

# APPROVAL SHEET

## MULTILAYER CERAMIC CAPACITORS

Automotive Capacitors Series (MT)

Qualified to AEC-Q200

0201 to 1210 Sizes (10V to 1000V)

X8G, 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 X8G, 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 1210).
- 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.

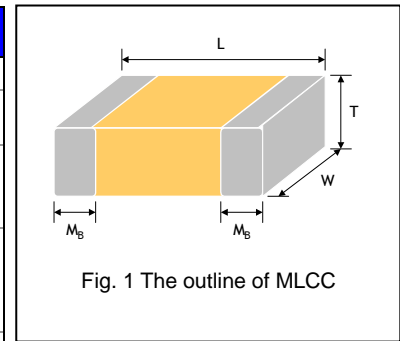
**4. HOW TO ORDER**

<u>MT</u>	<u>18</u>	<u>N</u>	<u>102</u>	<u>J</u>	<u>500</u>	<u>C</u>	<u>I</u>
<u>Series</u>	<u>Size</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging style</u>
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)	G=X8G 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.  100=10 VDC 160=16 VDC 250=25 VDC 500=50 VDC 101=100 VDC 201=200 VDC 251=250 VDC 501=500 VDC 631=630 VDC 102=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 #			
	2.00±0.20	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 3.30+0.3/-0.1*	1.60+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.  
\* For 1206(100V)/Cap≥1.2μF products.

**6. GENERAL ELECTRICAL DATA\***

Dielectric	X8G	NPO	X7R
Size	0201, 0402, 0603, 0805, 1206, 1210		
Capacitance range*	0.1pF to 0.015uF	0.1pF to 0.047uF	100pF to 10μF
Capacitance tolerance**	Cap≤5pF#1: 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%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V, 200V, 250, 500, 630, 1000		
Operating temperature	-55 to +150°C	-55 to +125°C	
Capacitance characteristic	±30ppm/°C		±15%
Termination	Ni/Sn (lead-free termination)		

#1: X8G/NPO, 0.1pF product only provide B tolerance.

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

X8G/NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap≤1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25°C at ambient temperature

X7R: Please refer to page 13 "Reliability test conditions and requirements" for detail.

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

Multilayer Ceramic Capacitors

**7. CAPACITANCE RANGE**

**X8G Dielectric**

DIELECTRIC		X8G												
SIZE		0402				0603				0805				
RATED VOLTAGE (VDC)		10	16	25	50	10	16	25	50	10	16	25	50	100
Capacitance	0.1pF (0R1)	N	N	N	N									
	0.2pF (0R2)	N	N	N	N									
	0.3pF (0R3)	N	N	N	N									
	0.4pF (0R4)	N	N	N	N									
	0.5pF (0R5)	N	N	N	N	S	S	S	S	A	A	A	A	A
	1.0pF (1R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	1.2pF (1R2)	N	N	N	N	S	S	S	S	A	A	A	A	A
	1.5pF (1R5)	N	N	N	N	S	S	S	S	A	A	A	A	A
	1.8pF (1R8)	N	N	N	N	S	S	S	S	A	A	A	A	A
	2.0pF (2R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	2.2pF (2R2)	N	N	N	N	S	S	S	S	A	A	A	A	A
	2.7pF (2R7)	N	N	N	N	S	S	S	S	A	A	A	A	A
	3.0pF (3R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	3.3pF (3R3)	N	N	N	N	S	S	S	S	A	A	A	A	A
	3.9pF (3R9)	N	N	N	N	S	S	S	S	A	A	A	A	A
	4.0pF (4R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	4.7pF (4R7)	N	N	N	N	S	S	S	S	A	A	A	A	A
	5.0pF (5R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	5.6pF (5R6)	N	N	N	N	S	S	S	S	A	A	A	A	A
	6.0pF (6R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	6.8pF (6R8)	N	N	N	N	S	S	S	S	A	A	A	A	A
	7.0pF (7R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	8.0pF (8R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	8.2pF (8R2)	N	N	N	N	S	S	S	S	A	A	A	A	A
	9.0pF (9R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	10pF (100)	N	N	N	N	S	S	S	S	A	A	A	A	A
	12pF (120)	N	N	N	N	S	S	S	S	A	A	A	A	A
	15pF (150)	N	N	N	N	S	S	S	S	A	A	A	A	A
	18pF (180)	N	N	N	N	S	S	S	S	A	A	A	A	A
	22pF (220)	N	N	N	N	S	S	S	S	A	A	A	A	A
	27pF (270)	N	N	N	N	S	S	S	S	A	A	A	A	A
	33pF (330)	N	N	N	N	S	S	S	S	A	A	A	A	A
	39pF (390)	N	N	N	N	S	S	S	S	A	A	A	A	A
	47pF (470)	N	N	N	N	S	S	S	S	A	A	A	A	A
	56pF (560)	N	N	N	N	S	S	S	S	A	A	A	A	A
	68pF (680)	N	N	N	N	S	S	S	S	A	A	A	A	A
	82pF (820)	N	N	N	N	S	S	S	S	A	A	A	A	A
	100pF (101)	N	N	N	N	S	S	S	S	A	A	A	A	A
	120pF (121)	N	N	N	N	S	S	S	S	A	A	A	A	A
	150pF (151)	N	N	N	N	S	S	S	S	A	A	A	A	A
180pF (181)	N	N	N	N	S	S	S	S	A	A	A	A	A	
220pF (221)	N	N	N	N	S	S	S	S	A	A	A	A	A	
270pF (271)	N	N	N	N	S	S	S	S	A	A	A	A	A	
330pF (331)	N	N	N	N	S	S	S	S	A	A	A	A	A	
390pF (391)	N	N	N	N	S	S	S	S	B	B	B	B	B	
470pF (471)	N	N	N	N	S	S	S	S	B	B	B	B	B	
560pF (561)	N	N	N	N	S	S	S	S	B	B	B	B	B	
680pF (681)	N	N	N	N	S	S	S	S	B	B	B	B	B	
820pF (821)	N	N	N	N	S	S	S	S	B	B	B	B	B	
1,000pF (102)	N	N	N	N	S	S	S	S	B	B	B	B	B	
1,200pF (122)					X	X	X	X	B	B	B	B	B	
1,500pF (152)					X	X	X	X	B	B	B	B	B	
1,800pF (182)					X	X	X	X	B	B	B	B	B	
2,200pF (222)					X	X	X	X	B	B	B	B	B	
2,700pF (272)					X	X	X	X	D	D	D	D	D	
3,300pF (332)					X	X	X	X	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	
0.010uF (103)									D	D	D	D	D	

\* X8G: 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.

X8G Dielectric

DIELECTRIC		X8G								
SIZE		1206				1210				
RATED VOLTAGE (VDC)		10	16	25	50	10	16	25	50	100
Capacitance	1.0pF (1R0)									
	1.2pF (1R2)	B	B	B	B					
	1.5pF (1R5)	B	B	B	B					
	1.8pF (1R8)	B	B	B	B					
	2.0pF (2R0)	B	B	B	B					
	2.2pF (2R2)	B	B	B	B					
	2.7pF (2R7)	B	B	B	B					
	3.0pF (3R0)	B	B	B	B					
	3.3pF (3R3)	B	B	B	B					
	3.9pF (3R9)	B	B	B	B					
	4.0pF (4R0)	B	B	B	B					
	4.7pF (4R7)	B	B	B	B					
	5.0pF (5R0)	B	B	B	B					
	5.6pF (5R6)	B	B	B	B					
	6.0pF (6R0)	B	B	B	B					
	6.8pF (6R8)	B	B	B	B					
	7.0pF (7R0)	B	B	B	B					
	8.0pF (8R0)	B	B	B	B					
	8.2pF (8R2)	B	B	B	B					
	9.0pF (9R0)	B	B	B	B					
	10pF (100)	B	B	B	B	C	C	C	C	C
	12pF (120)	B	B	B	B	C	C	C	C	C
	15pF (150)	B	B	B	B	C	C	C	C	C
	18pF (180)	B	B	B	B	C	C	C	C	C
	22pF (220)	B	B	B	B	C	C	C	C	C
	27pF (270)	B	B	B	B	C	C	C	C	C
	33pF (330)	B	B	B	B	C	C	C	C	C
	39pF (390)	B	B	B	B	C	C	C	C	C
	47pF (470)	B	B	B	B	C	C	C	C	C
	56pF (560)	B	B	B	B	C	C	C	C	C
	68pF (680)	B	B	B	B	C	C	C	C	C
	82pF (820)	B	B	B	B	C	C	C	C	C
	100pF (101)	B	B	B	B	C	C	C	C	C
	120pF (121)	B	B	B	B	C	C	C	C	C
	150pF (151)	B	B	B	B	C	C	C	C	C
	180pF (181)	B	B	B	B	C	C	C	C	C
	220pF (221)	B	B	B	B	C	C	C	C	C
	270pF (271)	B	B	B	B	C	C	C	C	C
	330pF (331)	B	B	B	B	C	C	C	C	C
	390pF (391)	B	B	B	B	C	C	C	C	C
	470pF (471)	B	B	B	B	C	C	C	C	C
	560pF (561)	B	B	B	B	C	C	C	C	C
	680pF (681)	B	B	B	B	C	C	C	C	C
	820pF (821)	B	B	B	B	C	C	C	C	C
	1,000pF (102)	B	B	B	B	C	C	C	C	C
	1,200pF (122)	B	B	B	B	C	C	C	C	C
	1,500pF (152)	B	B	B	B	C	C	C	C	C
	1,800pF (182)	B	B	B	B	C	C	C	C	C
	2,200pF (222)	B	B	B	B	C	C	C	C	C
	2,700pF (272)	B	B	B	B	C	C	C	C	C
3,300pF (332)	B	B	B	B	C	C	C	C	C	
3,900pF (392)	B	B	B	B	C	C	C	C	C	
4,700pF (472)	B	B	B	B	C	C	C	C	C	
5,600pF (562)	B	B	B	B	C	C	C	C	C	
6,800pF (682)	C	C	C	C	C	C	C	C	C	
8,200pF (822)	D	D	D	D	C	C	C	C	C	
0.010μF (103)	D	D	D	D	C	C	C	C	C	
0.012μF (123)					D	D	D	D	D	
0.015μF (153)					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		0201				0402				0603								
RATED VOLTAGE		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100	200	250
Capacitance	0.1pF (0R1)	L	L	L	L	L	N	N	N	N	N							
	0.2pF (0R2)	L	L	L	L	L	N	N	N	N	N							
	0.3pF (0R3)	L	L	L	L	L	N	N	N	N	N							
	0.4pF (0R4)	L	L	L	L	L	N	N	N	N	N							
	0.5pF (0R5)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.6pF (0R6)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.7pF (0R7)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.8pF (0R8)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.9pF (0R9)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.0pF (1R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.2pF (1R2)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.5pF (1R5)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.8pF (1R8)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	2.0pF (2R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	2.2pF (2R2)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	2.7pF (2R7)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	3.0pF (3R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	3.3pF (3R3)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	3.9pF (3R9)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	4.0pF (4R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	4.7pF (4R7)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	5.0pF (5R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	5.6pF (5R6)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	6.0pF (6R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	6.8pF (6R8)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	7.0pF (7R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	8.0pF (8R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	8.2pF (8R2)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	9.0pF (9R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	10pF (100)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	12pF (120)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	15pF (150)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	18pF (180)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	22pF (220)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	27pF (270)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	33pF (330)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	39pF (390)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	47pF (470)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	56pF (560)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	68pF (680)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
82pF (820)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S	
100pF (101)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S	
120pF (121)	L	L	L	L	L	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	X	X	
680pF (681)						N	N	N	N	N	S	S	S	S	S	X	X	
820pF (821)						N	N	N	N	N	S	S	S	S	S	X	X	
1,000pF (102)						N	N	N	N	N	S	S	S	S	S	X	X	
1,200pF (122)											X	X	X	X	X	X	X	
1,500pF (152)											X	X	X	X	X	X	X	
1,800pF (182)											X	X	X	X	X	X	X	
2,200pF (222)											X	X	X	X	X			
2,700pF (272)											X	X	X	X	X			
3,300pF (332)											X	X	X	X	X			
3,900pF (392)											X	X	X	X	X			
4,700pF (472)											X	X	X	X	X			
5,600pF (562)											X	X	X	X	X			
6,800pF (682)											X	X	X	X	X			
8,200pF (822)											X	X	X	X	X			
0.01uF (103)											X	X	X	X	X			

\* 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	I	I
	560pF (561)	B	B	B	B	B	D	D	I	I
	680pF (681)	B	B	B	B	B	D	D	I	I
	820pF (821)	B	B	B	B	B	D	D	I	I
	1,000pF (102)	B	B	B	B	B	D	D	I	I
1,200pF (122)	B	B	B	B	B	D	D	I	I	
1,500pF (152)	B	B	B	B	B	D	D	I	I	
1,800pF (182)	B	B	B	B	B	D	D	I	I	
2,200pF (222)	B	B	B	B	B	D	D	I	I	
2,700pF (272)	D	D	D	D	D	I	I			
3,300pF (332)	D	D	D	D	D	I	I			
3,900pF (392)	D	D	D	D	D	I	I			
4,700pF (472)	D	D	D	D	D	I	I			
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					
0.012μF (123)	D	D	D	D	D					
0.015μF (153)	D	D	D	D	D					
0.018μF (183)	D	D	D	D	D					
0.022μF (223)	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

**NPO Dielectric**

DIELECTRIC		NPO									
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	B	C	C	C	G
	560pF (561)	B	B	B	B	B	B	C	D	D	G
	680pF (681)	B	B	B	B	B	B	C	D	D	G
	820pF (821)	B	B	B	B	B	B	C	D	D	G
	1,000pF (102)	B	B	B	B	B	B	C	D	D	G
	1,200pF (122)	B	B	B	B	B	B	C	D	D	G
	1,500pF (152)	B	B	B	B	B	B	D	G	G	G
	1,800pF (182)	B	B	B	B	B	B	D	G	G	G
2,200pF (222)	B	B	B	B	B	B	D	G	G	G	
2,700pF (272)	B	B	B	B	B	B	D	G	G	G	
3,300pF (332)	B	B	B	B	B	B	D	G	G	G	
3,900pF (392)	B	B	B	B	B	B	D	G	G	G	
4,700pF (472)	B	B	B	B	B	B	D	G	G	G	
5,600pF (562)	B	B	B	B	B	B	G	G			
6,800pF (682)	C	C	C	C	C	C	G	G			
8,200pF (822)	D	D	D	D	D	D	G	G			
0.01μF (103)	D	D	D	D	D	D	G	G			

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

**NPO Dielectric**

DIELECTRIC		NPO									
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	D	D	D	D	G
	1,200pF (122)	C	C	C	C	C	D	D	D	D	K
	1,500pF (152)	C	C	C	C	C	D	D	D	D	K
	1,800pF (182)	C	C	C	C	C	D	D	D	D	K
	2,200pF (222)	C	C	C	C	C	D	D	D	D	K
	2,700pF (272)	C	C	C	C	C	D	D	D	D	K
	3,300pF (332)	C	C	C	C	C	D	D	D	D	K
	3,900pF (392)	C	C	C	C	C	D	D	D	D	K
	4,700pF (472)	C	C	C	C	C	G	G	G	G	K
	5,600pF (562)	C	C	C	C	C	G	G	G	G	K
	6,800pF (682)	C	C	C	C	C	G	G	G	G	K
	8,200pF (822)	C	C	C	C	C	G	G	G	G	K
	0.010μF (103)	C	C	C	C	C	G	G	K	K	M
	0.012μF (123)	D	D	D	D	D	K	K	M	M	M
	0.015μF (153)	D	D	D	D	D	K	K	M	M	M
	0.018μF (183)	K	K	K	K	K					
0.022μF (223)	K	K	K	K	K						
0.027μF (273)	K	K	K	K	K						
0.033μF (333)	K	K	K	K	K						
0.039μF (393)	K	K	K	K	K						
0.047μF (473)	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)					N	N	N		S	S	S	S	X
	0.015μF (153)					N	N	N		S	S	S	S	X
	0.018μF (183)					N	N	N		S	S	S	S	X
	0.022μF (223)					N	N	N		S	S	S	S	X
	0.027μF (273)					N	N	N		S	S	S	S	X
	0.033μF (333)					N	N	N		S	S	S	X	X
	0.039μF (393)					N	N	N		S	S	S	X	X
	0.047μF (473)					N	N	N		S	S	S	X	X
0.056μF (563)					N	N	N		S	S	S	X		
0.068μF (683)					N	N	N		S	S	S	X		
0.082μF (823)					N	N	N		S	S	S	X		
0.10μF (104)					N	N	N		S	S	S	X		
0.12μF (124)									X	X	X			
0.15μF (154)									X	X	X	X		
0.18μF (184)									X	X	X			
0.22μF (224)									X	X	X	X		
0.33μF (334)									X	X	X	X		

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	D	D	D	D	B	B	B	B	B	D	D	D	D
	6,800pF (682)	B	B	B	B	B	D	D	D	D	B	B	B	B	B	D	D	D	D
	8,200pF (822)	B	B	B	B	B	D	D	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	I						C	C	C	D						
0.33μF (334)	D	D	D	I						C	C	C	D						
0.39μF (394)	D	D	D	I						C	C	J	P						
0.47μF (474)	D	D	D	I						J	J	J	P						
0.56μF (564)	D	D	D							J	J	J	P						
0.68μF (684)	D	D	D	I						J	J	J	P						
0.82μF (824)	D	D	D							J	J	J	P						
1.0μF (105)	D	D	D	I						J	J	J	P						
2.2μF (225)													P	P					
4.7μF (475)																			
10μF (106)																			

- The letter in cell is expressed the symbol of product thickness.
- 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
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		M	M			
4.7μF (475)					M	M			
10μF (106)				M	M				

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

Multilayer Ceramic Capacitors

**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	8k
	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 : X8G/NPO: within ±2.5% or ±0.25pF whichever is larger. X7R: within ±10%. * Q/D.F. value: X8G/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">100V</td> <td rowspan="3">≤ 3%</td> <td>≤ 6% 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 7.5% 0603 ≥ 0.068μF; 0805 &gt; 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤ 20% 0805 &gt; 0.22μF; 1210 ≥ 3.3μF</td> </tr> <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% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤ 20% 0402 ≥ 0.012μF; 0603 &gt; 0.1μF; 0805/X7R &gt; 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤ 5%</td> <td>≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 14% 0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 5%</td> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 20% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤ 5%</td> <td>≤ 15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 &gt; 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 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 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF</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</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: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="6">1GΩ or RxC ≥ 10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 &gt; 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> <td></td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF	≤ 7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤ 20% 0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤ 20% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤ 10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 14% 0603 ≥ 0.33μF	25V	≤ 5%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 20% 0402 ≥ 0.33μF	≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	16V	≤ 5%	≤ 15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF	6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	4V	≤ 20%	---	Rated voltage	Insulation Resistance	100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.	50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF	6.3V; 4V; Size ≥ 1812	
Rated vol.	D.F. ≤	Exception of D.F. ≤																																																	
100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF																																																	
		≤ 7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF																																																	
		≤ 20% 0805 > 0.22μF; 1210 ≥ 3.3μF																																																	
50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																	
		≤ 10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF																																																	
		≤ 20% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																	
35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																	
		≤ 10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																																																	
		≤ 14% 0603 ≥ 0.33μF																																																	
25V	≤ 5%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																																	
		≤ 20% 0402 ≥ 0.33μF																																																	
		≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																																	
16V	≤ 5%	≤ 15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																																	
		≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																	
10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																	
		≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF																																																	
6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF																																																	
4V	≤ 20%	---																																																	
Rated voltage	Insulation Resistance																																																		
100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.																																																		
50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																																			
35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																			
25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																																			
16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF																																																			
10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF																																																			
6.3V; 4V; Size ≥ 1812																																																			

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

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-top: 10px;"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. operating temp. +0/-3</td> <td>5±1</td> </tr> <tr> <td>2</td> <td>Max. operating temp. +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	Min. operating temp. +0/-3	5±1	2	Max. operating temp. +3/-0	5±1	* No remarkable damage. * Cap change : X8G/NPO: within ±2.5% or 0.25pF whichever is larger. X7R: within ±10.0%. * Q/D.F. value: X8G/NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <table border="1" style="margin-top: 5px;"> <thead> <tr> <th>Rated vol.</th> <th>D.F. ≤</th> <th>Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">100V</td> <td>≤ 6%</td> <td>1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 7.5%</td> <td>0603 ≥ 0.068μF; 0805 &gt; 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤ 20%</td> <td>0805 &gt; 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td>≤ 6%</td> <td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 10%</td> <td>0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤ 20%</td> <td>0402 ≥ 0.012μF; 0603 &gt; 0.1μF; 0805/X7R &gt; 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td>≤ 5%</td> <td>≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">≤ 10%</td> <td>0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 14%</td> <td>0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td>≤ 5%</td> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="2">≤ 20%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td>≤ 10%</td> <td>0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤ 5%</td> <td>≤ 15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 &gt; 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="2">≤ 15%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.15μF;</td> </tr> <tr> <td>≤ 20%</td> <td>0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">10V</td> <td>≤ 7.5%</td> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF;</td> </tr> <tr> <td rowspan="2">≤ 30%</td> <td>0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>---</td> <td>---</td> </tr> <tr> <td rowspan="3">6.3V</td> <td>≤ 15%</td> <td>---</td> </tr> <tr> <td rowspan="2">≤ 20%</td> <td>---</td> </tr> <tr> <td>---</td> <td>---</td> </tr> <tr> <td rowspan="3">4V</td> <td>---</td> <td>---</td> </tr> <tr> <td>---</td> <td>---</td> </tr> <tr> <td>---</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	100V	≤ 6%	1206 ≥ 0.47μF	≤ 7.5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤ 20%	0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤ 6%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 10%	0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤ 20%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤ 10%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 14%	0603 ≥ 0.33μF	25V	≤ 5%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 20%	0402 ≥ 0.33μF	≤ 10%	0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	16V	≤ 5%	≤ 15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 15%	0201 ≥ 0.012μF; 0402 ≥ 0.15μF;	≤ 20%	0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF;	≤ 30%	0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	---	---	6.3V	≤ 15%	---	≤ 20%	---	---	---	4V	---	---	---	---	---	---
			Step	Temp. (°C)	Time (min.)																																																																		
			1	Min. operating temp. +0/-3	5±1																																																																		
			2	Max. operating temp. +3/-0	5±1																																																																		
			Rated vol.	D.F. ≤	Exception of D.F. ≤																																																																		
			100V	≤ 6%	1206 ≥ 0.47μF																																																																		
				≤ 7.5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF																																																																		
				≤ 20%	0805 > 0.22μF; 1210 ≥ 3.3μF																																																																		
			50V	≤ 6%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																																		
				≤ 10%	0201 ≥ 0.01μF; 1210 ≥ 3.3μF																																																																		
≤ 20%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																																						
35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																																					
	≤ 10%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																																																																					
		≤ 14%	0603 ≥ 0.33μF																																																																				
25V		≤ 5%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																																																				
	≤ 20%	0402 ≥ 0.33μF																																																																					
		≤ 10%	0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																																																				
16V	≤ 5%	≤ 15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																																																					
	≤ 15%	0201 ≥ 0.012μF; 0402 ≥ 0.15μF;																																																																					
		≤ 20%	0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																																				
10V	≤ 7.5%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF;																																																																					
	≤ 30%	0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF																																																																					
		---	---																																																																				
6.3V	≤ 15%	---																																																																					
	≤ 20%	---																																																																					
		---	---																																																																				
4V	---	---																																																																					
	---	---																																																																					
	---	---																																																																					
* I.R.: ≥10GΩ or RxC≥500Ω·F whichever is smaller. Class II (X7R)																																																																							
<table border="1" style="width: 100%;"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="7">1GΩ or RxC ≥ 10 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 &gt; 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> </tr> </tbody> </table>			Rated voltage	Insulation Resistance	100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω·F whichever is smaller.	50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF	6.3V; 4V; Size ≥ 1812																																																											
Rated voltage	Insulation Resistance																																																																						
100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω·F whichever is smaller.																																																																						
50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																																																							
35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																																							
25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																																																							
16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF																																																																							
10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF																																																																							
6.3V; 4V; Size ≥ 1812																																																																							

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

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 : X8G/NPO: within ±3.0% or 0.30pF whichever is larger X7R: within ±12.5%. * Q/D.F. value: X8G/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">≥100V</td> <td rowspan="3">≤3%</td> <td>≤6% 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤7.5% 0603 ≥ 0.068μF; 0805 &gt; 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤20% 0805 &gt; 0.22μF; 1210 ≥ 3.3μF</td> </tr> <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% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤20% 0402 ≥ 0.012μF; 0603 &gt; 0.1μF; 0805/X7R &gt; 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>35V</td> <td>≤5%</td> <td>≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 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</td> </tr> <tr> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤5%</td> <td>≤20% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 &gt; 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>10V</td> <td>≤7.5%</td> <td>≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 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</td> </tr> <tr> <td>≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥100V	≤3%	≤6% 1206 ≥ 0.47μF	≤7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤20% 0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤3%	≤6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤20% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤5%	≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤5%	≤10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤14% 0603 ≥ 0.33μF	≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	16V	≤5%	≤20% 0402 ≥ 0.33μF	≤10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	10V	≤7.5%	≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	6.3V	≤15%	≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	4V	≤20%	---
Rated vol.	D.F. ≤	Exception of D.F. ≤																																					
≥100V	≤3%	≤6% 1206 ≥ 0.47μF																																					
		≤7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF																																					
		≤20% 0805 > 0.22μF; 1210 ≥ 3.3μF																																					
50V	≤3%	≤6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																					
		≤10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF																																					
		≤20% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																					
35V	≤5%	≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																					
25V	≤5%	≤10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																																					
		≤14% 0603 ≥ 0.33μF																																					
		≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																					
16V	≤5%	≤20% 0402 ≥ 0.33μF																																					
		≤10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																					
		≤15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																					
10V	≤7.5%	≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																					
6.3V	≤15%	≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF																																					
		≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF																																					
4V	≤20%	---																																					
			* 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: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="6">1GΩ or RxC ≥ 10 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 &gt; 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> <td></td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω·F whichever is smaller.	50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF	6.3V; 4V; Size ≥ 1812																										
Rated voltage	Insulation Resistance																																						
100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω·F whichever is smaller.																																						
50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																							
35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																							
25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																							
16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF																																							
10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF																																							
6.3V; 4V; Size ≥ 1812																																							

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



Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																													
6.	<b>Biased Humidity</b> MIL-STD-202 Method 103	* Test temp.: 85±3°C * Humidity: 85%RH * Test time: 1000+24/-0 hrs. * To apply voltage : rated voltage (Max.500V) 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: X8G/NPO: within ±3.0% or 0.30pF whichever is larger. X7R: within ±12.5% * Q/D.F. value: X8G/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">100V</td> <td rowspan="3">≤ 3%</td> <td>≤ 6% 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 7.5% 0603 ≥ 0.068μF; 0805 &gt; 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤ 20% 0805 ≥ 0.22μF; 1210 ≥ 3.3μF</td> </tr> <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% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤ 20% 0402 ≥ 0.012μF; 0603 &gt; 0.1μF; 0805/X7R &gt; 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤ 5%</td> <td>≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 14% 0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 5%</td> <td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 20% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤ 5%</td> <td>≤ 15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 &gt; 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤ 7.5%</td> <td>≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>6.3V</td> <td>≤ 15%</td> <td>≤ 30%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>4V</td> <td>≤ 20%</td> <td>---</td> <td>---</td> </tr> </tbody> </table> * 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: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="7">500MΩ or RxC ≥ 5 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 &gt; 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> </tr> </tbody> </table> 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: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="7">1GΩ or RxC ≥ 10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 &gt; 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF	≤ 7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤ 20% 0805 ≥ 0.22μF; 1210 ≥ 3.3μF	50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤ 20% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤ 10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 14% 0603 ≥ 0.33μF	25V	≤ 5%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 20% 0402 ≥ 0.33μF	≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	16V	≤ 5%	≤ 15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	6.3V	≤ 15%	≤ 30%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	4V	≤ 20%	---	---	Rated voltage	Insulation Resistance	100V: All X7R; 1210 ≥ 3.3μF	500MΩ or RxC ≥ 5 Ω-F whichever is smaller.	50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF	6.3V; 4V; Size ≥ 1812	Rated voltage	Insulation Resistance	100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.	50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF	6.3V; 4V; Size ≥ 1812
Rated vol.	D.F. ≤	Exception of D.F. ≤																																																														
100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF																																																														
		≤ 7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF																																																														
		≤ 20% 0805 ≥ 0.22μF; 1210 ≥ 3.3μF																																																														
50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																														
		≤ 10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF																																																														
		≤ 20% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																														
35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																														
		≤ 10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																																																														
		≤ 14% 0603 ≥ 0.33μF																																																														
25V	≤ 5%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																																														
		≤ 20% 0402 ≥ 0.33μF																																																														
		≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																																														
16V	≤ 5%	≤ 15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																																														
		≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																														
		≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF																																																														
10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																														
		≤ 20% 0201 ≥ 0.1μF; 0402 ≥ 1μF																																																														
		≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF																																																														
6.3V	≤ 15%	≤ 30%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF																																																													
4V	≤ 20%	---	---																																																													
Rated voltage	Insulation Resistance																																																															
100V: All X7R; 1210 ≥ 3.3μF	500MΩ or RxC ≥ 5 Ω-F whichever is smaller.																																																															
50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																																																
35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																																
25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																																																
16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF																																																																
10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF																																																																
6.3V; 4V; Size ≥ 1812																																																																
Rated voltage	Insulation Resistance																																																															
100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.																																																															
50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF																																																																
35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																																
25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF																																																																
16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF																																																																
10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF																																																																
6.3V; 4V; Size ≥ 1812																																																																

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

Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																																
7.	Operational Life MIL-STD-202 Method 108	<p>* Test temp.: Maximum Operating Temperature <math>\pm 3^{\circ}\text{C}</math></p> <p>* To apply voltage: (1) <math>10\text{V} \leq U_r \leq 250\text{V}</math>: 200% of rated voltage. (2) 150% of rated voltage: a) 500V b) <math>\leq 6.3\text{V}</math> or <math>C \geq 10\mu\text{F}</math> c) 0603/X7R/50V/Cap.<math>&gt;0.1\mu\text{F}</math> 0603/X7R/<math>\leq 25\text{V}</math>/Cap.<math>\geq 1.0\mu\text{F}</math> d) 0805/X7R/50V/Cap.<math>\geq 0.68\mu\text{F}</math> e) 1206/X7R/100V/Cap.<math>\geq 1.0\mu\text{F}</math> f) 1210/X7R/50V&amp;100V/Cap.<math>\geq 2.2\mu\text{F}</math> (3) <math>630\text{V} \leq U_r \leq 1000\text{V}</math>: 120% of rated voltage.</p> <p>* Test time: 1000+24-0 hrs.</p> <p>* Before initial measurement (X7R only): Apply test voltage for 1 hr at <math>125^{\circ}\text{C}</math>. Remove and let set for <math>24 \pm 2</math> hrs at room temp.</p> <p>* Measurement to be made after keeping at room temp. for <math>24 \pm 2</math> hrs.</p>	<p>* No remarkable damage.</p> <p>* Cap change: X8G/NPO: within <math>\pm 3.0\%</math> or <math>\pm 0.3\text{pF}</math> whichever is larger X7R: within <math>\pm 12.5\%</math>.</p> <p>* Q/D.F. value: X8G/NPO: More than <math>30\text{pF}</math>, <math>Q \geq 350</math>; <math>10\text{pF} \leq C &lt; 30\text{pF}</math>, <math>Q \geq 275 + 2.5C</math> Less than <math>10\text{pF}</math>, <math>Q \geq 200 + 10C</math> X7R:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F. <math>\leq</math></th> <th colspan="2">Exception of D.F. <math>\leq</math></th> </tr> </thead> <tbody> <tr> <td rowspan="3">100V</td> <td rowspan="3"><math>\leq 3\%</math></td> <td><math>\leq 6\%</math></td> <td>1206 <math>\geq 0.47\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 7.5\%</math></td> <td>0603 <math>\geq 0.068\mu\text{F}</math>; 0805 <math>&gt; 0.1\mu\text{F}</math>; 1206 <math>\geq 1\mu\text{F}</math>; 1210 <math>\geq 2.2\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 20\%</math></td> <td>0805 <math>&gt; 0.22\mu\text{F}</math>; 1210 <math>\geq 3.3\mu\text{F}</math></td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3"><math>\leq 3\%</math></td> <td><math>\leq 6\%</math></td> <td>0201 (50V); 0603 <math>\geq 0.047\mu\text{F}</math>; 0805 <math>\geq 0.18\mu\text{F}</math>; 1206 <math>\geq 0.47\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 10\%</math></td> <td>0201 <math>\geq 0.01\mu\text{F}</math>; 1210 <math>\geq 3.3\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 20\%</math></td> <td>0402 <math>\geq 0.012\mu\text{F}</math>; 0603 <math>&gt; 0.1\mu\text{F}</math>; 0805/X7R <math>&gt; 0.47\mu\text{F}</math>; 1206 <math>\geq 2.2\mu\text{F}</math>; 1210 <math>\geq 10\mu\text{F}</math></td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3"><math>\leq 5\%</math></td> <td><math>\leq 20\%</math></td> <td>0603 <math>\geq 1\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 2.2\mu\text{F}</math>; 1210 <math>\geq 10\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 10\%</math></td> <td>0201 <math>\geq 0.01\mu\text{F}</math>; 0805 <math>\geq 1\mu\text{F}</math>; 1210 <math>\geq 10\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 14\%</math></td> <td>0603 <math>\geq 0.33\mu\text{F}</math></td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3"><math>\leq 5\%</math></td> <td><math>\leq 15\%</math></td> <td>0201 <math>\geq 0.1\mu\text{F}</math>; 0402 <math>\geq 0.056\mu\text{F}</math>; 0603 <math>\geq 0.47\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 4.7\mu\text{F}</math>; 1210 <math>\geq 22\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 20\%</math></td> <td>0402 <math>\geq 0.33\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 10\%</math></td> <td>0603 <math>\geq 0.15\mu\text{F}</math>; 0805 <math>\geq 0.68\mu\text{F}</math>; 1206 <math>\geq 2.2\mu\text{F}</math>; 1210 <math>\geq 4.7\mu\text{F}</math></td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2"><math>\leq 5\%</math></td> <td><math>\leq 15\%</math></td> <td>0201 <math>\geq 0.022\mu\text{F}</math>; 0402 <math>\geq 0.033\mu\text{F}</math>; 0603 <math>&gt; 0.47\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 4.7\mu\text{F}</math>; 1210 <math>\geq 22\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 15\%</math></td> <td>0201 <math>\geq 0.012\mu\text{F}</math>; 0402 <math>\geq 0.15\mu\text{F}</math>; 0603 <math>\geq 0.33\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 2.2\mu\text{F}</math>; 1210 <math>\geq 22\mu\text{F}</math></td> </tr> <tr> <td>10V</td> <td><math>\leq 7.5\%</math></td> <td><math>\leq 15\%</math></td> <td>0201 <math>\geq 0.1\mu\text{F}</math>; 0402 <math>\geq 1\mu\text{F}</math></td> </tr> <tr> <td>6.3V</td> <td><math>\leq 15\%</math></td> <td><math>\leq 30\%</math></td> <td>0201 <math>\geq 0.1\mu\text{F}</math>; 0402 <math>\geq 1\mu\text{F}</math>; 0603 <math>\geq 10\mu\text{F}</math>; 0805 <math>\geq 4.7\mu\text{F}</math>; 1206 <math>\geq 47\mu\text{F}</math>; 1210 <math>\geq 100\mu\text{F}</math></td> </tr> <tr> <td>4V</td> <td><math>\leq 20\%</math></td> <td>---</td> <td>---</td> </tr> </tbody> </table> <p>* I.R.: <math>\geq 1\text{G}\Omega</math> or <math>\text{RxC} \geq 50\Omega \cdot \text{F}</math> whichever is smaller.</p> <p>Class II (X7R)</p> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 <math>\geq 3.3\mu\text{F}</math></td> <td rowspan="7">1GΩ or RxC <math>\geq 10 \Omega \cdot \text{F}</math> whichever is smaller.</td> </tr> <tr> <td>50V: 0402 <math>&gt; 0.01\mu\text{F}</math>; 0603 <math>\geq 1\mu\text{F}</math>; 0805 <math>\geq 1\mu\text{F}</math>; 1206 <math>\geq 4.7\mu\text{F}</math>; 1210 <math>\geq 4.7\mu\text{F}</math></td> </tr> <tr> <td>35V: 0603 <math>\geq 1\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 2.2\mu\text{F}</math>; 1210 <math>\geq 10\mu\text{F}</math></td> </tr> <tr> <td>25V: 0201 <math>\geq 0.1\mu\text{F}</math>; 0402 <math>\geq 0.22\mu\text{F}</math>; 0603 <math>\geq 2.2\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 10\mu\text{F}</math>; 1210 <math>\geq 10\mu\text{F}</math></td> </tr> <tr> <td>16V: 0201 <math>\geq 0.1\mu\text{F}</math>; 0402 <math>\geq 0.22\mu\text{F}</math>; 0603 <math>\geq 1\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 10\mu\text{F}</math>; 1210 <math>\geq 47\mu\text{F}</math></td> </tr> <tr> <td>10V: 0201 <math>\geq 47\text{nF}</math>; 0402 <math>\geq 0.47\mu\text{F}</math>; 0603 <math>\geq 0.47\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 4.7\mu\text{F}</math>; 1210 <math>\geq 47\mu\text{F}</math></td> </tr> <tr> <td>6.3V; 4V; Size <math>\geq 1812</math></td> </tr> </tbody> </table>	Rated vol.	D.F. $\leq$	Exception of D.F. $\leq$		100V	$\leq 3\%$	$\leq 6\%$	1206 $\geq 0.47\mu\text{F}$	$\leq 7.5\%$	0603 $\geq 0.068\mu\text{F}$ ; 0805 $> 0.1\mu\text{F}$ ; 1206 $\geq 1\mu\text{F}$ ; 1210 $\geq 2.2\mu\text{F}$	$\leq 20\%$	0805 $> 0.22\mu\text{F}$ ; 1210 $\geq 3.3\mu\text{F}$	50V	$\leq 3\%$	$\leq 6\%$	0201 (50V); 0603 $\geq 0.047\mu\text{F}$ ; 0805 $\geq 0.18\mu\text{F}$ ; 1206 $\geq 0.47\mu\text{F}$	$\leq 10\%$	0201 $\geq 0.01\mu\text{F}$ ; 1210 $\geq 3.3\mu\text{F}$	$\leq 20\%$	0402 $\geq 0.012\mu\text{F}$ ; 0603 $> 0.1\mu\text{F}$ ; 0805/X7R $> 0.47\mu\text{F}$ ; 1206 $\geq 2.2\mu\text{F}$ ; 1210 $\geq 10\mu\text{F}$	35V	$\leq 5\%$	$\leq 20\%$	0603 $\geq 1\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 2.2\mu\text{F}$ ; 1210 $\geq 10\mu\text{F}$	$\leq 10\%$	0201 $\geq 0.01\mu\text{F}$ ; 0805 $\geq 1\mu\text{F}$ ; 1210 $\geq 10\mu\text{F}$	$\leq 14\%$	0603 $\geq 0.33\mu\text{F}$	25V	$\leq 5\%$	$\leq 15\%$	0201 $\geq 0.1\mu\text{F}$ ; 0402 $\geq 0.056\mu\text{F}$ ; 0603 $\geq 0.47\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 4.7\mu\text{F}$ ; 1210 $\geq 22\mu\text{F}$	$\leq 20\%$	0402 $\geq 0.33\mu\text{F}$	$\leq 10\%$	0603 $\geq 0.15\mu\text{F}$ ; 0805 $\geq 0.68\mu\text{F}$ ; 1206 $\geq 2.2\mu\text{F}$ ; 1210 $\geq 4.7\mu\text{F}$	16V	$\leq 5\%$	$\leq 15\%$	0201 $\geq 0.022\mu\text{F}$ ; 0402 $\geq 0.033\mu\text{F}$ ; 0603 $> 0.47\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 4.7\mu\text{F}$ ; 1210 $\geq 22\mu\text{F}$	$\leq 15\%$	0201 $\geq 0.012\mu\text{F}$ ; 0402 $\geq 0.15\mu\text{F}$ ; 0603 $\geq 0.33\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 2.2\mu\text{F}$ ; 1210 $\geq 22\mu\text{F}$	10V	$\leq 7.5\%$	$\leq 15\%$	0201 $\geq 0.1\mu\text{F}$ ; 0402 $\geq 1\mu\text{F}$	6.3V	$\leq 15\%$	$\leq 30\%$	0201 $\geq 0.1\mu\text{F}$ ; 0402 $\geq 1\mu\text{F}$ ; 0603 $\geq 10\mu\text{F}$ ; 0805 $\geq 4.7\mu\text{F}$ ; 1206 $\geq 47\mu\text{F}$ ; 1210 $\geq 100\mu\text{F}$	4V	$\leq 20\%$	---	---	Rated voltage	Insulation Resistance	100V: All X7R; 1210 $\geq 3.3\mu\text{F}$	1GΩ or RxC $\geq 10 \Omega \cdot \text{F}$ whichever is smaller.	50V: 0402 $> 0.01\mu\text{F}$ ; 0603 $\geq 1\mu\text{F}$ ; 0805 $\geq 1\mu\text{F}$ ; 1206 $\geq 4.7\mu\text{F}$ ; 1210 $\geq 4.7\mu\text{F}$	35V: 0603 $\geq 1\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 2.2\mu\text{F}$ ; 1210 $\geq 10\mu\text{F}$	25V: 0201 $\geq 0.1\mu\text{F}$ ; 0402 $\geq 0.22\mu\text{F}$ ; 0603 $\geq 2.2\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 10\mu\text{F}$ ; 1210 $\geq 10\mu\text{F}$	16V: 0201 $\geq 0.1\mu\text{F}$ ; 0402 $\geq 0.22\mu\text{F}$ ; 0603 $\geq 1\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 10\mu\text{F}$ ; 1210 $\geq 47\mu\text{F}$	10V: 0201 $\geq 47\text{nF}$ ; 0402 $\geq 0.47\mu\text{F}$ ; 0603 $\geq 0.47\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 4.7\mu\text{F}$ ; 1210 $\geq 47\mu\text{F}$	6.3V; 4V; Size $\geq 1812$
Rated vol.	D.F. $\leq$	Exception of D.F. $\leq$																																																																	
100V	$\leq 3\%$	$\leq 6\%$	1206 $\geq 0.47\mu\text{F}$																																																																
		$\leq 7.5\%$	0603 $\geq 0.068\mu\text{F}$ ; 0805 $> 0.1\mu\text{F}$ ; 1206 $\geq 1\mu\text{F}$ ; 1210 $\geq 2.2\mu\text{F}$																																																																
		$\leq 20\%$	0805 $> 0.22\mu\text{F}$ ; 1210 $\geq 3.3\mu\text{F}$																																																																
50V	$\leq 3\%$	$\leq 6\%$	0201 (50V); 0603 $\geq 0.047\mu\text{F}$ ; 0805 $\geq 0.18\mu\text{F}$ ; 1206 $\geq 0.47\mu\text{F}$																																																																
		$\leq 10\%$	0201 $\geq 0.01\mu\text{F}$ ; 1210 $\geq 3.3\mu\text{F}$																																																																
		$\leq 20\%$	0402 $\geq 0.012\mu\text{F}$ ; 0603 $> 0.1\mu\text{F}$ ; 0805/X7R $> 0.47\mu\text{F}$ ; 1206 $\geq 2.2\mu\text{F}$ ; 1210 $\geq 10\mu\text{F}$																																																																
35V	$\leq 5\%$	$\leq 20\%$	0603 $\geq 1\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 2.2\mu\text{F}$ ; 1210 $\geq 10\mu\text{F}$																																																																
		$\leq 10\%$	0201 $\geq 0.01\mu\text{F}$ ; 0805 $\geq 1\mu\text{F}$ ; 1210 $\geq 10\mu\text{F}$																																																																
		$\leq 14\%$	0603 $\geq 0.33\mu\text{F}$																																																																
25V	$\leq 5\%$	$\leq 15\%$	0201 $\geq 0.1\mu\text{F}$ ; 0402 $\geq 0.056\mu\text{F}$ ; 0603 $\geq 0.47\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 4.7\mu\text{F}$ ; 1210 $\geq 22\mu\text{F}$																																																																
		$\leq 20\%$	0402 $\geq 0.33\mu\text{F}$																																																																
		$\leq 10\%$	0603 $\geq 0.15\mu\text{F}$ ; 0805 $\geq 0.68\mu\text{F}$ ; 1206 $\geq 2.2\mu\text{F}$ ; 1210 $\geq 4.7\mu\text{F}$																																																																
16V	$\leq 5\%$	$\leq 15\%$	0201 $\geq 0.022\mu\text{F}$ ; 0402 $\geq 0.033\mu\text{F}$ ; 0603 $> 0.47\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 4.7\mu\text{F}$ ; 1210 $\geq 22\mu\text{F}$																																																																
		$\leq 15\%$	0201 $\geq 0.012\mu\text{F}$ ; 0402 $\geq 0.15\mu\text{F}$ ; 0603 $\geq 0.33\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 2.2\mu\text{F}$ ; 1210 $\geq 22\mu\text{F}$																																																																
10V	$\leq 7.5\%$	$\leq 15\%$	0201 $\geq 0.1\mu\text{F}$ ; 0402 $\geq 1\mu\text{F}$																																																																
6.3V	$\leq 15\%$	$\leq 30\%$	0201 $\geq 0.1\mu\text{F}$ ; 0402 $\geq 1\mu\text{F}$ ; 0603 $\geq 10\mu\text{F}$ ; 0805 $\geq 4.7\mu\text{F}$ ; 1206 $\geq 47\mu\text{F}$ ; 1210 $\geq 100\mu\text{F}$																																																																
4V	$\leq 20\%$	---	---																																																																
Rated voltage	Insulation Resistance																																																																		
100V: All X7R; 1210 $\geq 3.3\mu\text{F}$	1GΩ or RxC $\geq 10 \Omega \cdot \text{F}$ whichever is smaller.																																																																		
50V: 0402 $> 0.01\mu\text{F}$ ; 0603 $\geq 1\mu\text{F}$ ; 0805 $\geq 1\mu\text{F}$ ; 1206 $\geq 4.7\mu\text{F}$ ; 1210 $\geq 4.7\mu\text{F}$																																																																			
35V: 0603 $\geq 1\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 2.2\mu\text{F}$ ; 1210 $\geq 10\mu\text{F}$																																																																			
25V: 0201 $\geq 0.1\mu\text{F}$ ; 0402 $\geq 0.22\mu\text{F}$ ; 0603 $\geq 2.2\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 10\mu\text{F}$ ; 1210 $\geq 10\mu\text{F}$																																																																			
16V: 0201 $\geq 0.1\mu\text{F}$ ; 0402 $\geq 0.22\mu\text{F}$ ; 0603 $\geq 1\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 10\mu\text{F}$ ; 1210 $\geq 47\mu\text{F}$																																																																			
10V: 0201 $\geq 47\text{nF}$ ; 0402 $\geq 0.47\mu\text{F}$ ; 0603 $\geq 0.47\mu\text{F}$ ; 0805 $\geq 2.2\mu\text{F}$ ; 1206 $\geq 4.7\mu\text{F}$ ; 1210 $\geq 47\mu\text{F}$																																																																			
6.3V; 4V; Size $\geq 1812$																																																																			
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																																																																

\* "Room condition" Temperature: 15 to  $35^{\circ}\text{C}$ , Relative humidity: 25 to 75%, Atmospheric pressure: 86 to  $106\text{kPa}$ .

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: X8G/NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R:		
			Rated vol.	D.F. ≤	Exception of D.F. ≤
			≥ 100V	≤ 2.5%	≤ 3% 1206 ≥ 0.47μF ≤ 5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF ≤ 10% 0805 > 0.22μF; 1210 ≥ 3.3μF
			50V	≤ 2.5%	≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF ≤ 5% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF
					≤ 10% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF
					35V ≤ 3.5% ≤ 10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF
			25V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF ≤ 7% 0603 ≥ 0.33μF
					≤ 10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF ≤ 12.5% 0402 ≥ 0.33μF
					16V ≤ 3.5% ≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF ≤ 10% 0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF
			10V	≤ 5%	≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF ≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF
			6.3V	≤ 10%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF ≤ 20% 0402 ≥ 2.2μF
			4V	≤ 15%	--
			* I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller.		
			Class II (X7R)		
			Rated voltage		Insulation Resistance
100V: All X7R		10GΩ or RxC≥100 Ω-F whichever is smaller.			
50V: 0402>0.01μF; 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF					
35V: 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF					
25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF					
16V: 0201≥0.1μF; 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF					
10V: 0201≥47nF; 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF		RxC≥50 Ω-F.			
6.3V; 4V; Size≥1812					
Rated voltage					
100V: 1210≥3.3μF					
50V: 0402≥0.1μF; 0603≥2.2μF; 0805≥10μF; 1206≥10μF					
35V: 0603≥1μF;					
25V: 0201≥0.1μF; 0402≥2.2μF; 0603≥10μF; 0805≥10μF; 1206≥22μF					
16V: 0603≥10μF; 0402≥1μF; 0201≥0.22μF					
10V: 0201>0.1μF; 0402≥1μF; 0603≥10μF; 0805≥47μF					
6.3V: 0201≥0.1μF; 0402≥1μF; 0603>4.7μF; 0805≥47μF; 1206≥10μF					
4V: 0603≥22μF; 0805≥47μF; 1206≥100μF					

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

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: X8G/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 colspan="2">Exception of D.F. <math>\leq</math></th> </tr> </thead> <tbody> <tr> <td rowspan="3"><math>\geq</math> 100V</td> <td rowspan="3"><math>\leq</math> 2.5%</td> <td><math>\leq</math> 3%</td> <td>1206<math>\geq</math>0.47<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math> 5%</td> <td>0603<math>\geq</math>0.068<math>\mu</math>F;0805<math>&gt;</math>0.1<math>\mu</math>F;1206<math>\geq</math>1<math>\mu</math>F;1210<math>\geq</math>2.2<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math> 10%</td> <td>0805<math>&gt;</math>0.22<math>\mu</math>F;1210<math>\geq</math>3.3<math>\mu</math>F</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3"><math>\leq</math> 2.5%</td> <td><math>\leq</math> 3%</td> <td>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%</td> <td>0201<math>\geq</math>0.01<math>\mu</math>F;1210<math>\geq</math>3.3<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math> 10%</td> <td>0402<math>\geq</math>0.012<math>\mu</math>F;0603<math>&gt;</math>0.1<math>\mu</math>F; 0805<math>&gt;</math>0.47<math>\mu</math>F;1206<math>\geq</math>2.2<math>\mu</math>F;1210<math>\geq</math>10<math>\mu</math>F</td> </tr> <tr> <td>35V</td> <td><math>\leq</math> 3.5%</td> <td><math>\leq</math> 10%</td> <td>0603<math>\geq</math>1<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>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%</td> <td>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%</td> <td>0603<math>\geq</math>0.33<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math> 10%</td> <td>0201<math>\geq</math>0.1<math>\mu</math>F;0402<math>\geq</math>0.056<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>22<math>\mu</math>F</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3"><math>\leq</math> 3.5%</td> <td><math>\leq</math> 12.5%</td> <td>0402<math>\geq</math>0.33<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math> 5%</td> <td>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%</td> <td>0201<math>\geq</math>0.022<math>\mu</math>F; 0402<math>\geq</math>0.15<math>\mu</math>F;0603<math>&gt;</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>22<math>\mu</math>F</td> </tr> <tr> <td>10V</td> <td><math>\leq</math> 5%</td> <td><math>\leq</math> 10%</td> <td>0201<math>\geq</math>0.012<math>\mu</math>F;0402<math>\geq</math>0.15<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</td> </tr> <tr> <td rowspan="3">6.3V</td> <td rowspan="3"><math>\leq</math> 10%</td> <td><math>\leq</math> 15%</td> <td>0201<math>\geq</math>0.1<math>\mu</math>F; 0402<math>\geq</math>1<math>\mu</math>F</td> </tr> <tr> <td><math>\leq</math> 15%</td> <td>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</td> </tr> <tr> <td><math>\leq</math> 20%</td> <td>0402<math>\geq</math>2.2<math>\mu</math>F</td> </tr> <tr> <td>4V</td> <td><math>\leq</math> 15%</td> <td>--</td> <td>--</td> </tr> </tbody> </table>	Rated vol.	D.F. $\leq$	Exception of D.F. $\leq$		$\geq$ 100V	$\leq$ 2.5%	$\leq$ 3%	1206 $\geq$ 0.47 $\mu$ F	$\leq$ 5%	0603 $\geq$ 0.068 $\mu$ F;0805 $>$ 0.1 $\mu$ F;1206 $\geq$ 1 $\mu$ F;1210 $\geq$ 2.2 $\mu$ F	$\leq$ 10%	0805 $>$ 0.22 $\mu$ F;1210 $\geq$ 3.3 $\mu$ F	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%	0201 $\geq$ 0.01 $\mu$ F;1210 $\geq$ 3.3 $\mu$ F	$\leq$ 10%	0402 $\geq$ 0.012 $\mu$ F;0603 $>$ 0.1 $\mu$ F; 0805 $>$ 0.47 $\mu$ F;1206 $\geq$ 2.2 $\mu$ F;1210 $\geq$ 10 $\mu$ F	35V	$\leq$ 3.5%	$\leq$ 10%	0603 $\geq$ 1 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F;1206 $\geq$ 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	$\leq$ 10%	0201 $\geq$ 0.1 $\mu$ F;0402 $\geq$ 0.056 $\mu$ F;0603 $\geq$ 0.47 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F;1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 22 $\mu$ F	16V	$\leq$ 3.5%	$\leq$ 12.5%	0402 $\geq$ 0.33 $\mu$ F	$\leq$ 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 $\geq$ 0.022 $\mu$ F; 0402 $\geq$ 0.15 $\mu$ F;0603 $>$ 0.47 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F;1206 $\geq$ 4.7 $\mu$ F;1210 $\geq$ 22 $\mu$ F	10V	$\leq$ 5%	$\leq$ 10%	0201 $\geq$ 0.012 $\mu$ F;0402 $\geq$ 0.15 $\mu$ F;0603 $\geq$ 0.33 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F;1206 $\geq$ 2.2 $\mu$ F;1210 $\geq$ 22 $\mu$ F	6.3V	$\leq$ 10%	$\leq$ 15%	0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 1 $\mu$ F	$\leq$ 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	$\leq$ 20%	0402 $\geq$ 2.2 $\mu$ F	4V	$\leq$ 15%	--	--
			Rated vol.	D.F. $\leq$	Exception of D.F. $\leq$																																																						
			$\geq$ 100V	$\leq$ 2.5%	$\leq$ 3%	1206 $\geq$ 0.47 $\mu$ F																																																					
					$\leq$ 5%	0603 $\geq$ 0.068 $\mu$ F;0805 $>$ 0.1 $\mu$ F;1206 $\geq$ 1 $\mu$ F;1210 $\geq$ 2.2 $\mu$ F																																																					
					$\leq$ 10%	0805 $>$ 0.22 $\mu$ F;1210 $\geq$ 3.3 $\mu$ F																																																					
			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%	0201 $\geq$ 0.01 $\mu$ F;1210 $\geq$ 3.3 $\mu$ F																																																					
					$\leq$ 10%	0402 $\geq$ 0.012 $\mu$ F;0603 $>$ 0.1 $\mu$ F; 0805 $>$ 0.47 $\mu$ F;1206 $\geq$ 2.2 $\mu$ F;1210 $\geq$ 10 $\mu$ F																																																					
			35V	$\leq$ 3.5%	$\leq$ 10%	0603 $\geq$ 1 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F;1206 $\geq$ 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																																																					
					$\leq$ 10%	0201 $\geq$ 0.1 $\mu$ F;0402 $\geq$ 0.056 $\mu$ F;0603 $\geq$ 0.47 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F;1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 22 $\mu$ F																																																					
			16V	$\leq$ 3.5%	$\leq$ 12.5%	0402 $\geq$ 0.33 $\mu$ F																																																					
					$\leq$ 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 $\geq$ 0.022 $\mu$ F; 0402 $\geq$ 0.15 $\mu$ F;0603 $>$ 0.47 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F;1206 $\geq$ 4.7 $\mu$ F;1210 $\geq$ 22 $\mu$ F																																																										
10V	$\leq$ 5%	$\leq$ 10%	0201 $\geq$ 0.012 $\mu$ F;0402 $\geq$ 0.15 $\mu$ F;0603 $\geq$ 0.33 $\mu$ F;0805 $\geq$ 2.2 $\mu$ F;1206 $\geq$ 2.2 $\mu$ F;1210 $\geq$ 22 $\mu$ F																																																								
6.3V	$\leq$ 10%	$\leq$ 15%	0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 1 $\mu$ F																																																								
		$\leq$ 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																																																								
		$\leq$ 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>100V: All 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: 0402<math>&gt;</math>0.01<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>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;1206<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; Size<math>\geq</math>1812</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R	10G $\Omega$ or RxC $\geq$ 100 $\Omega$ -F whichever is smaller.	50V: 0402 $>$ 0.01 $\mu$ F;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;1206 $\geq$ 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; Size $\geq$ 1812																																																	
Rated voltage	Insulation Resistance																																																										
100V: All X7R	10G $\Omega$ or RxC $\geq$ 100 $\Omega$ -F whichever is smaller.																																																										
50V: 0402 $>$ 0.01 $\mu$ F;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;1206 $\geq$ 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; Size $\geq$ 1812																																																											
<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: 1210<math>\geq</math>3.3<math>\mu</math>F</td> <td rowspan="7">Rx<math>\geq</math>50 <math>\Omega</math>-F.</td> </tr> <tr> <td>50V: 0402<math>\geq</math>0.1<math>\mu</math>F;0603<math>\geq</math>2.2<math>\mu</math>F;0805<math>\geq</math>10<math>\mu</math>F;1206<math>\geq</math>10<math>\mu</math>F</td> </tr> <tr> <td>35V: 0603<math>\geq</math>1<math>\mu</math>F;</td> </tr> <tr> <td>25V: 0201<math>\geq</math>0.1<math>\mu</math>F;0402<math>\geq</math>2.2<math>\mu</math>F;0603<math>\geq</math>10<math>\mu</math>F;0805<math>\geq</math>10<math>\mu</math>F;1206<math>\geq</math>22<math>\mu</math>F</td> </tr> <tr> <td>16V: 0603<math>\geq</math>10<math>\mu</math>F;0402<math>\geq</math>1<math>\mu</math>F;0201<math>\geq</math>0.22<math>\mu</math>F</td> </tr> <tr> <td>10V: 0201<math>&gt;</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>47<math>\mu</math>F</td> </tr> <tr> <td>6.3V: 0201<math>\geq</math>0.1<math>\mu</math>F;0402<math>\geq</math>1<math>\mu</math>F;0603<math>&gt;</math>4.7<math>\mu</math>F;0805<math>\geq</math>47<math>\mu</math>F;1206<math>\geq</math>10<math>\mu</math>F</td> </tr> <tr> <td>4V: 0603<math>\geq</math>22<math>\mu</math>F;0805<math>\geq</math>47<math>\mu</math>F;1206<math>\geq</math>100<math>\mu</math>F</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: 1210 $\geq$ 3.3 $\mu$ F	Rx $\geq$ 50 $\Omega$ -F.	50V: 0402 $\geq$ 0.1 $\mu$ F;0603 $\geq$ 2.2 $\mu$ F;0805 $\geq$ 10 $\mu$ F;1206 $\geq$ 10 $\mu$ F	35V: 0603 $\geq$ 1 $\mu$ F;	25V: 0201 $\geq$ 0.1 $\mu$ F;0402 $\geq$ 2.2 $\mu$ F;0603 $\geq$ 10 $\mu$ F;0805 $\geq$ 10 $\mu$ F;1206 $\geq$ 22 $\mu$ F	16V: 0603 $\geq$ 10 $\mu$ F;0402 $\geq$ 1 $\mu$ F;0201 $\geq$ 0.22 $\mu$ F	10V: 0201 $>$ 0.1 $\mu$ F;0402 $\geq$ 1 $\mu$ F;0603 $\geq$ 10 $\mu$ F;0805 $\geq$ 47 $\mu$ F	6.3V: 0201 $\geq$ 0.1 $\mu$ F;0402 $\geq$ 1 $\mu$ F;0603 $>$ 4.7 $\mu$ F;0805 $\geq$ 47 $\mu$ F;1206 $\geq$ 10 $\mu$ F	4V: 0603 $\geq$ 22 $\mu$ F;0805 $\geq$ 47 $\mu$ F;1206 $\geq$ 100 $\mu$ F																																																
Rated voltage	Insulation Resistance																																																										
100V: 1210 $\geq$ 3.3 $\mu$ F	Rx $\geq$ 50 $\Omega$ -F.																																																										
50V: 0402 $\geq$ 0.1 $\mu$ F;0603 $\geq$ 2.2 $\mu$ F;0805 $\geq$ 10 $\mu$ F;1206 $\geq$ 10 $\mu$ F																																																											
35V: 0603 $\geq$ 1 $\mu$ F;																																																											
25V: 0201 $\geq$ 0.1 $\mu$ F;0402 $\geq$ 2.2 $\mu$ F;0603 $\geq$ 10 $\mu$ F;0805 $\geq$ 10 $\mu$ F;1206 $\geq$ 22 $\mu$ F																																																											
16V: 0603 $\geq$ 10 $\mu$ F;0402 $\geq$ 1 $\mu$ F;0201 $\geq$ 0.22 $\mu$ F																																																											
10V: 0201 $>$ 0.1 $\mu$ F;0402 $\geq$ 1 $\mu$ F;0603 $\geq$ 10 $\mu$ F;0805 $\geq$ 47 $\mu$ F																																																											
6.3V: 0201 $\geq$ 0.1 $\mu$ F;0402 $\geq$ 1 $\mu$ F;0603 $>$ 4.7 $\mu$ F;0805 $\geq$ 47 $\mu$ F;1206 $\geq$ 10 $\mu$ F																																																											
4V: 0603 $\geq$ 22 $\mu$ F;0805 $\geq$ 47 $\mu$ F;1206 $\geq$ 100 $\mu$ F																																																											

\* "Room condition" Temperature: 15 to 35 $^{\circ}$ C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																								
12.	<b>Vibration</b> 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: X8G/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">≥ 100V</td> <td rowspan="3">≤ 2.5%</td> <td>≤ 3%</td> <td>1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 5%</td> <td>0603 ≥ 0.068μF; 0805 &gt; 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤ 10%</td> <td>0805 &gt; 0.22μF; 1210 ≥ 3.3μF</td> </tr> <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>0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤ 10%</td> <td>0402 ≥ 0.012μF; 0603 &gt; 0.1μF; 0805 &gt; 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>35V</td> <td>≤ 3.5%</td> <td>≤ 10%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 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</td> </tr> <tr> <td>≤ 10%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤ 3.5%</td> <td>≤ 12.5%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <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 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 &gt; 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>10V</td> <td>≤ 5%</td> <td>≤ 10%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">6.3V</td> <td rowspan="3">≤ 10%</td> <td>≤ 15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤ 15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</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. ≤		≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF	≤ 5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤ 10%	0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 5%	0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤ 10%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 7%	0603 ≥ 0.33μF	≤ 10%	0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	16V	≤ 3.5%	≤ 12.5%	0402 ≥ 0.33μF	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤ 10%	0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	10V	≤ 5%	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	≤ 20%	0402 ≥ 2.2μF	4V	≤ 15%	--	--
			Rated vol.	D.F. ≤	Exception of D.F. ≤																																																						
			≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF																																																					
					≤ 5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF																																																					
					≤ 10%	0805 > 0.22μF; 1210 ≥ 3.3μF																																																					
			50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																					
					≤ 5%	0201 ≥ 0.01μF; 1210 ≥ 3.3μF																																																					
					≤ 10%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																					
			35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																					
			25V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																																																					
					≤ 7%	0603 ≥ 0.33μF																																																					
≤ 10%	0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																																										
16V	≤ 3.5%	≤ 12.5%	0402 ≥ 0.33μF																																																								
		≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																																								
		≤ 10%	0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																																								
10V	≤ 5%	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																								
6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF																																																								
		≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF																																																								
		≤ 20%	0402 ≥ 2.2μF																																																								
4V	≤ 15%	--	--																																																								
* I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller.																																																											
Class II (X7R)																																																											
Rated voltage		Insulation Resistance																																																									
100V: All X7R		10GΩ or RxC≥100 Ω-F whichever is smaller.																																																									
50V: 0402>0.01μF; 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF																																																											
35V: 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF																																																											
25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF																																																											
16V: 0201≥0.1μF; 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF																																																											
10V: 0201≥47nF; 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF																																																											
6.3V; 4V; Size≥1812																																																											
Rated voltage		Insulation Resistance																																																									
		RxC≥50 Ω-F.																																																									
100V: 1210≥3.3μF																																																											
50V: 0402≥0.1μF; 0603≥2.2μF; 0805≥10μF; 1206≥10μF																																																											
35V: 0603≥1μF;																																																											
25V: 0201≥0.1μF; 0402≥2.2μF; 0603≥10μF; 0805≥10μF; 1206≥22μF																																																											
16V: 0603≥10μF; 0402≥1μF; 0201≥0.22μF																																																											
10V: 0201>0.1μF; 0402≥1μF; 0603≥10μF; 0805≥47μF																																																											
6.3V: 0201≥0.1μF; 0402≥1μF; 0603>4.7μF; 0805≥47μF; 1206≥10μF																																																											
4V: 0603≥22μF; 0805≥47μF; 1206≥100μF																																																											

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

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: 260±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: X8G/NPO: within ±2.5% or 0.25pF whichever is larger X7R: within ±7.5% * Q/D.F. value: X8G/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 colspan="2">Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥ 100V</td> <td rowspan="3">≤ 2.5%</td> <td>≤ 3%</td> <td>1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 5%</td> <td>0603 ≥ 0.068μF; 0805 &gt; 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤ 10%</td> <td>0805 &gt; 0.22μF; 1210 ≥ 3.3μF</td> </tr> <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>0201 ≥ 0.01 uF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤ 10%</td> <td>0402 ≥ 0.012μF; 0603 &gt; 0.1μF; 0805 &gt; 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>35V</td> <td>≤ 3.5%</td> <td>≤ 10%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 3.5%</td> <td>≤ 5%</td> <td>0201 ≥ 0.01 μF; 0805 ≥ 1 μF; 1210 ≥ 10 μF</td> </tr> <tr> <td>≤ 7%</td> <td>0603 ≥ 0.33μF</td> </tr> <tr> <td>≤ 10%</td> <td>0201 ≥ 0.1 μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47 μF; 0805 ≥ 2.2 μF; 1206 ≥ 4.7 μF; 1210 ≥ 22 μF</td> </tr> <tr> <td></td> <td></td> <td>≤ 12.5%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤ 3.5%</td> <td>≤ 5%</td> <td>0201 ≥ 0.01 μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15 μF; 0805 ≥ 0.68 μF; 1206 ≥ 2.2 μF; 1210 ≥ 4.7 μF</td> </tr> <tr> <td>≤ 10%</td> <td>0201 ≥ 0.022 μF; 0402 ≥ 0.15 uF; 0603 &gt; 0.47 μF; 0805 ≥ 2.2 μF; 1206 ≥ 4.7 μF; 1210 ≥ 22 μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤ 5%</td> <td>≤ 10%</td> <td>0201 ≥ 0.012 μF; 0402 ≥ 0.15 μF; 0603 ≥ 0.33 μF; 0805 ≥ 2.2 μF; 1206 ≥ 2.2 μF; 1210 ≥ 22 μF</td> </tr> <tr> <td>≤ 15%</td> <td>0201 ≥ 0.1 μF; 0402 ≥ 1 μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤ 10%</td> <td>≤ 15%</td> <td>0201 ≥ 0.1 μF; 0402 ≥ 1 μF; 0603 ≥ 10 μF; 0805 ≥ 4.7 μF; 1206 ≥ 47 μF; 1210 ≥ 100 μF</td> </tr> <tr> <td>≤ 20%</td> <td>0402 ≥ 2.2 μF</td> </tr> <tr> <td>4V</td> <td>≤ 15%</td> <td>---</td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤		≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF	≤ 5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤ 10%	0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 5%	0201 ≥ 0.01 uF; 1210 ≥ 3.3μF	≤ 10%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤ 3.5%	≤ 5%	0201 ≥ 0.01 μF; 0805 ≥ 1 μF; 1210 ≥ 10 μF	≤ 7%	0603 ≥ 0.33μF	≤ 10%	0201 ≥ 0.1 μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47 μF; 0805 ≥ 2.2 μF; 1206 ≥ 4.7 μF; 1210 ≥ 22 μF			≤ 12.5%	0402 ≥ 0.33μF	16V	≤ 3.5%	≤ 5%	0201 ≥ 0.01 μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15 μF; 0805 ≥ 0.68 μF; 1206 ≥ 2.2 μF; 1210 ≥ 4.7 μF	≤ 10%	0201 ≥ 0.022 μF; 0402 ≥ 0.15 uF; 0603 > 0.47 μF; 0805 ≥ 2.2 μF; 1206 ≥ 4.7 μF; 1210 ≥ 22 μF	10V	≤ 5%	≤ 10%	0201 ≥ 0.012 μF; 0402 ≥ 0.15 μF; 0603 ≥ 0.33 μF; 0805 ≥ 2.2 μF; 1206 ≥ 2.2 μF; 1210 ≥ 22 μF	≤ 15%	0201 ≥ 0.1 μF; 0402 ≥ 1 μF	6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1 μF; 0402 ≥ 1 μF; 0603 ≥ 10 μF; 0805 ≥ 4.7 μF; 1206 ≥ 47 μF; 1210 ≥ 100 μF	≤ 20%	0402 ≥ 2.2 μF	4V	≤ 15%	---	---
Rated vol.	D.F. ≤	Exception of D.F. ≤																																																											
≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF																																																										
		≤ 5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF																																																										
		≤ 10%	0805 > 0.22μF; 1210 ≥ 3.3μF																																																										
50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																										
		≤ 5%	0201 ≥ 0.01 uF; 1210 ≥ 3.3μF																																																										
		≤ 10%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																										
35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																										
25V	≤ 3.5%	≤ 5%	0201 ≥ 0.01 μF; 0805 ≥ 1 μF; 1210 ≥ 10 μF																																																										
		≤ 7%	0603 ≥ 0.33μF																																																										
		≤ 10%	0201 ≥ 0.1 μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47 μF; 0805 ≥ 2.2 μF; 1206 ≥ 4.7 μF; 1210 ≥ 22 μF																																																										
		≤ 12.5%	0402 ≥ 0.33μF																																																										
16V	≤ 3.5%	≤ 5%	0201 ≥ 0.01 μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15 μF; 0805 ≥ 0.68 μF; 1206 ≥ 2.2 μF; 1210 ≥ 4.7 μF																																																										
		≤ 10%	0201 ≥ 0.022 μF; 0402 ≥ 0.15 uF; 0603 > 0.47 μF; 0805 ≥ 2.2 μF; 1206 ≥ 4.7 μF; 1210 ≥ 22 μF																																																										
10V	≤ 5%	≤ 10%	0201 ≥ 0.012 μF; 0402 ≥ 0.15 μF; 0603 ≥ 0.33 μF; 0805 ≥ 2.2 μF; 1206 ≥ 2.2 μF; 1210 ≥ 22 μF																																																										
		≤ 15%	0201 ≥ 0.1 μF; 0402 ≥ 1 μF																																																										
6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1 μF; 0402 ≥ 1 μF; 0603 ≥ 10 μF; 0805 ≥ 4.7 μF; 1206 ≥ 47 μF; 1210 ≥ 100 μF																																																										
		≤ 20%	0402 ≥ 2.2 μF																																																										
4V	≤ 15%	---	---																																																										
			* I.R.: ≥10GΩ or RxC≥5000Ω-F whichever is smaller. Class II (X7R) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R</td> <td rowspan="5">10GΩ or RxC≥100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402&gt;0.01 μF; 0603≥1 μF; 0805≥1 μF; 1206≥4.7 μF; 1210≥4.7 μF</td> </tr> <tr> <td>35V: 0805≥2.2 μF; 1206≥2.2 μF; 1210≥10 μF</td> </tr> <tr> <td>25V: 0402≥1 μF; 0603≥2.2 μF; 0805≥2.2 μF; 1206≥10 μF; 1210≥10 μF</td> </tr> <tr> <td>16V: 0201≥0.1 μF; 0402≥0.22 μF; 0603≥1 μF; 0805≥2.2 μF; 1206≥10 μF; 1210≥47 μF</td> </tr> <tr> <td>10V: 0201≥47nF; 0402≥0.47 μF; 0603≥0.47 μF; 0805≥2.2 μF; 1206≥4.7 μF; 1210≥47 μF</td> <td rowspan="7">RxC≥50 Ω-F.</td> </tr> <tr> <td>6.3V; 4V; Size≥1812</td> </tr> <tr> <td>Rated voltage</td> </tr> <tr> <td>100V: 1210≥3.3μF</td> </tr> <tr> <td>50V: 0402≥0.1μF; 0603≥2.2μF; 0805≥10μF; 1206≥10μF</td> </tr> <tr> <td>35V: 0603≥1μF;</td> </tr> <tr> <td>25V: 0201≥0.1μF; 0402≥2.2μF; 0603≥10μF; 0805≥10μF; 1206≥22μF</td> </tr> <tr> <td>16V: 0603≥10μF; 0402≥1μF; 0201≥0.22μF</td> </tr> <tr> <td>10V: 0201&gt;0.1μF; 0402≥1μF; 0603≥10μF; 0805≥47μF</td> </tr> <tr> <td>6.3V: 0201≥0.1μF; 0402≥1μF; 0603&gt;4.7μF; 0805≥47μF; 1206≥10μF</td> </tr> <tr> <td>4V: 0603≥22μF; 0805≥47μF; 1206≥100μF</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R	10GΩ or RxC≥100 Ω-F whichever is smaller.	50V: 0402>0.01 μF; 0603≥1 μF; 0805≥1 μF; 1206≥4.7 μF; 1210≥4.7 μF	35V: 0805≥2.2 μF; 1206≥2.2 μF; 1210≥10 μF	25V: 0402≥1 μF; 0603≥2.2 μF; 0805≥2.2 μF; 1206≥10 μF; 1210≥10 μF	16V: 0201≥0.1 μF; 0402≥0.22 μF; 0603≥1 μF; 0805≥2.2 μF; 1206≥10 μF; 1210≥47 μF	10V: 0201≥47nF; 0402≥0.47 μF; 0603≥0.47 μF; 0805≥2.2 μF; 1206≥4.7 μF; 1210≥47 μF	RxC≥50 Ω-F.	6.3V; 4V; Size≥1812	Rated voltage	100V: 1210≥3.3μF	50V: 0402≥0.1μF; 0603≥2.2μF; 0805≥10μF; 1206≥10μF	35V: 0603≥1μF;	25V: 0201≥0.1μF; 0402≥2.2μF; 0603≥10μF; 0805≥10μF; 1206≥22μF	16V: 0603≥10μF; 0402≥1μF; 0201≥0.22μF	10V: 0201>0.1μF; 0402≥1μF; 0603≥10μF; 0805≥47μF	6.3V: 0201≥0.1μF; 0402≥1μF; 0603>4.7μF; 0805≥47μF; 1206≥10μF	4V: 0603≥22μF; 0805≥47μF; 1206≥100μF																																						
Rated voltage	Insulation Resistance																																																												
100V: All X7R	10GΩ or RxC≥100 Ω-F whichever is smaller.																																																												
50V: 0402>0.01 μF; 0603≥1 μF; 0805≥1 μF; 1206≥4.7 μF; 1210≥4.7 μF																																																													
35V: 0805≥2.2 μF; 1206≥2.2 μF; 1210≥10 μF																																																													
25V: 0402≥1 μF; 0603≥2.2 μF; 0805≥2.2 μF; 1206≥10 μF; 1210≥10 μF																																																													
16V: 0201≥0.1 μF; 0402≥0.22 μF; 0603≥1 μF; 0805≥2.2 μF; 1206≥10 μF; 1210≥47 μF																																																													
10V: 0201≥47nF; 0402≥0.47 μF; 0603≥0.47 μF; 0805≥2.2 μF; 1206≥4.7 μF; 1210≥47 μF	RxC≥50 Ω-F.																																																												
6.3V; 4V; Size≥1812																																																													
Rated voltage																																																													
100V: 1210≥3.3μF																																																													
50V: 0402≥0.1μF; 0603≥2.2μF; 0805≥10μF; 1206≥10μF																																																													
35V: 0603≥1μF;																																																													
25V: 0201≥0.1μF; 0402≥2.2μF; 0603≥10μF; 0805≥10μF; 1206≥22μF																																																													
16V: 0603≥10μF; 0402≥1μF; 0201≥0.22μF																																																													
10V: 0201>0.1μF; 0402≥1μF; 0603≥10μF; 0805≥47μF																																																													
6.3V: 0201≥0.1μF; 0402≥1μF; 0603>4.7μF; 0805≥47μF; 1206≥10μF																																																													
4V: 0603≥22μF; 0805≥47μF; 1206≥100μF																																																													

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

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.	* No remarkable damage. * Cap change : X8G/NPO: within $\pm 2.5\%$ or 0.25pF whichever is larger X7R: within $\pm 10.0\%$																									
		<table border="1"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. operating temp. +0/-3</td> <td>15<math>\pm</math>3</td> </tr> <tr> <td>2</td> <td>Max. operating temp. +3/-0</td> <td>15<math>\pm</math>3</td> </tr> </tbody> </table>	Step	Temp. (°C)	Time (min.)	1	Min. operating temp. +0/-3	15 $\pm$ 3	2	Max. operating temp. +3/-0	15 $\pm$ 3	* Q/D.F. value: X8G/NPO: Cap $\geq$ 30pF, Q $\geq$ 1000 ; Cap<30pF, Q $\geq$ 400+20C.																
		Step	Temp. (°C)	Time (min.)																								
		1	Min. operating temp. +0/-3	15 $\pm$ 3																								
		2	Max. operating temp. +3/-0	15 $\pm$ 3																								
		* Max. transfer time: 20 sec. * Before initial measurement (X7R only): Perform 150+0/-10°C for 1 hr and then set for 24 $\pm$ 2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24 $\pm$ 2 hrs.	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> 100V</td> <td><math>\leq 3\%</math></td> <td><math>\leq 6\%</math> 1206 <math>\geq</math> 0.47<math>\mu</math>F <math>\leq 7.5\%</math> 0603 <math>\geq</math> 0.068<math>\mu</math>F; 0805 &gt; 0.1<math>\mu</math>F; 1206 <math>\geq</math> 1<math>\mu</math>F; 1210 <math>\geq</math> 2.2<math>\mu</math>F <math>\leq 20\%</math> 0805 &gt; 0.22<math>\mu</math>F; 1210 <math>\geq</math> 3.3<math>\mu</math>F</td> </tr> <tr> <td rowspan="3"><math>\leq 3\%</math></td> <td><math>\leq 6\%</math> 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 <math>\leq 10\%</math> 0201 <math>\geq</math> 0.01<math>\mu</math>F; 1210 <math>\geq</math> 3.3<math>\mu</math>F <math>\leq 20\%</math> 0402 <math>\geq</math> 0.012<math>\mu</math>F; 0603 &gt; 0.1<math>\mu</math>F; 0805/X7R &gt; 0.47<math>\mu</math>F; 1206 <math>\geq</math> 2.2<math>\mu</math>F; 1210 <math>\geq</math> 10<math>\mu</math>F</td> </tr> <tr> <td><math>\leq 5\%</math></td> <td><math>\leq 20\%</math> 0603 <math>\geq</math> 1<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> 10<math>\mu</math>F</td> </tr> <tr> <td rowspan="3"><math>\leq 5\%</math></td> <td><math>\leq 10\%</math> 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 <math>\leq 14\%</math> 0603 <math>\geq</math> 0.33<math>\mu</math>F <math>\leq 15\%</math> 0201 <math>\geq</math> 0.1<math>\mu</math>F; 0402 <math>\geq</math> 0.056<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> 22<math>\mu</math>F <math>\leq 20\%</math> 0402 <math>\geq</math> 0.33<math>\mu</math>F</td> </tr> <tr> <td rowspan="2"><math>\leq 5\%</math></td> <td><math>\leq 10\%</math> 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 <math>\leq 15\%</math> 0201 <math>\geq</math> 0.022<math>\mu</math>F; 0402 <math>\geq</math> 0.033<math>\mu</math>F; 0603 &gt; 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> 22<math>\mu</math>F</td> </tr> <tr> <td><math>\leq 7.5\%</math></td> <td><math>\leq 15\%</math> 0201 <math>\geq</math> 0.012<math>\mu</math>F; 0402 <math>\geq</math> 0.15<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 <math>\leq 20\%</math> 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><math>\leq 15\%</math></td> <td><math>\leq 30\%</math> 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</td> </tr> <tr> <td><math>\leq 20\%</math></td> <td>---</td> </tr> <tr> <td>4V</td> <td><math>\leq 20\%</math></td> <td>---</td> </tr> </tbody> </table>	Rated vol.	D.F. $\leq$	Exception of D.F. $\leq$	$\geq$ 100V	$\leq 3\%$	$\leq 6\%$ 1206 $\geq$ 0.47 $\mu$ F $\leq 7.5\%$ 0603 $\geq$ 0.068 $\mu$ F; 0805 > 0.1 $\mu$ F; 1206 $\geq$ 1 $\mu$ F; 1210 $\geq$ 2.2 $\mu$ F $\leq 20\%$ 0805 > 0.22 $\mu$ F; 1210 $\geq$ 3.3 $\mu$ F	$\leq 3\%$	$\leq 6\%$ 0201(50V); 0603 $\geq$ 0.047 $\mu$ F; 0805 $\geq$ 0.18 $\mu$ F; 1206 $\geq$ 0.47 $\mu$ F $\leq 10\%$ 0201 $\geq$ 0.01 $\mu$ F; 1210 $\geq$ 3.3 $\mu$ F $\leq 20\%$ 0402 $\geq$ 0.012 $\mu$ F; 0603 > 0.1 $\mu$ F; 0805/X7R > 0.47 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F	$\leq 5\%$	$\leq 20\%$ 0603 $\geq$ 1 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F	$\leq 5\%$	$\leq 10\%$ 0201 $\geq$ 0.01 $\mu$ F; 0805 $\geq$ 1 $\mu$ F; 1210 $\geq$ 10 $\mu$ F $\leq 14\%$ 0603 $\geq$ 0.33 $\mu$ F $\leq 15\%$ 0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 0.056 $\mu$ F; 0603 $\geq$ 0.47 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 22 $\mu$ F $\leq 20\%$ 0402 $\geq$ 0.33 $\mu$ F	$\leq 5\%$	$\leq 10\%$ 0603 $\geq$ 0.15 $\mu$ F; 0805 $\geq$ 0.68 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 4.7 $\mu$ F $\leq 15\%$ 0201 $\geq$ 0.022 $\mu$ F; 0402 $\geq$ 0.033 $\mu$ F; 0603 > 0.47 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 22 $\mu$ F	$\leq 7.5\%$	$\leq 15\%$ 0201 $\geq$ 0.012 $\mu$ F; 0402 $\geq$ 0.15 $\mu$ F; 0603 $\geq$ 0.33 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 22 $\mu$ F $\leq 20\%$ 0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 1 $\mu$ F	6.3V	$\leq 15\%$	$\leq 30\%$ 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	$\leq 20\%$	---	4V	$\leq 20\%$	---	* I.R.: $\geq 10G\Omega$ or $RxC \geq 500\Omega \cdot F$ whichever is smaller. Class II (X7R)
		Rated vol.	D.F. $\leq$	Exception of D.F. $\leq$																								
		$\geq$ 100V	$\leq 3\%$	$\leq 6\%$ 1206 $\geq$ 0.47 $\mu$ F $\leq 7.5\%$ 0603 $\geq$ 0.068 $\mu$ F; 0805 > 0.1 $\mu$ F; 1206 $\geq$ 1 $\mu$ F; 1210 $\geq$ 2.2 $\mu$ F $\leq 20\%$ 0805 > 0.22 $\mu$ F; 1210 $\geq$ 3.3 $\mu$ F																								
			$\leq 3\%$	$\leq 6\%$ 0201(50V); 0603 $\geq$ 0.047 $\mu$ F; 0805 $\geq$ 0.18 $\mu$ F; 1206 $\geq$ 0.47 $\mu$ F $\leq 10\%$ 0201 $\geq$ 0.01 $\mu$ F; 1210 $\geq$ 3.3 $\mu$ F $\leq 20\%$ 0402 $\geq$ 0.012 $\mu$ F; 0603 > 0.1 $\mu$ F; 0805/X7R > 0.47 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F																								
				$\leq 5\%$	$\leq 20\%$ 0603 $\geq$ 1 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F																							
		$\leq 5\%$		$\leq 10\%$ 0201 $\geq$ 0.01 $\mu$ F; 0805 $\geq$ 1 $\mu$ F; 1210 $\geq$ 10 $\mu$ F $\leq 14\%$ 0603 $\geq$ 0.33 $\mu$ F $\leq 15\%$ 0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 0.056 $\mu$ F; 0603 $\geq$ 0.47 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 22 $\mu$ F $\leq 20\%$ 0402 $\geq$ 0.33 $\mu$ F																								
			$\leq 5\%$	$\leq 10\%$ 0603 $\geq$ 0.15 $\mu$ F; 0805 $\geq$ 0.68 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 4.7 $\mu$ F $\leq 15\%$ 0201 $\geq$ 0.022 $\mu$ F; 0402 $\geq$ 0.033 $\mu$ F; 0603 > 0.47 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 22 $\mu$ F																								
				$\leq 7.5\%$	$\leq 15\%$ 0201 $\geq$ 0.012 $\mu$ F; 0402 $\geq$ 0.15 $\mu$ F; 0603 $\geq$ 0.33 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 22 $\mu$ F $\leq 20\%$ 0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 1 $\mu$ F																							
6.3V	$\leq 15\%$	$\leq 30\%$ 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																										
	$\leq 20\%$	---																										
4V	$\leq 20\%$	---																										
		<table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 <math>\geq</math> 3.3<math>\mu</math>F</td> <td rowspan="7">1G<math>\Omega</math> or <math>RxC \geq 10 \Omega \cdot F</math> whichever is smaller.</td> </tr> <tr> <td>50V: 0402 &gt; 0.01<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> 4.7<math>\mu</math>F; 1210 <math>\geq</math> 4.7<math>\mu</math>F</td> </tr> <tr> <td>35V: 0603 <math>\geq</math> 1<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> 10<math>\mu</math>F</td> </tr> <tr> <td>25V: 0201 <math>\geq</math> 0.1<math>\mu</math>F; 0402 <math>\geq</math> 0.22<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; Size <math>\geq</math> 1812</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R; 1210 $\geq$ 3.3 $\mu$ F	1G $\Omega$ or $RxC \geq 10 \Omega \cdot F$ whichever is smaller.	50V: 0402 > 0.01 $\mu$ F; 0603 $\geq$ 1 $\mu$ F; 0805 $\geq$ 1 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 4.7 $\mu$ F	35V: 0603 $\geq$ 1 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F	25V: 0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 0.22 $\mu$ 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; Size $\geq$ 1812																
Rated voltage	Insulation Resistance																											
100V: All X7R; 1210 $\geq$ 3.3 $\mu$ F	1G $\Omega$ or $RxC \geq 10 \Omega \cdot F$ whichever is smaller.																											
50V: 0402 > 0.01 $\mu$ F; 0603 $\geq$ 1 $\mu$ F; 0805 $\geq$ 1 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 4.7 $\mu$ F																												
35V: 0603 $\geq$ 1 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 10 $\mu$ F																												
25V: 0201 $\geq$ 0.1 $\mu$ F; 0402 $\geq$ 0.22 $\mu$ 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; Size $\geq$ 1812																												

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

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:
			X8G/NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C.
			X7R:
			Rated vol.   D.F. ≤   Exception of D.F. ≤
			≥ 100V   ≤ 2.5%   ≤ 3%   1206 ≥ 0.47μF
			≤ 5%   0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF
			≤ 10%   0805 > 0.22μF; 1210 ≥ 3.3μF
			50V   ≤ 2.5%   ≤ 3%   0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF
			≤ 5%   0201 ≥ 0.01μF; 1210 ≥ 3.3μF
			≤ 10%   0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF
			35V   ≤ 3.5%   ≤ 10%   0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF
			≤ 5%   0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF
			25V   ≤ 3.5%   ≤ 7%   0603 ≥ 0.33μF
≤ 10%   0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF			
≤ 12.5%   0402 ≥ 0.33μF			
16V   ≤ 3.5%   ≤ 5%   0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF			
≤ 10%   0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF			
10V   ≤ 5%   ≤ 10%   0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF			
≤ 15%   0201 ≥ 0.1μF; 0402 ≥ 1μF			
6.3V   ≤ 10%   ≤ 15%   0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF			
≤ 20%   0402 ≥ 2.2μF			
4V   ≤ 15%   --   --			
			* I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller.
			Class II (X7R)
			Rated voltage   Insulation Resistance
			100V: All X7R
			50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF
			35V: 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF
			25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF
			16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF
			10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF
			6.3V; 4V; Size ≥ 1812
			Rated voltage   Insulation Resistance
			100V: 1210 ≥ 3.3μF
			50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF
			35V: 0603 ≥ 1μF;
			25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF
			16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF
			10V: 0201 > 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 47μF
			6.3V: 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 > 4.7μF; 0805 ≥ 47μF; 1206 ≥ 10μF
			4V: 0603 ≥ 22μF; 0805 ≥ 47μF; 1206 ≥ 100μF
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±0.5 sec in solder bath at 235±5°C.	
		* Condition B	
		Un-mounted chips steam 8 hrs then completely immersed for 10±1sec in solder bath at 215+5/-0°C.	
		* Condition C	
		Un-mounted chips steam 8 hrs then completely immersed for 10±1 sec. in solder bath at 260+0/-5°C.	

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



Multilayer Ceramic Capacitors

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																																										
17.	<b>Electrical Characterization</b>  * Capacitance * Q/ D.F. (Dissipation Factor) * Test temp.: Room Temperature. Class I: (X8G/NPO) Cap≤1000pF 1.0±0.2Vrms, 1MHz±10% Cap>1000pF 1.0±0.2Vrms, 1KHz±10% Class II: (X7R) Cap ≤10μF, 1.0±0.2Vrms · 1KHz±10% Cap> 10μF, 0.5±0.2Vrms · 120Hz±20%  * Insulation Resistance * Test temp.: Room Temperature. * Test voltage: ≤100V: To apply rated voltage for max. 120 sec. ≥200V: To apply rated voltage (Max.500V) for 60 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: Min. operating temp. to Max. operating temp. at 25°C	* Capacitance within the specified tolerance. * Q/D.F. value: X8G/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">≥100V</td> <td rowspan="3">≤2.5%</td> <td>≤3%</td> <td>1206 ≥0.47μF</td> </tr> <tr> <td>≤5%</td> <td>0603 ≥0.068μF;0805 &gt;0.1μF;1206 ≥1μF;1210 ≥2.2μF</td> </tr> <tr> <td>≤10%</td> <td>0805 &gt;0.22μF;1210 ≥3.3μF</td> </tr> <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>0201 ≥0.01 uF;1210 ≥3.3μF</td> </tr> <tr> <td>≤10%</td> <td>0402 ≥0.012μF;0603&gt;0.1μF; 0805&gt;0.47μF; 1206 ≥2.2μF;1210 ≥10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤3.5%</td> <td>≤10%</td> <td>0603 ≥1μF;0805≥2.2μF;1206 ≥2.2μF;1210 ≥10μF</td> </tr> <tr> <td>≤5%</td> <td>0201 ≥0.01 μF;0805 ≥1μF;1210 ≥10μF</td> </tr> <tr> <td>≤7%</td> <td>0603 ≥0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤3.5%</td> <td>≤10%</td> <td>0201 ≥0.1μF;0402 ≥0.056μF;0603 ≥0.47μF; 0805 ≥2.2μF;1206 ≥4.7μF; 1210 ≥22μF</td> </tr> <tr> <td>≤12.5%</td> <td>0402 ≥0.33μF</td> </tr> <tr> <td>≤5%</td> <td>0201 ≥0.01 μF;0402 ≥0.033μF;0603 ≥0.15μF; 0805 ≥0.68μF;1206 ≥2.2μF;1210 ≥4.7μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤3.5%</td> <td>≤10%</td> <td>0201 ≥0.022μF; 0402 ≥0.15uF;0603&gt;0.47μF; 0805 ≥2.2μF;1206 ≥4.7μF;1210 ≥22μF</td> </tr> <tr> <td>≤15%</td> <td>0201 ≥0.1μF;0402 ≥1μF;0603 ≥10μF; 0805 ≥4.7μF;1206 ≥47μF;1210 ≥100μF</td> </tr> <tr> <td>10V</td> <td>≤5%</td> <td>≤10%</td> <td>0201 ≥0.012μF;0402 ≥0.15μF;0603 ≥0.33μF; 0805 ≥2.2μF;1206 ≥2.2μF;1210 ≥22μF</td> </tr> <tr> <td>6.3V</td> <td>≤10%</td> <td>≤15%</td> <td>0201 ≥0.1μF;0402 ≥1μF;0603 ≥10μF; 0805 ≥4.7μF;1206 ≥47μF;1210 ≥100μF</td> </tr> <tr> <td>4V</td> <td>≤15%</td> <td>---</td> <td>0402 ≥2.2μF</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤		≥100V	≤2.5%	≤3%	1206 ≥0.47μF	≤5%	0603 ≥0.068μF;0805 >0.1μF;1206 ≥1μF;1210 ≥2.2μF	≤10%	0805 >0.22μF;1210 ≥3.3μF	50V	≤2.5%	≤3%	0201(50V);0603 ≥0.047μF; 0805 ≥0.18μF;1206 ≥0.47μF	≤5%	0201 ≥0.01 uF;1210 ≥3.3μF	≤10%	0402 ≥0.012μF;0603>0.1μF; 0805>0.47μF; 1206 ≥2.2μF;1210 ≥10μF	35V	≤3.5%	≤10%	0603 ≥1μF;0805≥2.2μF;1206 ≥2.2μF;1210 ≥10μF	≤5%	0201 ≥0.01 μF;0805 ≥1μF;1210 ≥10μF	≤7%	0603 ≥0.33μF	25V	≤3.5%	≤10%	0201 ≥0.1μF;0402 ≥0.056μF;0603 ≥0.47μF; 0805 ≥2.2μF;1206 ≥4.7μF; 1210 ≥22μF	≤12.5%	0402 ≥0.33μF	≤5%	0201 ≥0.01 μF;0402 ≥0.033μF;0603 ≥0.15μF; 0805 ≥0.68μF;1206 ≥2.2μF;1210 ≥4.7μF	16V	≤3.5%	≤10%	0201 ≥0.022μF; 0402 ≥0.15uF;0603>0.47μF; 0805 ≥2.2μF;1206 ≥4.7μF;1210 ≥22μF	≤15%	0201 ≥0.1μF;0402 ≥1μF;0603 ≥10μF; 0805 ≥4.7μF;1206 ≥47μF;1210 ≥100μF	10V	≤5%	≤10%	0201 ≥0.012μF;0402 ≥0.15μF;0603 ≥0.33μF; 0805 ≥2.2μF;1206 ≥2.2μF;1210 ≥22μF	6.3V	≤10%	≤15%	0201 ≥0.1μF;0402 ≥1μF;0603 ≥10μF; 0805 ≥4.7μF;1206 ≥47μF;1210 ≥100μF	4V	≤15%	---	0402 ≥2.2μF	* 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: All X7R</td> <td rowspan="5">10GΩ or RxC≥100 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0402&gt;0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥2.2μF;1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td>25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1μF;0402≥0.22μF;0603≥1μF; 0805≥2.2μF;1206≥10μF;1210≥47μF</td> </tr> <tr> <td>10V: 0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF; 1206≥4.7μF;1210≥47μF</td> <td rowspan="7">RxC≥50 Ω·F.</td> </tr> <tr> <td>6.3V; 4V; Size≥1812</td> </tr> <tr> <td>Rated voltage</td> </tr> <tr> <td>100V: 1210≥3.3μF</td> </tr> <tr> <td>50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF</td> </tr> <tr> <td>35V: 0603≥1μF;</td> </tr> <tr> <td>25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF</td> </tr> <tr> <td>16V: 0603≥10μF;0402≥1μF;0201≥0.22μF</td> </tr> <tr> <td>10V: 0201&gt;0.1μF;0402≥1μF;0603≥10μF;0805≥47μF</td> </tr> <tr> <td>6.3V: 0201≥0.1μF;0402≥1μF;0603&gt;4.7μF;0805≥47μF;1206≥10μF</td> </tr> <tr> <td>4V: 0603≥22μF;0805≥47μF;1206≥100μF</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R	10GΩ or RxC≥100 Ω·F whichever is smaller.	50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	35V: 0805≥2.2μF;1206≥2.2μF;1210≥10μF	25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF	16V: 0201≥0.1μF;0402≥0.22μF;0603≥1μF; 0805≥2.2μF;1206≥10μF;1210≥47μF	10V: 0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF; 1206≥4.7μF;1210≥47μF	RxC≥50 Ω·F.	6.3V; 4V; Size≥1812	Rated voltage	100V: 1210≥3.3μF	50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF	35V: 0603≥1μF;	25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF	16V: 0603≥10μF;0402≥1μF;0201≥0.22μF	10V: 0201>0.1μF;0402≥1μF;0603≥10μF;0805≥47μF	6.3V: 0201≥0.1μF;0402≥1μF;0603>4.7μF;0805≥47μF;1206≥10μF	4V: 0603≥22μF;0805≥47μF;1206≥100μF
		Rated vol.	D.F. ≤	Exception of D.F. ≤																																																																									
		≥100V	≤2.5%	≤3%	1206 ≥0.47μF																																																																								
				≤5%	0603 ≥0.068μF;0805 >0.1μF;1206 ≥1μF;1210 ≥2.2μF																																																																								
				≤10%	0805 >0.22μF;1210 ≥3.3μF																																																																								
		50V	≤2.5%	≤3%	0201(50V);0603 ≥0.047μF; 0805 ≥0.18μF;1206 ≥0.47μF																																																																								
				≤5%	0201 ≥0.01 uF;1210 ≥3.3μF																																																																								
				≤10%	0402 ≥0.012μF;0603>0.1μF; 0805>0.47μF; 1206 ≥2.2μF;1210 ≥10μF																																																																								
		35V	≤3.5%	≤10%	0603 ≥1μF;0805≥2.2μF;1206 ≥2.2μF;1210 ≥10μF																																																																								
				≤5%	0201 ≥0.01 μF;0805 ≥1μF;1210 ≥10μF																																																																								
				≤7%	0603 ≥0.33μF																																																																								
		25V	≤3.5%	≤10%	0201 ≥0.1μF;0402 ≥0.056μF;0603 ≥0.47μF; 0805 ≥2.2μF;1206 ≥4.7μF; 1210 ≥22μF																																																																								
				≤12.5%	0402 ≥0.33μF																																																																								
				≤5%	0201 ≥0.01 μF;0402 ≥0.033μF;0603 ≥0.15μF; 0805 ≥0.68μF;1206 ≥2.2μF;1210 ≥4.7μF																																																																								
		16V	≤3.5%	≤10%	0201 ≥0.022μF; 0402 ≥0.15uF;0603>0.47μF; 0805 ≥2.2μF;1206 ≥4.7μF;1210 ≥22μF																																																																								
				≤15%	0201 ≥0.1μF;0402 ≥1μF;0603 ≥10μF; 0805 ≥4.7μF;1206 ≥47μF;1210 ≥100μF																																																																								
		10V	≤5%	≤10%	0201 ≥0.012μF;0402 ≥0.15μF;0603 ≥0.33μF; 0805 ≥2.2μF;1206 ≥2.2μF;1210 ≥22μF																																																																								
6.3V	≤10%	≤15%	0201 ≥0.1μF;0402 ≥1μF;0603 ≥10μF; 0805 ≥4.7μF;1206 ≥47μF;1210 ≥100μF																																																																										
4V	≤15%	---	0402 ≥2.2μF																																																																										
Rated voltage	Insulation Resistance																																																																												
100V: All X7R	10GΩ or RxC≥100 Ω·F whichever is smaller.																																																																												
50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																																																													
35V: 0805≥2.2μF;1206≥2.2μF;1210≥10μF																																																																													
25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF																																																																													
16V: 0201≥0.1μF;0402≥0.22μF;0603≥1μF; 0805≥2.2μF;1206≥10μF;1210≥47μF																																																																													
10V: 0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF; 1206≥4.7μF;1210≥47μF	RxC≥50 Ω·F.																																																																												
6.3V; 4V; Size≥1812																																																																													
Rated voltage																																																																													
100V: 1210≥3.3μF																																																																													
50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF																																																																													
35V: 0603≥1μF;																																																																													
25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF																																																																													
16V: 0603≥10μF;0402≥1μF;0201≥0.22μF																																																																													
10V: 0201>0.1μF;0402≥1μF;0603≥10μF;0805≥47μF																																																																													
6.3V: 0201≥0.1μF;0402≥1μF;0603>4.7μF;0805≥47μF;1206≥10μF																																																																													
4V: 0603≥22μF;0805≥47μF;1206≥100μF																																																																													
		* Dielectric strength No evidence of damage or flash over during test.																																																																											
		* Temperature Coefficient Capacitance Change: X8G/NPO: Within ±30ppm/°C X7R: Within ±15%																																																																											

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

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 : X8G/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: X8G/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 colspan="2">Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥ 100V</td> <td rowspan="3">≤ 2.5%</td> <td>≤ 3%</td> <td>1206 ≥ 0.47μF</td> </tr> <tr> <td>≤ 5%</td> <td>0603 ≥ 0.068μF; 0805 &gt; 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤ 10%</td> <td>0805 &gt; 0.22μF; 1210 ≥ 3.3μF</td> </tr> <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>0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤ 10%</td> <td>0402 ≥ 0.012μF; 0603 &gt; 0.1μF; 0805 &gt; 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤ 3.5%</td> <td>≤ 10%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 5%</td> <td>0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤ 7%</td> <td>0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤ 3.5%</td> <td>≤ 10%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 12.5%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <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 rowspan="3">16V</td> <td rowspan="3">≤ 3.5%</td> <td>≤ 10%</td> <td>0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 &gt; 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 10%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤ 15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤ 5%</td> <td>≤ 15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>≤ 20%</td> <td>0402 ≥ 2.2μF</td> </tr> <tr> <td>--</td> <td>--</td> </tr> <tr> <td rowspan="3">6.3V</td> <td rowspan="3">≤ 10%</td> <td>≤ 15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>≤ 20%</td> <td>0402 ≥ 2.2μF</td> </tr> <tr> <td>--</td> <td>--</td> </tr> <tr> <td rowspan="3">4V</td> <td rowspan="3">≤ 15%</td> <td>--</td> <td>--</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤		≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF	≤ 5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤ 10%	0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤ 2.5%	≤ 3%	0201(50V):0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 5%	0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤ 10%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 7%	0603 ≥ 0.33μF	25V	≤ 3.5%	≤ 10%	0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 12.5%	0402 ≥ 0.33μF	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	16V	≤ 3.5%	≤ 10%	0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF	10V	≤ 5%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	≤ 20%	0402 ≥ 2.2μF	--	--	6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	≤ 20%	0402 ≥ 2.2μF	--	--	4V	≤ 15%	--	--
Rated vol.	D.F. ≤	Exception of D.F. ≤																																																																	
≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF																																																																
		≤ 5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF																																																																
		≤ 10%	0805 > 0.22μF; 1210 ≥ 3.3μF																																																																
50V	≤ 2.5%	≤ 3%	0201(50V):0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																																
		≤ 5%	0201 ≥ 0.01μF; 1210 ≥ 3.3μF																																																																
		≤ 10%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																																
35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																																
		≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF																																																																
		≤ 7%	0603 ≥ 0.33μF																																																																
25V	≤ 3.5%	≤ 10%	0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																																																
		≤ 12.5%	0402 ≥ 0.33μF																																																																
		≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																																																
16V	≤ 3.5%	≤ 10%	0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF																																																																
		≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF																																																																
		≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF																																																																
10V	≤ 5%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF																																																																
		≤ 20%	0402 ≥ 2.2μF																																																																
		--	--																																																																
6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF																																																																
		≤ 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)																																																														

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

Multilayer Ceramic Capacitors

APPENDIXES

▣ Tape & reel dimensions

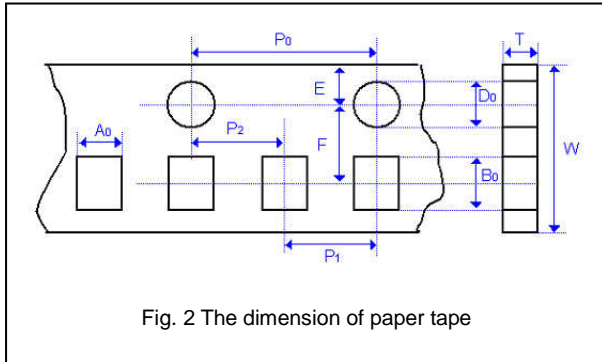


Fig. 2 The dimension of paper tape

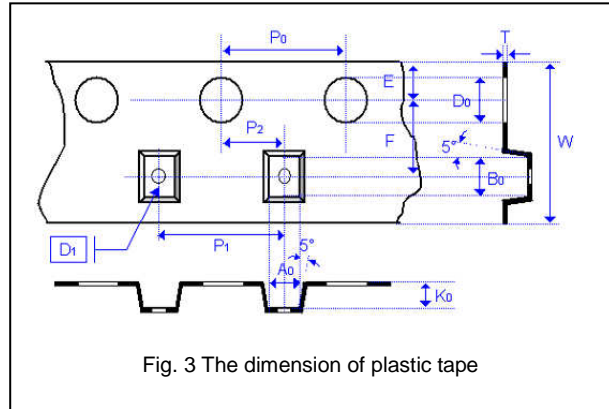


Fig. 3 The dimension of plastic tape

Size	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	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-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	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

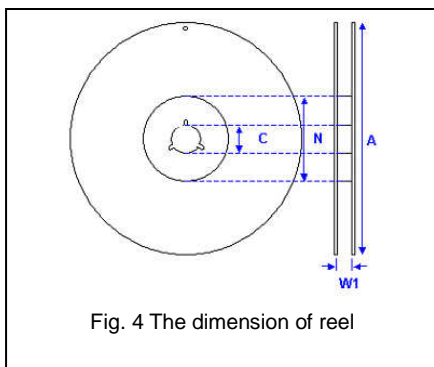
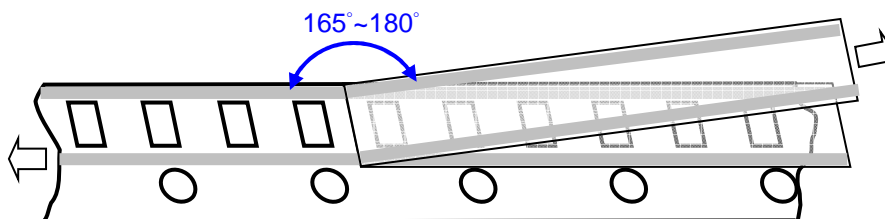


Fig. 4 The dimension of reel

Size	0201, 0402, 0603, 0805, 1206, 1210		
Reel size	7"	10"	13"
C	13.0±0.5	13.0±0.5	13.0±0.5
W <sub>1</sub>	10.0±1.5	10.0±1.5	10.0±1.5
A	178.0±2.0	250.0±2.0	330.0±2.0
N	60.0+1.0/-0	50 min	50 min

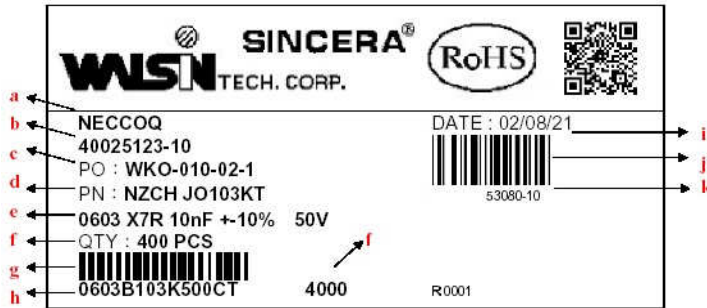
▣ Peeling force (EIA-481)

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



Multilayer Ceramic Capacitors

Example of customer label

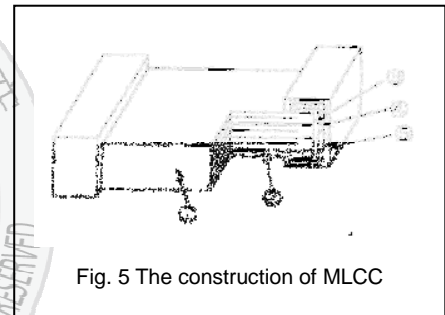


- a. Customer name
- b. WTC order series and item number
- c. Customer P/O
- d. Customer P/N
- e. Description of product
- f. Quantity
- g. Bar code including quantity & WTC P/N or customer
- h. WTC P/N
- i. Shipping date
- j. Order bar code including series and item numbers
- k. Serial number of label

\*Customized label is available upon request

Constructions

No.	Name	X8G, NP0	X7R
①	Ceramic material	CaZrO <sub>3</sub> based	BaTiO <sub>3</sub> based
②	Inner electrode	Ni	
③	Termination	Inner layer	Cu
④		Middle layer	Ni
⑤		Outer layer	Sn (Matt)



Storage and handling conditions

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

Cautions:

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

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.

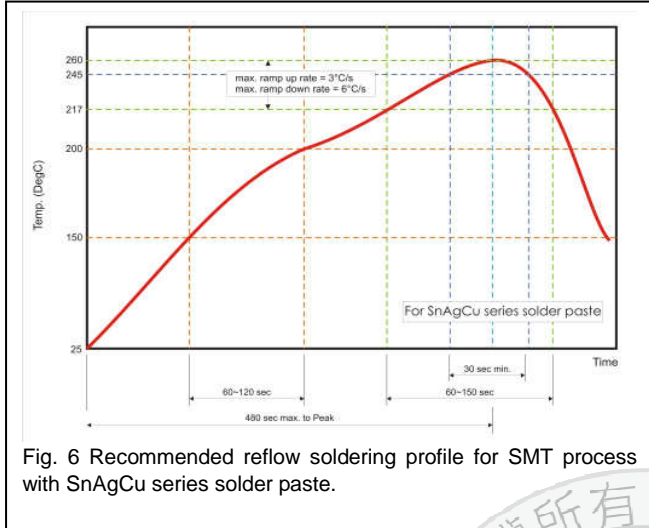


Fig. 6 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.

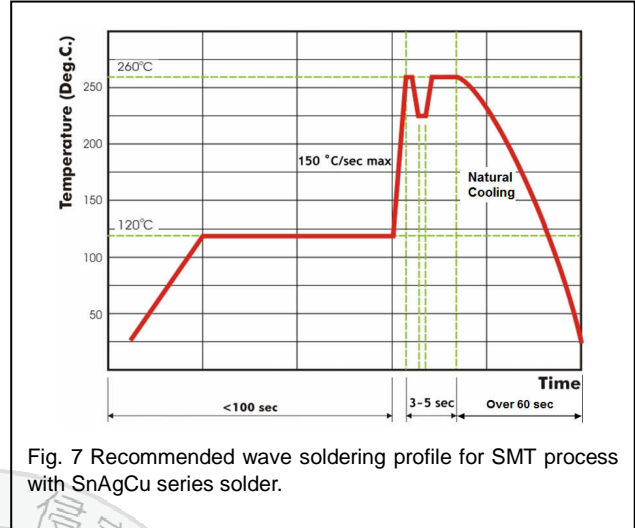


Fig. 7 Recommended wave soldering profile for SMT process with SnAgCu series solder.



# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Kamaya:](#)

[MT15N470F500C](#)

[Walsin:](#)

[MT15B102K500CT](#) [MT15B332K500CT](#) [MT15N100J500CT](#) [MT18B102K500CT](#) [MT18B103K500CT](#)  
[MT18B104K160CT](#) [MT15N221J500CT](#) [MT18N9R0B500CT](#) [MT18B473K500CT](#) [MT15B103K500CT](#)  
[MT15B222K500CT](#) [MT15B472K500CT](#) [MT15N102J500CT](#) [MT15N220J500CT](#) [MT18N221J500CT](#)  
[MT18N470J500CT](#) [MT21B102K101CT](#) [MT21B102K500CT](#) [MT21B104K500CT](#) [MT31B105K500CT](#)  
[MT18B104K500CT](#) [MT18B472K500CT](#) [MT18N101J101CT](#) [MT18N101J500CT](#) [MT18N220J500CT](#)  
[MT21B104K101CT](#) [MT21B103K500CT](#) [MT21B224K500CT](#) [MT21B474K250CT](#) [MT18B103K101CT](#)  
[MT21B223K101CT](#) [MT18N101F500CT](#) [MT18N102J500CT](#) [MT18N180J500CT](#) [MT18N222J500CT](#)  
[MT18N330J500CT](#) [MT18N331J500CT](#) [MT18N471J500CT](#) [MT18B153K500CT](#) [MT18B221K500CT](#)  
[MT18B223K500CT](#) [MT18B332K500CT](#) [MT18B333K500CT](#) [MT18N100J500CT](#) [MT15N2R2C500CT](#)  
[MT15N330J500CT](#) [MT15N470J500CT](#) [MT15N6R8B500CT](#) [MT18B104K250CT](#) [MT18B152K500CT](#)  
[MT15B221K500CT](#) [MT15B471K500CT](#) [MT15B822K250CT](#) [MT15N101J500CT](#) [MT18N6R8C500CT](#)  
[MT18N6R8D500CT](#) [MT18N8R0D500CT](#) [MT21B102M201CT](#) [MT21B103K101CT](#) [MT21B103M101CT](#)  
[MT18N271J251CT](#) [MT18N2R0B500CT](#) [MT18N2R0C500CT](#) [MT18N152J500CT](#) [MT18N180J101CT](#)  
[MT18N181J500CT](#) [MT18N1R8C500CT](#) [MT18N220F101CT](#) [MT18N221F160CT](#) [MT18N102J101CT](#)  
[MT18N102J250CT](#) [MT18N120G500CT](#) [MT18N120J500CT](#) [MT18N122J500CT](#) [MT18N150F160CT](#)  
[MT18B223K250CT](#) [MT18B332K250CT](#) [MT18B472K101CT](#) [MT18B472M500CT](#) [MT18B562K500CT](#)  
[MT18B683K160CT](#) [MT18B104M160CT](#) [MT18B152J500CT](#) [MT18B153K250CT](#) [MT18B182K500CT](#)  
[MT18B223K101CT](#) [MT18B223K160CT](#) [MT15N561G500CT](#) [MT15N8R2J500CT](#) [MT18B103J250CT](#)  
[MT18B103K250CT](#) [MT18B103M250CT](#) [MT18B103M500CT](#) [MT15N121J500CT](#) [MT15N150J250CT](#)  
[MT15N1R2B500CT](#) [MT15N221K500CT](#) [MT15N471J500CT](#) [MT15N560K250CT](#) [MT15N150J500CT](#)