S	S	S
	3,300pF (332)	L	L	L		N	N	N	N	S	S	S	S	S
	3,900pF (392)	L	L	L		N	N	N	N	S	S	S	S	S
	4,700pF (472)	L	L	L		N	N	N	N	S	S	S	S	S
	5,600pF (562)	L	L	L		N	N	N	N	S	S	S	S	S
	6,800pF (682)	L				N	N	N	N	S	S	S	S	S
	8,200pF (822)	L				N	N	N	N	S	S	S	S	S
	0.010μF (103)	L				N	N	N	N	S	S	S	S	S
	0.012μF (123)									S	S	S	S	X
	0.015μF (153)									S	S	S	S	X
	0.018μF (183)									S	S	S	S	X
	0.022μF (223)									S	S	S	S	X
	0.027μF (273)									S	S	S	S	
0.033μF (333)									S	S	S	X		
0.039μF (393)									S	S	S	X		
0.047μF (473)									S	S	S	X		
0.056μF (563)									S	S	S	X		
0.068μF (683)									S	S	S	X		
0.082μF (823)									S	S	S	X		
0.10μF (104)									S	S	S	X		
0.22μF (224)														
0.47μF (474)														
1.0μF (105)														

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

**X7R Dielectric**

DIELECTRIC		X7R																	
SIZE		0805								1206									
RATED VOLTAGE (VDC)		10	16	25	50	100	200	250	500	630	10	16	25	50	100	200	250	500	630
Capacitance	100pF (101)	B	B	B	B	B	B	B	B	B						D	D	D	D
	120pF (121)	B	B	B	B	B	B	B	B	B						D	D	D	D
	150pF (151)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	180pF (181)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	220pF (221)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	270pF (271)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	330pF (331)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	390pF (391)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	470pF (471)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	560pF (561)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	680pF (681)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	820pF (821)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	1,000pF (102)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	1,200pF (122)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	1,500pF (152)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	1,800pF (182)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	2,200pF (222)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	2,700pF (272)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	3,300pF (332)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	3,900pF (392)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	4,700pF (472)	B	B	B	B	B	B	B	D	D	B	B	B	B	B	D	D	D	D
	5,600pF (562)	B	B	B	B	B	B	B	D	D	B	B	B	B	B	D	D	D	D
	6,800pF (682)	B	B	B	B	B	B	B	D	D	B	B	B	B	B	D	D	D	D
	8,200pF (822)	B	B	B	B	B	B	B	D	D	B	B	B	B	B	D	D	D	D
	0.010μF (103)	B	B	B	B	B	D	D	D	D	B	B	B	B	B	D	D	D	D
	0.012μF (123)	B	B	B	B	B	D	D			B	B	B	B	B	D	D		
	0.015μF (153)	B	B	B	B	B	D	D			B	B	B	B	B	D	D		
	0.018μF (183)	B	B	B	B	B	D	D			B	B	B	B	B	D	D		
	0.022μF (223)	B	B	B	B	B	D	D			B	B	B	B	B	D	D		
	0.027μF (273)	B	B	B	B	D					B	B	B	B	B				
	0.033μF (333)	B	B	B	B	D					B	B	B	B	B				
	0.039μF (393)	B	B	B	B	D					B	B	B	B	B				
	0.047μF (473)	B	B	B	B	D					B	B	B	B	B				
	0.056μF (563)	B	B	B	B	D					B	B	B	B	B				
	0.068μF (683)	B	B	B	B	D					B	B	B	B	B				
	0.082μF (823)	B	B	B	B	D					B	B	B	B	D				
	0.10μF (104)	B	B	B	B	D					B	B	B	B	D				
	0.12μF (124)	B	B	B	D						B	B	B	B	D				
	0.15μF (154)	D	D	D	D						C	C	C	C	G				
	0.18μF (184)	D	D	D	D						C	C	C	C	G				
0.22μF (224)	D	D	D	D						C	C	C	C	G					
0.27μF (274)	D	D	D							C	C	C	D						
0.33μF (334)	D	D	D							C	C	C	D						
0.39μF (394)	D	D	D							C	C	J	P						
0.47μF (474)	D	D	D							J	J	J	P						
0.56μF (564)	D	D	D							J	J	J	P						
0.68μF (684)	D	D	D							J	J	J	P						
0.82μF (824)	D	D	D							J	J	J	P						
1.0μF (105)	D									J	J	J	P						
2.2μF (225)																			
4.7μF (475)																			
10μF (106)																			

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

**X7R Dielectric**

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

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

**8. PACKAGING STYLE AND QUANTITY**

Size	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0201 (0603)	0.30±0.03	L	15k	70k	-	-
0402 (1005)	0.50±0.05	N	10k	50k	-	-
0603 (1608)	0.80±0.07	S	4k	15k	-	-
	0.80+0.15/-0.10	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±0.20	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
	1.60+0.30/-0.10	P	-	-	2k	9k
1210 (3225)	0.95±0.10	C	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	-
	2.00±0.20	K	-	-	1k	6k
	2.50±0.30	M	-	-	1k	6k

Unit: pieces



Multilayer Ceramic Capacitors

**9. RELIABILITY TEST CONDITIONS AND REQUIREMENTS**

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																														
1.	Pre-and Post-Stress Electrical Test	---																															
2.	High Temperature Exposure (Storage) MIL-STD-202 Method 108	* Test temp.: 150±3°C * Unpowered. * Test time: 1000+24/-0 hrs. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change : NPO: within ±2.5% or ±0.25pF whichever is larger. X7R: within ±10.00%. * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <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="3">≥50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0201(50V);0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤10% 1210≥4.7μF</td> </tr> <tr> <td>≤20% 0402≥0.1μF;0603≥1μF; 0805≥1μF;1206≥2.2μF; 1210≥10μF; TT series</td> </tr> <tr> <td>35V</td> <td>≤5%</td> <td>≤20% 0603≥1μF;0805≥2.2μF;1210≥10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤10% 0201≥0.01μF;0805≥1μF; 1210≥10μF</td> </tr> <tr> <td>≤14% 0603≥0.33μF;1206≥4.7μF</td> </tr> <tr> <td>≤15% 0402≥0.10μF;0603≥0.47μF;0805≥2.2μF;1206≥6.8μF; 1210≥22μF; TT series</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;0402≥0.033μF;0603≥0.68μF;0805≥2.2μF; 1206≥4.7μF; 1210≥22μF; TT series</td> </tr> <tr> <td>10V</td> <td>≤7.5%</td> <td>≤15% 0201≥0.012μF;0402≥0.33μF; 0603≥0.33μF;0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤15%</td> <td>≤20% 0201≥0.1μF ;0402≥1μF; TT series</td> </tr> <tr> <td>≤30% 0201≥0.1μF;0402≥1μF;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> * I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller. Class II (X7R)	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥50V	≤3%	≤6% 0201(50V);0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF	≤10% 1210≥4.7μF	≤20% 0402≥0.1μF;0603≥1μF; 0805≥1μF;1206≥2.2μF; 1210≥10μF; TT series	35V	≤5%	≤20% 0603≥1μF;0805≥2.2μF;1210≥10μF	25V	≤5%	≤10% 0201≥0.01μF;0805≥1μF; 1210≥10μF	≤14% 0603≥0.33μF;1206≥4.7μF	≤15% 0402≥0.10μF;0603≥0.47μF;0805≥2.2μF;1206≥6.8μF; 1210≥22μF; TT series	16V	≤5%	≤10% 0603≥0.15μF;0805≥0.68μF;1206≥2.2μF;1210≥4.7μF	≤15% 0201≥0.01μF;0402≥0.033μF;0603≥0.68μF;0805≥2.2μF; 1206≥4.7μF; 1210≥22μF; TT series	10V	≤7.5%	≤15% 0201≥0.012μF;0402≥0.33μF; 0603≥0.33μF;0805≥2.2μF; 1206≥2.2μF; 1210≥22μF	6.3V	≤15%	≤20% 0201≥0.1μF ;0402≥1μF; TT series	≤30% 0201≥0.1μF;0402≥1μF;0603≥10μF; 0805≥4.7μF;1206≥47μF;1210≥100μF;TT series	4V	≤20%	---
Rated vol.	D.F. ≤	Exception of D.F. ≤																															
≥50V	≤3%	≤6% 0201(50V);0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF																															
		≤10% 1210≥4.7μF																															
		≤20% 0402≥0.1μF;0603≥1μF; 0805≥1μF;1206≥2.2μF; 1210≥10μF; TT series																															
35V	≤5%	≤20% 0603≥1μF;0805≥2.2μF;1210≥10μF																															
25V	≤5%	≤10% 0201≥0.01μF;0805≥1μF; 1210≥10μF																															
		≤14% 0603≥0.33μF;1206≥4.7μF																															
		≤15% 0402≥0.10μF;0603≥0.47μF;0805≥2.2μF;1206≥6.8μF; 1210≥22μF; TT series																															
16V	≤5%	≤10% 0603≥0.15μF;0805≥0.68μF;1206≥2.2μF;1210≥4.7μF																															
		≤15% 0201≥0.01μF;0402≥0.033μF;0603≥0.68μF;0805≥2.2μF; 1206≥4.7μF; 1210≥22μF; TT series																															
10V	≤7.5%	≤15% 0201≥0.012μF;0402≥0.33μF; 0603≥0.33μF;0805≥2.2μF; 1206≥2.2μF; 1210≥22μF																															
6.3V	≤15%	≤20% 0201≥0.1μF ;0402≥1μF; TT series																															
		≤30% 0201≥0.1μF;0402≥1μF;0603≥10μF; 0805≥4.7μF;1206≥47μF;1210≥100μF;TT series																															
4V	≤20%	---																															
			<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">1GΩ or RxC ≥10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>35V:0805≥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</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	≥100V: X7R	1GΩ or RxC ≥10 Ω-F whichever is smaller.	50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	35V:0805≥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																				
Rated voltage	Insulation Resistance																																
≥100V: X7R	1GΩ or RxC ≥10 Ω-F whichever is smaller.																																
50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																	
35V:0805≥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																																	

Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																	
3.	<b>Temperature Cycling</b> JESD22 Method JA-104	* Conduct 1000 cycles according to the temperatures and time. <table border="1" style="margin: 10px 0;"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C +0/-3</td> <td>5±1</td> </tr> <tr> <td>2</td> <td>+125°C +3/-0</td> <td>5±1</td> </tr> </tbody> </table> * Before initial measurement (X7R only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp. *Measurement to be made after keeping at room temp. for 24±2 hrs.	Step	Temp. (°C)	Time (min.)	1	-55°C +0/-3	5±1	2	+125°C +3/-0	5±1	* No remarkable damage. * Cap change : NPO: within ±2.5% or 0.25pF whichever is larger. X7R: within ±10.0%. * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <table border="1" style="margin: 10px 0;"> <thead> <tr> <th>Rated vol.</th> <th>D.F. ≤</th> <th>Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤10% 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td>35V</td> <td>≤5%</td> <td>≤20% 0603 ≥ 1μF;0805≥2.2μF;1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF</td> </tr> <tr> <td>≤15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series</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;0402 ≥ 0.033μF;0603 ≥ 0.68μF;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 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30% 0201 ≥ 0.1μF;0402 ≥ 1μF;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> * I.R.: ≥10GΩ or RxC≥500Ω·F whichever is smaller. Class II (X7R) <table border="1" style="margin: 10px 0;"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">1GΩ or RxC ≥ 10 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>35V:0805≥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</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥50V	≤3%	≤6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤10% 1210 ≥ 4.7μF	≤20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤5%	≤20% 0603 ≥ 1μF;0805≥2.2μF;1210 ≥ 10μF	25V	≤5%	≤10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF	≤14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF	≤15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series	16V	≤5%	≤10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF	≤15% 0201 ≥ 0.01μF;0402 ≥ 0.033μF;0603 ≥ 0.68μF;0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	10V	≤7.5%	≤15% 0201 ≥ 0.012μF;0402 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series	6.3V	≤15%	≤30% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603 ≥ 10μF; 0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF;TT series	4V	≤20%	---	Rated voltage	Insulation Resistance	≥100V: X7R	1GΩ or RxC ≥ 10 Ω·F whichever is smaller.	50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	35V:0805≥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
Step	Temp. (°C)	Time (min.)																																																		
1	-55°C +0/-3	5±1																																																		
2	+125°C +3/-0	5±1																																																		
Rated vol.	D.F. ≤	Exception of D.F. ≤																																																		
≥50V	≤3%	≤6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																		
		≤10% 1210 ≥ 4.7μF																																																		
		≤20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																																																		
35V	≤5%	≤20% 0603 ≥ 1μF;0805≥2.2μF;1210 ≥ 10μF																																																		
25V	≤5%	≤10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF																																																		
		≤14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF																																																		
		≤15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series																																																		
16V	≤5%	≤10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF																																																		
		≤15% 0201 ≥ 0.01μF;0402 ≥ 0.033μF;0603 ≥ 0.68μF;0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																																																		
10V	≤7.5%	≤15% 0201 ≥ 0.012μF;0402 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																		
		≤20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series																																																		
6.3V	≤15%	≤30% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603 ≥ 10μF; 0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF;TT series																																																		
4V	≤20%	---																																																		
Rated voltage	Insulation Resistance																																																			
≥100V: X7R	1GΩ or RxC ≥ 10 Ω·F whichever is smaller.																																																			
50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																																				
35V:0805≥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																																																				

Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																								
4.	<b>Destructive Physical Analysis</b> EIA-469	Per EIA-469	No defects or abnormalities																																								
5.	<b>Moisture Resistance</b> MIL-STD-202 Method 106	* Test temp.: 25~65°C * Humidity: 80~100% RH * Test time: 10 cycles, t=24hrs/cycle. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change : NPO: within ±3.0% or 0.30pF whichever is larger X7R: within ±12.5%. * Q/D.F. value: NPO: More than 30pF Q≥350 ; 10pF≤C≤30pF, Q≥275+2.5C Less than 10pF Q≥200+10C X7R: <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="3">≥ 50V</td> <td rowspan="3">≤ 3%</td> <td>≤ 6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 10% 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td>35V</td> <td>≤ 5%</td> <td>≤ 20% 0603 ≥ 1μF;0805≥2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 5%</td> <td>≤ 10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF</td> </tr> <tr> <td>≤ 15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series</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;0402 ≥ 0.033μF;0603 ≥ 0.68μF;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 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series</td> </tr> <tr> <td>6.3V</td> <td>≤ 15%</td> <td>≤ 30% 0201 ≥ 0.1μF;0402 ≥ 1μF;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> <p>* I.R.: ≥10GΩ or RxC≥500Ω·F whichever is smaller. Class II (X7R)</p> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">1GΩ or RxC ≥ 10 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>35V:0805≥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</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 50V	≤ 3%	≤ 6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 10% 1210 ≥ 4.7μF	≤ 20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤ 5%	≤ 20% 0603 ≥ 1μF;0805≥2.2μF; 1210 ≥ 10μF	25V	≤ 5%	≤ 10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF	≤ 14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF	≤ 15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series	16V	≤ 5%	≤ 10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF	≤ 15% 0201 ≥ 0.01μF;0402 ≥ 0.033μF;0603 ≥ 0.68μF;0805 ≥ 2.2μF 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF;0402 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤ 20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series	6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603 ≥ 10μF; 0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF;TT series	4V	≤ 20%	---	Rated voltage	Insulation Resistance	≥100V: X7R	1GΩ or RxC ≥ 10 Ω·F whichever is smaller.	50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	35V:0805≥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
Rated vol.	D.F. ≤	Exception of D.F. ≤																																									
≥ 50V	≤ 3%	≤ 6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																									
		≤ 10% 1210 ≥ 4.7μF																																									
		≤ 20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																																									
35V	≤ 5%	≤ 20% 0603 ≥ 1μF;0805≥2.2μF; 1210 ≥ 10μF																																									
25V	≤ 5%	≤ 10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF																																									
		≤ 14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF																																									
		≤ 15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series																																									
16V	≤ 5%	≤ 10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF																																									
		≤ 15% 0201 ≥ 0.01μF;0402 ≥ 0.033μF;0603 ≥ 0.68μF;0805 ≥ 2.2μF 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																																									
10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF;0402 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF 1206 ≥ 2.2μF; 1210 ≥ 22μF																																									
		≤ 20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series																																									
6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603 ≥ 10μF; 0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF;TT series																																									
4V	≤ 20%	---																																									
Rated voltage	Insulation Resistance																																										
≥100V: X7R	1GΩ or RxC ≥ 10 Ω·F whichever is smaller.																																										
50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																											
35V:0805≥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																																											

Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																														
6.	Biased Humidity MIL-STD-202 Method 103	* Test temp.: 85±3°C * Humidity: 85%RH * Test time: 1000+24/-0 hrs. * To apply voltage : rated voltage and 1.3~1.5Vdc. (add 100k ohm resistor) * Before initial measurement (Class II only) : To apply test voltage for 1hr at test temp. and 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: NPO: within ±3.0% or 0.30pF whichever is larger. X7R: within ±12.5% * Q/D.F. value: NPO: C≥30pF , Q≥200 ; C<30pF , Q≥100+10/3C X7R:																														
			<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="3">≥50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤10% 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td>35V</td> <td>≤5%</td> <td>≤20% 0603 ≥ 1μF;0805 ≥ 2.2μF;1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF</td> </tr> <tr> <td>≤15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series</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;0402 ≥ 0.033μF;0603 ≥ 0.68μF;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 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30% 0201 ≥ 0.1μF;0402 ≥ 1μF;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. ≤	≥50V	≤3%	≤6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤10% 1210 ≥ 4.7μF	≤20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤5%	≤20% 0603 ≥ 1μF;0805 ≥ 2.2μF;1210 ≥ 10μF	25V	≤5%	≤10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF	≤14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF	≤15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series	16V	≤5%	≤10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF	≤15% 0201 ≥ 0.01μF;0402 ≥ 0.033μF;0603 ≥ 0.68μF;0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	10V	≤7.5%	≤15% 0201 ≥ 0.012μF;0402 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series	6.3V	≤15%	≤30% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603 ≥ 10μF; 0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF;TT series	4V	≤20%	---
			Rated vol.	D.F. ≤	Exception of D.F. ≤																												
			≥50V	≤3%	≤6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																												
					≤10% 1210 ≥ 4.7μF																												
					≤20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																												
			35V	≤5%	≤20% 0603 ≥ 1μF;0805 ≥ 2.2μF;1210 ≥ 10μF																												
			25V	≤5%	≤10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF																												
					≤14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF																												
					≤15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series																												
16V	≤5%	≤10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF																															
		≤15% 0201 ≥ 0.01μF;0402 ≥ 0.033μF;0603 ≥ 0.68μF;0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																															
10V	≤7.5%	≤15% 0201 ≥ 0.012μF;0402 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																															
		≤20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series																															
6.3V	≤15%	≤30% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603 ≥ 10μF; 0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF;TT series																															
4V	≤20%	---																															
* I.R.: ≥1GΩ or RxC≥50Ω-F whichever is smaller. Class II (X7R) for rated voltage test																																	
<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">500MΩ or RxC ≥ 5 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>35V:0805≥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: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</td> </tr> </tbody> </table>			Rated voltage	Insulation Resistance	≥100V: X7R	500MΩ or RxC ≥ 5 Ω-F whichever is smaller.	50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	35V:0805≥2.2μF;1210 ≥ 10μF	25V:0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF	16V: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																					
Rated voltage	Insulation Resistance																																
≥100V: X7R	500MΩ or RxC ≥ 5 Ω-F whichever is smaller.																																
50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																	
35V:0805≥2.2μF;1210 ≥ 10μF																																	
25V:0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF																																	
16V: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																																	
Class II (X7R) for 1.3~1.5Vdc																																	
<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">1GΩ or RxC ≥ 10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>35V:0805≥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</td> </tr> </tbody> </table>			Rated voltage	Insulation Resistance	≥100V: X7R	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.	50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	35V:0805≥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																					
Rated voltage	Insulation Resistance																																
≥100V: X7R	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.																																
50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																	
35V:0805≥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																																	



Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																								
7.	Operational Life MIL-STD-202 Method 108	* Test temp.: 125±3°C * To apply voltage: full rated voltage. * Test time: 1000+24/0 hrs. * Before initial measurement (X7R only): Apply rated voltage for 1 hr at 125°C. Remove and let 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: NPO: within ±3.0% or ±0.3pF whichever is larger X7R: within ±12.5%. * Q/D.F. value: NPO: More than 30pF, Q≥350 ; 10pF≤C<30pF, Q≥275+2.5C Less than 10pF, Q≥200+10C X7R: <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="3">≥50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤10% 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td>35V</td> <td>≤5%</td> <td>≤20% 0603 ≥ 1μF;0805≥2.2μF;1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF</td> </tr> <tr> <td>≤15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series</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;0402 ≥ 0.033μF;0603 ≥ 0.68μF;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 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30% 0201 ≥ 0.1μF;0402 ≥ 1μF;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> * I.R.: ≥1GΩ or RxC≥50Ω-F whichever is smaller. Class II (X7R) <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">1GΩ or RxC ≥ 10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>35V:0805≥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</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥50V	≤3%	≤6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤10% 1210 ≥ 4.7μF	≤20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤5%	≤20% 0603 ≥ 1μF;0805≥2.2μF;1210 ≥ 10μF	25V	≤5%	≤10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF	≤14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF	≤15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series	16V	≤5%	≤10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF	≤15% 0201 ≥ 0.01μF;0402 ≥ 0.033μF;0603 ≥ 0.68μF;0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	10V	≤7.5%	≤15% 0201 ≥ 0.012μF;0402 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series	6.3V	≤15%	≤30% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603 ≥ 10μF; 0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF;TT series	4V	≤20%	---	Rated voltage	Insulation Resistance	≥100V: X7R	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.	50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	35V:0805≥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
Rated vol.	D.F. ≤	Exception of D.F. ≤																																									
≥50V	≤3%	≤6% 0201(50V);0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																									
		≤10% 1210 ≥ 4.7μF																																									
		≤20% 0402 ≥ 0.1μF;0603 ≥ 1μF; 0805 ≥ 1μF;1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																																									
35V	≤5%	≤20% 0603 ≥ 1μF;0805≥2.2μF;1210 ≥ 10μF																																									
25V	≤5%	≤10% 0201 ≥ 0.01μF;0805 ≥ 1μF; 1210 ≥ 10μF																																									
		≤14% 0603 ≥ 0.33μF;1206 ≥ 4.7μF																																									
		≤15% 0402 ≥ 0.10μF;0603 ≥ 0.47μF;0805 ≥ 2.2μF;1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series																																									
16V	≤5%	≤10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF																																									
		≤15% 0201 ≥ 0.01μF;0402 ≥ 0.033μF;0603 ≥ 0.68μF;0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																																									
10V	≤7.5%	≤15% 0201 ≥ 0.012μF;0402 ≥ 0.33μF; 0603 ≥ 0.33μF;0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																									
		≤20% 0201 ≥ 0.1μF ;0402 ≥ 1μF; TT series																																									
6.3V	≤15%	≤30% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603 ≥ 10μF; 0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF;TT series																																									
4V	≤20%	---																																									
Rated voltage	Insulation Resistance																																										
≥100V: X7R	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.																																										
50V:0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																											
35V:0805≥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																																											
8.	External Visual MIL-STD-883 Method 2009	Visual inspection	No remarkable defect.																																								
9.	Physical Dimension JESD22 Method JB-100	Using by calipers	Within the specified dimensions																																								



Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements			
10.	Resistance to Solvents MIL-STD-202 Method 215	* Temperature: 25±5°C * Time: 3+0.5/-0 min. * Solvent: Iso-propyl alcohol.	* No remarkable damage. * Cap.: within the specified tolerance. * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R:			
			Rated vol.	D.F. ≤	Exception of D.F. ≤	
			≥ 50V	≤ 2.5%	≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF ≤ 5% 1210 ≥ 4.7μF ≤ 10% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	
			35V	≤ 3.5%	≤ 10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF	
			25V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	
					≤ 7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF	
					≤ 10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series	
			16V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	
					≤ 10% 0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	
			10V	≤ 5%	≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series	
					≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF	
			6.3V	≤ 10%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	
			4V	≤ 15%	≤ 20% 0402 ≥ 2.2μF	
						* I.R.: ≥10GΩ or RxC≥500Ω·F whichever is smaller.
						Class II (X7R)
		Rated voltage	Insulation Resistance			
		≥100V: X7R	10GΩ or RxC ≥ 100 Ω·F whichever is smaller.			
		50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF				
		35V: 0805 ≥ 2.2μF; 1210 ≥ 10μF				
		25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF				
		16V: 0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 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				

Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																												
11.	<b>Mechanical Shock</b> MIL-STD-202 Method 213	* Peak value: 1500g's. * Wave: 1/2 sine. * Velocity: 15.4 ft/sec * Three shocks in each direction should be applied along 3 mutually perpendicular axes of the test specimen (18 shocks)	* No remarkable damage. * Cap.: within the specified tolerance. * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R:																																												
			<table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F. ≤</th> <th colspan="2">Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥ 50V</td> <td rowspan="3">≤ 2.5%</td> <td>≤ 3%</td> <td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 5%</td> <td>1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10%</td> <td>0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td>35V</td> <td>≤ 3.5%</td> <td>≤ 10%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 3.5%</td> <td>≤ 5%</td> <td>0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 7%</td> <td>0603 ≥ 0.33μF; 1206 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10%</td> <td>0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF ; TT series</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤ 3.5%</td> <td>≤ 5%</td> <td>0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10%</td> <td>0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td>10V</td> <td>≤ 5%</td> <td>≤ 10%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤ 10%</td> <td>≤ 15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td>≤ 20%</td> <td>0402 ≥ 2.2μF</td> </tr> <tr> <td>4V</td> <td>≤ 15%</td> <td>---</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤		≥ 50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 5%	1210 ≥ 4.7μF	≤ 10%	0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 7%	0603 ≥ 0.33μF; 1206 ≥ 4.7μF	≤ 10%	0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF ; TT series	16V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤ 10%	0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	10V	≤ 5%	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series	6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	≤ 20%	0402 ≥ 2.2μF	4V	≤ 15%	---	---
			Rated vol.	D.F. ≤	Exception of D.F. ≤																																										
			≥ 50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																									
					≤ 5%	1210 ≥ 4.7μF																																									
					≤ 10%	0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																																									
			35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF																																									
			25V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																																									
					≤ 7%	0603 ≥ 0.33μF; 1206 ≥ 4.7μF																																									
					≤ 10%	0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF ; TT series																																									
			16V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																									
					≤ 10%	0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																																									
			10V	≤ 5%	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series																																									
			6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																									
					≤ 20%	0402 ≥ 2.2μF																																									
4V	≤ 15%	---	---																																												
* I.R.: ≥10GΩ or RxC≥500Ω·F whichever is smaller.																																															
Class II (X7R)																																															
<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">10GΩ or RxC ≥ 100 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0805 ≥ 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 ≥ 0.1uF; 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</td> </tr> </tbody> </table>			Rated voltage	Insulation Resistance	≥100V: X7R	10GΩ or RxC ≥ 100 Ω·F whichever is smaller.	50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0805 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1uF; 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																																			
Rated voltage	Insulation Resistance																																														
≥100V: X7R	10GΩ or RxC ≥ 100 Ω·F whichever is smaller.																																														
50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																															
35V: 0805 ≥ 2.2μF; 1210 ≥ 10μF																																															
25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																															
16V: 0201 ≥ 0.1uF; 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																																															

Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																														
12.	Vibration MIL-STD-202 Method 204	* Vibration frequency: 10~2000 Hz/min. (5g's for 20 min) * Total amplitude: 1.5mm * 12 cycles each of 3 orientations (36 times)	* No remarkable damage. * Cap.: within the specified tolerance. * Q/D.F. value: NPO:Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <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="3">≥ 50V</td> <td rowspan="3">≤ 2.5%</td> <td>≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 5% 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td>35V</td> <td>≤ 3.5%</td> <td>≤ 10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 3.5%</td> <td>≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤ 3.5%</td> <td>≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td>10V</td> <td>≤ 5%</td> <td>≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤ 10%</td> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td>4V</td> <td>≤ 15%</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 50V	≤ 2.5%	≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 5% 1210 ≥ 4.7μF	≤ 10% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤ 3.5%	≤ 10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF	≤ 10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series	16V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤ 10% 0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	10V	≤ 5%	≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series	6.3V	≤ 10%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	4V	≤ 15%	---
Rated vol.	D.F. ≤	Exception of D.F. ≤																															
≥ 50V	≤ 2.5%	≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																															
		≤ 5% 1210 ≥ 4.7μF																															
		≤ 10% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																															
35V	≤ 3.5%	≤ 10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF																															
25V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																															
		≤ 7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF																															
		≤ 10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series																															
16V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																															
		≤ 10% 0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																															
10V	≤ 5%	≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series																															
6.3V	≤ 10%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF																															
		≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																															
4V	≤ 15%	---																															
			* I.R.: ≥10GΩ or RxC≥500Ω·F whichever is smaller. Class II (X7R) <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">10GΩ or RxC ≥ 100 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0805 ≥ 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 ≥ 0.1uF; 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</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	≥100V: X7R	10GΩ or RxC ≥ 100 Ω·F whichever is smaller.	50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0805 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1uF; 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																				
Rated voltage	Insulation Resistance																																
≥100V: X7R	10GΩ or RxC ≥ 100 Ω·F whichever is smaller.																																
50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																	
35V: 0805 ≥ 2.2μF; 1210 ≥ 10μF																																	
25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																	
16V: 0201 ≥ 0.1uF; 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																																	

Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																															
13.	Resistance to Soldering Heat MIL-STD-202 Method 210	* Solder temperature: 270±5°C * Dipping time: 10±1 sec * Before initial measurement (X7R only): Perform 150+0/-10°C for 1 hr and 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: NPO: within ±2.5% or 0.25pF whichever is larger X7R: within ±7.5% * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R:																															
			<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="2">≥ 50V</td> <td rowspan="2">≤ 2.5%</td> <td>≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 5% 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="2">35V</td> <td rowspan="2">≤ 3.5%</td> <td>≤ 10% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 3.5%</td> <td>≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF ; TT series</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤ 3.5%</td> <td>≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤ 5%</td> <td>≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤ 10%</td> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF ; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td>≤ 20% 0402 ≥ 2.2μF</td> </tr> <tr> <td>4V</td> <td>≤ 15%</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 50V	≤ 2.5%	≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 5% 1210 ≥ 4.7μF	35V	≤ 3.5%	≤ 10% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF	≤ 10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF ; TT series	16V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤ 10% 0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	10V	≤ 5%	≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF	6.3V	≤ 10%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF ; 1210 ≥ 100μF; TT series	≤ 20% 0402 ≥ 2.2μF	4V	≤ 15%	---
			Rated vol.	D.F. ≤	Exception of D.F. ≤																													
			≥ 50V	≤ 2.5%	≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																													
					≤ 5% 1210 ≥ 4.7μF																													
			35V	≤ 3.5%	≤ 10% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																													
					0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF																													
			25V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																													
					≤ 7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF																													
					≤ 10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF ; TT series																													
			16V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																													
					≤ 10% 0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																													
			10V	≤ 5%	≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series																													
≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF																																		
6.3V	≤ 10%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF ; 1210 ≥ 100μF; TT series																																
		≤ 20% 0402 ≥ 2.2μF																																
4V	≤ 15%	---																																
* I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller. Class II (X7R)																																		
<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">10GΩ or RxC ≥ 100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0805 ≥ 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 ≥ 0.1uF; 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</td> </tr> </tbody> </table>		Rated voltage	Insulation Resistance	≥100V: X7R	10GΩ or RxC ≥ 100 Ω-F whichever is smaller.	50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0805 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1uF; 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																							
Rated voltage	Insulation Resistance																																	
≥100V: X7R	10GΩ or RxC ≥ 100 Ω-F whichever is smaller.																																	
50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																		
35V: 0805 ≥ 2.2μF; 1210 ≥ 10μF																																		
25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																		
16V: 0201 ≥ 0.1uF; 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																																		

**Multilayer Ceramic Capacitors**

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																		
14	<b>Thermal Shock</b> MIL-STD-202 Method 107	* Conduct 300 cycles according to the temperatures and time. <table border="1"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C +0/-3</td> <td>15±3</td> </tr> <tr> <td>2</td> <td>+125°C +3/-0</td> <td>15±3</td> </tr> </tbody> </table> * Max. transfer time: 20 sec. * Before initial measurement (X7R only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs.	Step	Temp. (°C)	Time (min.)	1	-55°C +0/-3	15±3	2	+125°C +3/-0	15±3	* No remarkable damage. * Cap change : NPO: within ±2.5% or 0.25pF whichever is larger X7R: within ±10.0% * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <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="3">≥ 50V</td> <td rowspan="3">≤ 3%</td> <td>≤ 6% 0201 (50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 10% 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 20% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 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; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 5%</td> <td>≤ 14% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF</td> </tr> <tr> <td>≤ 15% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td>≤ 15% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤ 5%</td> <td>≤ 15% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤ 7.5%</td> <td>≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1μF ; 0402 ≥ 1μF; TT series</td> </tr> <tr> <td>6.3V</td> <td>≤ 15%</td> <td>≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 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> * I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller. Class II (X7R) <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">1GΩ or RxC ≥ 10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥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</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 50V	≤ 3%	≤ 6% 0201 (50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 10% 1210 ≥ 4.7μF	≤ 20% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF	≤ 10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	25V	≤ 5%	≤ 14% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF	≤ 15% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series	≤ 15% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	16V	≤ 5%	≤ 15% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤ 20% 0201 ≥ 0.1μF ; 0402 ≥ 1μF; TT series	6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series	4V	≤ 20%	---	Rated voltage	Insulation Resistance	≥100V: X7R	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.	50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF	35V: 0805≥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
			Step	Temp. (°C)	Time (min.)																																																
			1	-55°C +0/-3	15±3																																																
			2	+125°C +3/-0	15±3																																																
			Rated vol.	D.F. ≤	Exception of D.F. ≤																																																
			≥ 50V	≤ 3%	≤ 6% 0201 (50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																
					≤ 10% 1210 ≥ 4.7μF																																																
					≤ 20% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																																																
			35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF																																																
					≤ 10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																																																
			25V	≤ 5%	≤ 14% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF																																																
					≤ 15% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series																																																
					≤ 15% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																																
			16V	≤ 5%	≤ 15% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																																																
					≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																
10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																			
		≤ 20% 0201 ≥ 0.1μF ; 0402 ≥ 1μF; TT series																																																			
6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF; TT series																																																			
4V	≤ 20%	---																																																			
Rated voltage	Insulation Resistance																																																				
≥100V: X7R	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.																																																				
50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF																																																					
35V: 0805≥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																																																					

Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																															
15.	ESD AEC-Q200-002	Per AEC-Q200-002	No remarkable damage.																															
			* Cap.: within the specified tolerance.																															
			* Q/D.F. value:																															
			NPO: Cap $\geq$ 30pF, Q $\geq$ 1000 ; Cap $<$ 30pF, Q $\geq$ 400+20C.																															
			X7R:																															
			<table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F. <math>\leq</math></th> <th>Exception of D.F. <math>\leq</math></th> </tr> </thead> <tbody> <tr> <td rowspan="3"><math>\geq</math>50V</td> <td rowspan="3"><math>\leq</math>2.5%</td> <td><math>\leq</math>3% 0201(50V); 0603<math>\geq</math>0.047<math>\mu</math>F; 0805<math>\geq</math>0.18<math>\mu</math>F;1206<math>\geq</math>0.47<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math>5% 1210<math>\geq</math>4.7<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math>10% 0402<math>\geq</math>0.1<math>\mu</math>F;0603<math>\geq</math>1<math>\mu</math>F; 0805<math>\geq</math>1<math>\mu</math>F;1206<math>\geq</math>2.2<math>\mu</math>F; 1210<math>\geq</math>10<math>\mu</math>F; TT series</td> </tr> <tr> <td>35V</td> <td><math>\leq</math>3.5%</td> <td><math>\leq</math>10% 0603<math>\geq</math>1<math>\mu</math>F;0805<math>\geq</math>2.2<math>\mu</math>F; 1210<math>\geq</math>10<math>\mu</math>F</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3"><math>\leq</math>3.5%</td> <td><math>\leq</math>5% 0201<math>\geq</math>0.01<math>\mu</math>F;0805<math>\geq</math>1<math>\mu</math>F; 1210<math>\geq</math>10<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math>7% 0603<math>\geq</math>0.33<math>\mu</math>F; 1206<math>\geq</math>4.7<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math>10% 0402<math>\geq</math>0.10<math>\mu</math>F;0603<math>\geq</math>0.47<math>\mu</math>F; 0805<math>\geq</math>2.2<math>\mu</math>F; 1206<math>\geq</math>6.8<math>\mu</math>F ; 1210<math>\geq</math>22<math>\mu</math>F ; TT series</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2"><math>\leq</math>3.5%</td> <td><math>\leq</math>5% 0201<math>\geq</math>0.01<math>\mu</math>F;0402<math>\geq</math>0.033<math>\mu</math>F;0603<math>\geq</math>0.15<math>\mu</math>F; 0805<math>\geq</math>0.68<math>\mu</math>F;1206<math>\geq</math>2.2<math>\mu</math>F;1210<math>\geq</math>4.7<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math>10% 0201<math>\geq</math>0.1<math>\mu</math>F; 0402<math>\geq</math>0.22<math>\mu</math>F; 0603<math>\geq</math>0.68<math>\mu</math>F;0805<math>\geq</math>2.2<math>\mu</math>F; 1206<math>\geq</math>4.7<math>\mu</math>F; 1210<math>\geq</math>22<math>\mu</math>F; TT series</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2"><math>\leq</math>5%</td> <td><math>\leq</math>10% 0201<math>\geq</math>0.012<math>\mu</math>F;0402<math>\geq</math>0.33<math>\mu</math>F;0603<math>\geq</math>0.33<math>\mu</math>F; 0805<math>\geq</math>2.2<math>\mu</math>F; 1206<math>\geq</math>2.2<math>\mu</math>F;1210<math>\geq</math>22<math>\mu</math>F; TT series</td> </tr> <tr> <td><math>\leq</math>15% 0201<math>\geq</math>0.1<math>\mu</math>F; 0402<math>\geq</math>1<math>\mu</math>F</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2"><math>\leq</math>10%</td> <td><math>\leq</math>15% 0201<math>\geq</math>0.1<math>\mu</math>F;0402<math>\geq</math>1<math>\mu</math>F;0603<math>\geq</math>10<math>\mu</math>F; 0805<math>\geq</math>4.7<math>\mu</math>F; 1206<math>\geq</math>47<math>\mu</math>F ;1210<math>\geq</math>100<math>\mu</math>F; TT series</td> </tr> <tr> <td><math>\leq</math>20% 0402<math>\geq</math>2.2<math>\mu</math>F</td> </tr> <tr> <td>4V</td> <td><math>\leq</math>15%</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. $\leq$	Exception of D.F. $\leq$	$\geq$ 50V	$\leq$ 2.5%	$\leq$ 3% 0201(50V); 0603 $\geq$ 0.047 $\mu$ F; 0805 $\geq$ 0.18 $\mu$ F;1206 $\geq$ 0.47 $\mu$ F	$\leq$ 5% 1210 $\geq$ 4.7 $\mu$ F	$\leq$ 10% 0402 $\geq$ 0.1 $\mu$ F;0603 $\geq$ 1 $\mu$ F; 0805 $\geq$ 1 $\mu$ F;1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F; TT series	35V	$\leq$ 3.5%	$\leq$ 10% 0603 $\geq$ 1 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F	25V	$\leq$ 3.5%	$\leq$ 5% 0201 $\geq$ 0.01 $\mu$ F;0805 $\geq$ 1 $\mu$ F; 1210 $\geq$ 10 $\mu$ F	$\leq$ 7% 0603 $\geq$ 0.33 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F	$\leq$ 10% 0402 $\geq$ 0.10 $\mu$ F;0603 $\geq$ 0.47 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 6.8 $\mu$ F ; 1210 $\geq$ 22 $\mu$ F ; TT series	16V	$\leq$ 3.5%	$\leq$ 5% 0201 $\geq$ 0.01 $\mu$ F;0402 $\geq$ 0.033 $\mu$ F;0603 $\geq$ 0.15 $\mu$ F; 0805 $\geq$ 0.68 $\mu$ F;1206 $\geq$ 2.2 $\mu$ F;1210 $\geq$ 4.7 $\mu$ F	$\leq$ 10% 0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 0.22 $\mu$ F; 0603 $\geq$ 0.68 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 22 $\mu$ F; TT series	10V	$\leq$ 5%	$\leq$ 10% 0201 $\geq$ 0.012 $\mu$ F;0402 $\geq$ 0.33 $\mu$ F;0603 $\geq$ 0.33 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F;1210 $\geq$ 22 $\mu$ F; TT series	$\leq$ 15% 0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 1 $\mu$ F	6.3V	$\leq$ 10%	$\leq$ 15% 0201 $\geq$ 0.1 $\mu$ F;0402 $\geq$ 1 $\mu$ F;0603 $\geq$ 10 $\mu$ F; 0805 $\geq$ 4.7 $\mu$ F; 1206 $\geq$ 47 $\mu$ F ;1210 $\geq$ 100 $\mu$ F; TT series	$\leq$ 20% 0402 $\geq$ 2.2 $\mu$ F	4V	$\leq$ 15%	---
			Rated vol.	D.F. $\leq$	Exception of D.F. $\leq$																													
			$\geq$ 50V	$\leq$ 2.5%	$\leq$ 3% 0201(50V); 0603 $\geq$ 0.047 $\mu$ F; 0805 $\geq$ 0.18 $\mu$ F;1206 $\geq$ 0.47 $\mu$ F																													
					$\leq$ 5% 1210 $\geq$ 4.7 $\mu$ F																													
					$\leq$ 10% 0402 $\geq$ 0.1 $\mu$ F;0603 $\geq$ 1 $\mu$ F; 0805 $\geq$ 1 $\mu$ F;1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F; TT series																													
			35V	$\leq$ 3.5%	$\leq$ 10% 0603 $\geq$ 1 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F																													
			25V	$\leq$ 3.5%	$\leq$ 5% 0201 $\geq$ 0.01 $\mu$ F;0805 $\geq$ 1 $\mu$ F; 1210 $\geq$ 10 $\mu$ F																													
					$\leq$ 7% 0603 $\geq$ 0.33 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F																													
					$\leq$ 10% 0402 $\geq$ 0.10 $\mu$ F;0603 $\geq$ 0.47 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 6.8 $\mu$ F ; 1210 $\geq$ 22 $\mu$ F ; TT series																													
			16V	$\leq$ 3.5%	$\leq$ 5% 0201 $\geq$ 0.01 $\mu$ F;0402 $\geq$ 0.033 $\mu$ F;0603 $\geq$ 0.15 $\mu$ F; 0805 $\geq$ 0.68 $\mu$ F;1206 $\geq$ 2.2 $\mu$ F;1210 $\geq$ 4.7 $\mu$ F																													
$\leq$ 10% 0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 0.22 $\mu$ F; 0603 $\geq$ 0.68 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 22 $\mu$ F; TT series																																		
10V	$\leq$ 5%	$\leq$ 10% 0201 $\geq$ 0.012 $\mu$ F;0402 $\geq$ 0.33 $\mu$ F;0603 $\geq$ 0.33 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F;1210 $\geq$ 22 $\mu$ F; TT series																																
		$\leq$ 15% 0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 1 $\mu$ F																																
6.3V	$\leq$ 10%	$\leq$ 15% 0201 $\geq$ 0.1 $\mu$ F;0402 $\geq$ 1 $\mu$ F;0603 $\geq$ 10 $\mu$ F; 0805 $\geq$ 4.7 $\mu$ F; 1206 $\geq$ 47 $\mu$ F ;1210 $\geq$ 100 $\mu$ F; TT series																																
		$\leq$ 20% 0402 $\geq$ 2.2 $\mu$ F																																
4V	$\leq$ 15%	---																																
* I.R.: $\geq$ 10G $\Omega$ or RxC $\geq$ 500 $\Omega$ -F whichever is smaller.																																		
Class II (X7R)																																		
<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td><math>\geq</math>100V: X7R</td> <td rowspan="7">10G<math>\Omega</math> or RxC<math>\geq</math>100 <math>\Omega</math>-F whichever is smaller.</td> </tr> <tr> <td>50V:0603<math>\geq</math>1<math>\mu</math>F;0805<math>\geq</math>1<math>\mu</math>F;1206<math>\geq</math>4.7<math>\mu</math>F;1210<math>\geq</math>4.7<math>\mu</math>F</td> </tr> <tr> <td>35V:0805<math>\geq</math>2.2<math>\mu</math>F; 1210<math>\geq</math>10<math>\mu</math>F</td> </tr> <tr> <td>25V:0402<math>\geq</math>1<math>\mu</math>F;0603<math>\geq</math>2.2<math>\mu</math>F;0805<math>\geq</math>2.2<math>\mu</math>F;1206<math>\geq</math>10<math>\mu</math>F;1210<math>\geq</math>10<math>\mu</math>F</td> </tr> <tr> <td>16V: 0201<math>\geq</math>0.1<math>\mu</math>F;0402<math>\geq</math>0.22<math>\mu</math>F;0603<math>\geq</math>1<math>\mu</math>F;0805<math>\geq</math>2.2<math>\mu</math>F; 1206<math>\geq</math>10<math>\mu</math>F;1210<math>\geq</math>47<math>\mu</math>F</td> </tr> <tr> <td>10V:0201<math>\geq</math>47nF;0402<math>\geq</math>0.47<math>\mu</math>F;0603<math>\geq</math>0.47<math>\mu</math>F;0805<math>\geq</math>2.2<math>\mu</math>F; 1206<math>\geq</math>4.7<math>\mu</math>F;1210<math>\geq</math>47<math>\mu</math>F</td> </tr> <tr> <td>6.3V ; 4V ; TT series</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	$\geq$ 100V: X7R	10G $\Omega$ or RxC $\geq$ 100 $\Omega$ -F whichever is smaller.	50V:0603 $\geq$ 1 $\mu$ F;0805 $\geq$ 1 $\mu$ F;1206 $\geq$ 4.7 $\mu$ F;1210 $\geq$ 4.7 $\mu$ F	35V:0805 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F	25V:0402 $\geq$ 1 $\mu$ F;0603 $\geq$ 2.2 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F;1206 $\geq$ 10 $\mu$ F;1210 $\geq$ 10 $\mu$ F	16V: 0201 $\geq$ 0.1 $\mu$ F;0402 $\geq$ 0.22 $\mu$ F;0603 $\geq$ 1 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 10 $\mu$ F;1210 $\geq$ 47 $\mu$ F	10V:0201 $\geq$ 47nF;0402 $\geq$ 0.47 $\mu$ F;0603 $\geq$ 0.47 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F;1210 $\geq$ 47 $\mu$ F	6.3V ; 4V ; TT series																								
Rated voltage	Insulation Resistance																																	
$\geq$ 100V: X7R	10G $\Omega$ or RxC $\geq$ 100 $\Omega$ -F whichever is smaller.																																	
50V:0603 $\geq$ 1 $\mu$ F;0805 $\geq$ 1 $\mu$ F;1206 $\geq$ 4.7 $\mu$ F;1210 $\geq$ 4.7 $\mu$ F																																		
35V:0805 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F																																		
25V:0402 $\geq$ 1 $\mu$ F;0603 $\geq$ 2.2 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F;1206 $\geq$ 10 $\mu$ F;1210 $\geq$ 10 $\mu$ F																																		
16V: 0201 $\geq$ 0.1 $\mu$ F;0402 $\geq$ 0.22 $\mu$ F;0603 $\geq$ 1 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 10 $\mu$ F;1210 $\geq$ 47 $\mu$ F																																		
10V:0201 $\geq$ 47nF;0402 $\geq$ 0.47 $\mu$ F;0603 $\geq$ 0.47 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F;1210 $\geq$ 47 $\mu$ F																																		
6.3V ; 4V ; TT series																																		
16.	Solderability J-STD-002 JESD22-B102E	* Condition A	All terminations shall exhibit a continuous solder coating free from defects from a minimum of 95% of the critical surface area of any individual termination.																															
		Un-mounted chips 4hrs / 155°C*dry then completely immersed for 5 $\pm$ 0.5 sec in solder bath at 245 $\pm$ 5°C.																																
		* Condition B																																
		Un-mounted chips steam 8 hrs then completely immersed for 10 $\pm$ 1sec in solder bath at 220+5/-0°C.																																
* Condition C																																		
Un-mounted chips steam 8 hrs then completely immersed for 10 $\pm$ 1 sec. in solder bath at 260+0/-5°C.																																		

Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																								
17.	<b>Electrical Characterization</b>  * Capacitance * Q/ D.F. (Dissipation Factor) Cap≤1000pF 1.0±0.2Vrms, 1MHz±10% Cap>1000pF 1.0±0.2Vrms, 1KHz±10%  * Insulation Resistance To apply rated voltage(500V max.) for max. 120 sec.  * Dielectric Strength To apply voltage: ≤ 100                    ≥2.5 times VDC 200V~300V            ≥2 times VDC 400V~450V            ≥1.2 times VDC 500V~999V            ≥1.5 times VDC 1000V~3000V        ≥1.2 times VDC , duration 1~5 sec, charge and discharge current less than 50mA. * Temperature Coefficient (with no electrical load) Operation temperature: -55~125°C at 25°C	* Capacitance within the specified tolerance. * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F. ≤</th> <th colspan="2">Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥ 50V</td> <td rowspan="3">≤ 2.5%</td> <td>≤ 3%</td> <td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 5%</td> <td>1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10%</td> <td>0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td>35V</td> <td>≤ 3.5%</td> <td>≤ 10%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 3.5%</td> <td>≤ 5%</td> <td>0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 7%</td> <td>0603 ≥ 0.33μF; 1206 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10%</td> <td>0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF ; TT series</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤ 3.5%</td> <td>≤ 5%</td> <td>0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤ 10%</td> <td>0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤ 5%</td> <td>≤ 10%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td>≤ 15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤ 10%</td> <td>≤ 15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF ; 1210 ≥ 100μF; TT series</td> </tr> <tr> <td>≤ 20%</td> <td>0402 ≥ 2.2μF</td> </tr> <tr> <td>4V</td> <td>≤ 15%</td> <td>---</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤		≥ 50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 5%	1210 ≥ 4.7μF	≤ 10%	0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 7%	0603 ≥ 0.33μF; 1206 ≥ 4.7μF	≤ 10%	0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF ; TT series	16V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤ 10%	0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	10V	≤ 5%	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF	6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF ; 1210 ≥ 100μF; TT series	≤ 20%	0402 ≥ 2.2μF	4V	≤ 15%	---	---	* IR. ≥10GΩ or RxC≥500Ω-F whichever is smaller. Class II (X7R) <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>≥100V: X7R</td> <td rowspan="7">10GΩ or RxC ≥ 100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0805 ≥ 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 ≥ 0.1uF; 0402 ≥ 0.22uF; 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</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	≥100V: X7R	10GΩ or RxC ≥ 100 Ω-F whichever is smaller.	50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0805 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 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
			Rated vol.	D.F. ≤	Exception of D.F. ≤																																																						
			≥ 50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																					
					≤ 5%	1210 ≥ 4.7μF																																																					
					≤ 10%	0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																																																					
			35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF																																																					
			25V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																																																					
					≤ 7%	0603 ≥ 0.33μF; 1206 ≥ 4.7μF																																																					
					≤ 10%	0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF ; TT series																																																					
			16V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																																					
					≤ 10%	0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																																																					
			10V	≤ 5%	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series																																																					
					≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF																																																					
			6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF ; 1210 ≥ 100μF; TT series																																																					
					≤ 20%	0402 ≥ 2.2μF																																																					
			4V	≤ 15%	---	---																																																					
			Rated voltage	Insulation Resistance																																																							
≥100V: X7R	10GΩ or RxC ≥ 100 Ω-F whichever is smaller.																																																										
50V: 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																																											
35V: 0805 ≥ 2.2μF; 1210 ≥ 10μF																																																											
25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																																											
16V: 0201 ≥ 0.1uF; 0402 ≥ 0.22uF; 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																																																											
			* Dielectric strength No evidence of damage or flash over during test.  * Temperature Coefficient Capacitance Change: NPO: Within ±30ppm/°C X7R: Within ±15%																																																								



Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																														
18.	<b>Board Flex</b> AEC-Q200-005	* 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 3mm (2mm for X7R) and then the pressure shall be maintained for 60±1 sec. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change : NPO: within ±5% or 0.5pF whichever is larger X7R: within ±12.5% (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)																														
19.	<b>Terminal Strength</b> AEC-Q200-006	* Pressurizing force : 2N (0201 & 0402), 10N(0603), 18N(≥0805). * Test time: 60±1 sec.	* No remarkable damage or removal of the terminations. * Capacitance within the specified tolerance. * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Rated vol.</th> <th>D.F. ≤</th> <th>Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥50V</td> <td rowspan="3">≤2.5%</td> <td>≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤5% 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤10% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series</td> </tr> <tr> <td>35V</td> <td>≤3.5%</td> <td>≤10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤3.5%</td> <td>≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF</td> </tr> <tr> <td>≤10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤3.5%</td> <td>≤5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td>10V</td> <td>≤5%</td> <td>≤10% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤10%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤20% 0402 ≥ 2.2μF</td> </tr> <tr> <td>4V</td> <td>≤15%</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥50V	≤2.5%	≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤5% 1210 ≥ 4.7μF	≤10% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series	35V	≤3.5%	≤10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤3.5%	≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF	≤10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series	16V	≤3.5%	≤5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series	10V	≤5%	≤10% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series	6.3V	≤10%	≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤20% 0402 ≥ 2.2μF	4V	≤15%	---
Rated vol.	D.F. ≤	Exception of D.F. ≤																															
≥50V	≤2.5%	≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																															
		≤5% 1210 ≥ 4.7μF																															
		≤10% 0402 ≥ 0.1μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF; TT series																															
35V	≤3.5%	≤10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1210 ≥ 10μF																															
25V	≤3.5%	≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																															
		≤7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF																															
		≤10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF; TT series																															
16V	≤3.5%	≤5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																															
		≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF; TT series																															
10V	≤5%	≤10% 0201 ≥ 0.012μF; 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF; TT series																															
6.3V	≤10%	≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF																															
		≤20% 0402 ≥ 2.2μF																															
4V	≤15%	---																															
20	<b>Beam Load Test</b> AEC-Q200-003	* Break strength test * Beam speed: 2.5±0.25 mm/sec	The chip endure following force * Chip length ≤2.5mm; Thickness >0.5mm (20N), ≤0.5mm (8N) * Chip length ≥3.2mm: Thickness ≥1.25mm (54.5N), <1.25mm (15N)																														



Multilayer Ceramic Capacitors

**APPENDICES**

■ Tape & reel dimensions



Fig. 2 The dimension of paper tape



Fig. 3 The dimension of plastic tape

Size	0201	0402	0603	0805			1206			1210		
Thickness	L	N,E	S,H,X	A,H	B,T	D,I	B,T	C,J,D	G,P	T	C,D,G,K	M
A <sub>0</sub>	0.40 +/-0.10	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	< 3.05	< 3.20
B <sub>0</sub>	0.70 +/-0.10	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	< 3.80	< 4.00
T	≤ 0.55	≤ 0.80	≤ 1.20	≤ 1.15	≤ 1.20	0.23 +/-0.1	≤ 1.20	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1
K <sub>0</sub>	-	-	-	-	-	< 2.50	-	< 2.50	< 2.50	< 1.50	< 2.50	< 3.20
W	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30
P <sub>0</sub>	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10
10xP <sub>0</sub>	40.00 +/-0.10	40.00 +/-0.10	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20
P <sub>1</sub>	2.00 +/-0.05	2.00 +/-0.05	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10
P <sub>2</sub>	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05
D <sub>0</sub>	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0
D <sub>1</sub>	-	-	-	-	-	1.00 +/-0.10	-	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10
E	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10
F	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05

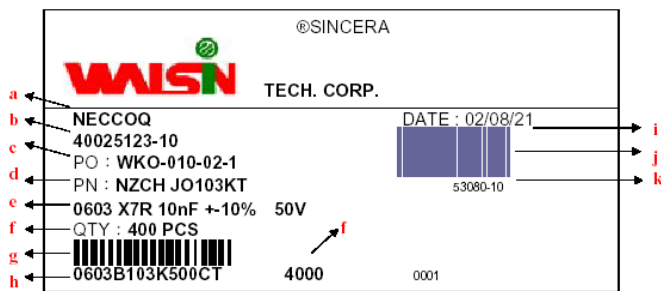


Fig. 4 The dimension of reel

Size	0201, 0402, 0603, 0805, 1206, 1210		
Reel size	7"	10"	13"
C	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2
W <sub>1</sub>	8.4+1.5/-0	8.4+1.5/-0	8.4+1.5/-0
A	178.0±1.0	250.0±1.0	330.0±1.0
N	60.0+1.0/-0	100.0±1.0	100±1.0

Multilayer Ceramic Capacitors

▣ Description 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

▣ Constructions

No.	Name	NP0, X7R
①	Ceramic material	BaTiO <sub>3</sub> based
②	Inner electrode	Ni
③	Termination	Inner layer Cu
④		Middle layer Ni
⑤		Outer layer Sn (Matt)

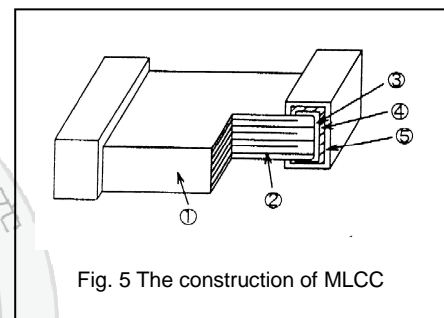


Fig. 5 The construction of MLCC

▣ Storage and handling conditions

- (1) To store products at 5 to 40°C ambient temperature and 20 to 70% related humidity conditions.
- (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.

Multilayer Ceramic Capacitors

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 N<sub>2</sub> within oven are recommended.



Fig. 5 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.



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



## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Multilayer Ceramic Capacitors MLCC - SMD/SMT](#) category:*

*Click to view products by [Walsin](#) manufacturer:*

Other Similar products are found below :

[M39014/02-1225V](#) [M39014/22-0631](#) [D55342E07B523DR-T/R](#) [NCA1206X7R103K50TRPF](#) [NCA1206X7R104K16TRPF](#) [NIN-FB391JTRF](#)  
[NIN-FC2R7JTRF](#) [NMC0201X5R474K4TRPF](#) [NMC0402NPO220J50TRPF](#) [NMC0402X5R105K6.3TRPF](#) [NMC0402X5R224K6.3TRPF](#)  
[NMC0402X7R103J25TRPF](#) [NMC0402X7R153K16TRPF](#) [NMC0603NPO1R8C50TRPF](#) [NMC0603NPO201J50TRPF](#)  
[NMC0603NPO330G50TRPF](#) [NMC0603X5R475M6.3TRPF](#) [NMC0805NPO270J50TRPF](#) [NMC0805NPO820J50TRPF](#)  
[NMC0805X7R224K16TRPLPF](#) [NMC0805X7R224K25TRPF](#) [NMC1206X7R102K50TRPF](#) [NMC1206X7R106K10TRPLPF](#)  
[NMC1206X7R475K10TRPLPF](#) [NMC-H0805X7R472K250TRPF](#) [NMC-L0402NPO7R0C50TRPF](#) [NMC-L0603NPO2R2B50TRPF](#) [NMC-](#)  
[P0805NPO221J500TRPLPF](#) [NMC-Q0402NPO8R2D200TRPF](#) [C1206C101J1GAC](#) [C1608C0G2A221J](#) [C1608X7R1E334K](#) [C2012C0G2A472J](#)  
[2220J2K00562KXT](#) [1812J2K00332KXT](#) [CDR31BX103AKWR](#) [CDR33BX104AKUR](#) [CDR33BX683AKUS](#) [CGA2B2C0G1H010C](#)  
[CGA2B2C0G1H040C](#) [CGA2B2C0G1H050C](#) [CGA2B2C0G1H060D](#) [CGA2B2C0G1H070D](#) [CGA2B2C0G1H120J](#) [CGA2B2C0G1H151J](#)  
[CGA2B2C0G1H181JT0Y0F](#) [CGA2B2C0G1H1R5C](#) [CGA2B2C0G1H2R2C](#) [CGA2B2C0G1H390J](#) [CGA2B2C0G1H391J](#)