

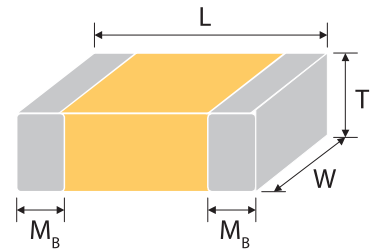
**RoHS
Compliant**



Description

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

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



The outline of MLCC

External Dimensions

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	Remark	M _B min (mm)	
0201 (0603)	0.6 ±0.03	0.3 ±0.03	0.3 ±0.03	L	#	0.15 ±0.05
0402 (1005)	1 ±0.05	0.5 ±0.05	0.5 ±0.05	N	#	0.25 +0.05/-0.1
0603 (1608)	1.6 ±0.1	0.8 ±0.1	0.8 ±0.07	S		0.4 ±0.15
	1.6+0.15/-0.1	0.8 +0.15/-0.1	0.8 +0.15/-0.1	X		
0805 (2012)	2 ±0.15	1.25 ±0.1	0.6 ±0.1	A		0.5 ±0.2
			0.8 ±0.1	B		
			1.25 ±0.1	D	#	
	2 ±0.2	1.25 ±0.2	1.25 ±0.2	I	#	
1206 (3216)	3.2 ±0.15	1.6 ±0.15	0.8±0.1	B		0.6 ±0.2
			0.95±0.1	C		
			1.25±0.1	D	#	
			1.15±0.15	J	#	
	3.2 ±0.2	1.6 ±0.2	1.6 ±0.2	G	#	
3.2 +0.3/-0.1 3.3 +0.3/-0.1 ^{#5}	1.6 +0.3/-0.1	1.6 +0.3/-0.1	P	#		
1210 (3225)	3.2 ±0.3	2.50±0.2	0.95 ±0.1	C	#	0.75 ±0.25
			1.25 ±0.1	D	#	
	3.2 ±0.4	2.50±0.3	1.6 ±0.2	G	#	
			2 ±0.2	K	#	
			2.5 ±0.3	M	#	

Reflow soldering only is recommended.

* For 1206(100V)/Cap≥1.2μF products.

General Electrical Data*

Dielectric	NPO	X7R
Size	0201, 0402, 0603, 0805, 1206, 1210	
Capacitance range*	0.1pF to 0.047μF	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, 250V, 500V, 630, 1000	
Operating temperature	-55 to +125°C	
Capacitance characteristic	±30ppm	±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.

Capacitance Range

Dielectric		NPO											
Size		0402					0603						
Rated Voltage (V DC)		10	16	25	50	100	10	16	25	50	100	200	250
Capacitance	0.1pF (0R1)	N	N	N	N	N							
	0.2pF (0R2)	N	N	N	N	N							
	0.3pF (0R3)	N	N	N	N	N							
	0.4pF (0R4)	N	N	N	N	N							
	0.5pF (0R5)	N	N	N	N	N	S	S	S	S	S	S	S
	0.6pF (0R6)	N	N	N	N	N	S	S	S	S	S	S	S
	0.7pF (0R7)	N	N	N	N	N	S	S	S	S	S	S	S
	0.8pF (0R8)	N	N	N	N	N	S	S	S	S	S	S	S
	0.9pF (0R9)	N	N	N	N	N	S	S	S	S	S	S	S
	1.0pF (1R0)	N	N	N	N	N	S	S	S	S	S	S	S
	1.2pF (1R2)	N	N	N	N	N	S	S	S	S	S	S	S
	1.5pF (1R5)	N	N	N	N	N	S	S	S	S	S	S	S
	1.8pF (1R8)	N	N	N	N	N	S	S	S	S	S	S	S
	2.0pF (2R0)	N	N	N	N	N	S	S	S	S	S	S	S
2.2pF (2R2)	N	N	N	N	N	S	S	S	S	S	S	S	
2.7pF (2R7)	N	N	N	N	N	S	S	S	S	S	S	S	

SMD Multilayer Ceramic Capacitors Automotive



Dielectric		NPO											
Size		0402					0603						
Rated Voltage (V DC)		10	16	25	50	100	10	16	25	50	100	200	250
Capacitance	3.0pF (3R0)	N	N	N	N	N	S	S	S	S	S	S	S
	3.3pF (3R3)	N	N	N	N	N	S	S	S	S	S	S	S
	3.9pF (3R9)	N	N	N	N	N	S	S	S	S	S	S	S
	4.0pF (4R0)	N	N	N	N	N	S	S	S	S	S	S	S
	4.7pF (4R7)	N	N	N	N	N	S	S	S	S	S	S	S
	5.0pF (5R0)	N	N	N	N	N	S	S	S	S	S	S	S
	5.6pF (5R6)	N	N	N	N	N	S	S	S	S	S	S	S
	6.0pF (6R0)	N	N	N	N	N	S	S	S	S	S	S	S
	6.8pF (6R8)	N	N	N	N	N	S	S	S	S	S	S	S
	7.0pF (7R0)	N	N	N	N	N	S	S	S	S	S	S	S
	8.0pF (8R0)	N	N	N	N	N	S	S	S	S	S	S	S
	8.2pF (8R2)	N	N	N	N	N	S	S	S	S	S	S	S
	9.0pF (9R0)	N	N	N	N	N	S	S	S	S	S	S	S
	10pF (100)	N	N	N	N	N	S	S	S	S	S	S	S
	12pF (120)	N	N	N	N	N	S	S	S	S	S	S	S
	15pF (150)	N	N	N	N	N	S	S	S	S	S	S	S
	18pF (180)	N	N	N	N	N	S	S	S	S	S	S	S
	22pF (220)	N	N	N	N	N	S	S	S	S	S	S	S
	27pF (270)	N	N	N	N	N	S	S	S	S	S	S	S
	33pF (330)	N	N	N	N	N	S	S	S	S	S	S	S
	39pF (390)	N	N	N	N	N	S	S	S	S	S	S	S
	47pF (470)	N	N	N	N	N	S	S	S	S	S	S	S
	56pF (560)	N	N	N	N	N	S	S	S	S	S	S	S
	68pF (680)	N	N	N	N	N	S	S	S	S	S	S	S
	82pF (820)	N	N	N	N	N	S	S	S	S	S	S	S
	100pF (101)	N	N	N	N	N	S	S	S	S	S	S	S
	120pF (121)	N	N	N	N	N	S	S	S	S	S	S	S
	150pF (151)	N	N	N	N	N	S	S	S	S	S	S	S
180pF (181)	N	N	N	N	N	S	S	S	S	S	S	S	
220pF (221)	N	N	N	N	N	S	S	S	S	S	S	S	
270pF (271)	N	N	N	N		S	S	S	S	S	X	X	
330pF (331)	N	N	N	N		S	S	S	S	S	X	X	
390pF (391)	N	N	N	N		S	S	S	S	S	X	X	
470pF (471)	N	N	N	N		S	S	S	S	S	X	X	
560pF (561)	N	N	N	N		S	S	S	S	S	X	X	
680pF (681)	N	N	N	N		S	S	S	S	S	X	X	
820pF (821)	N	N	N	N		S	S	S	S	S	X	X	

Newark.com/multicomp-pro
Farnell.com/multicomp-pro
sg.element14.com/b/multicomp-pro



SMD Multilayer Ceramic Capacitors Automotive



Dielectric		NPO											
Size		0402					0603						
Rated Voltage (V DC)		10	16	25	50	100	10	16	25	50	100	200	250
Capacitance	1,000pF (102)	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		
	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		
0.010uF (103)						X*	X*	X*	X*	X			

* NPO, 0.1pF product only provide B tolerance.

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

X7R Dielectric 0402, 0603, 0805 Sizes

Dielectric		X7R								
SIZE		0402				0603				
Rated Voltage (VDC)		10	16	25	50	10	16	25	50	100
Capacitance	100pF (101)	N	N	N	N	S	S	S	S	S
	120pF (121)	N	N	N	N	S	S	S	S	S
	150pF (151)	N	N	N	N	S	S	S	S	S
	180pF (181)	N	N	N	N	S	S	S	S	S
	220pF (221)	N	N	N	N	S	S	S	S	S
	270pF (271)	N	N	N	N	S	S	S	S	S
	330pF (331)	N	N	N	N	S	S	S	S	S
	390pF (391)	N	N	N	N	S	S	S	S	S
	470pF (471)	N	N	N	N	S	S	S	S	S
	560pF (561)	N	N	N	N	S	S	S	S	S
	680pF (681)	N	N	N	N	S	S	S	S	S
	820pF (821)	N	N	N	N	S	S	S	S	S
	1,000pF (102)	N	N	N	N	S	S	S	S	S
	1,200pF (122)	N	N	N	N	S	S	S	S	S
	1,500pF (152)	N	N	N	N	S	S	S	S	S

Newark.com/multicomp-pro

Farnell.com/multicomp-pro

sg.element14.com/b/multicomp-pro



SMD Multilayer Ceramic Capacitors Automotive



Dielectric		X7R								
SIZE		0402				0603				
Rated Voltage (VDC)		10	16	25	50	10	16	25	50	100
Capacitance	1,800pF (182)	N	N	N	N	S	S	S	S	S
	2,200pF (222)	N	N	N	N	S	S	S	S	S
	2,700pF (272)	N	N	N	N	S	S	S	S	S
	3,300pF (332)	N	N	N	N	S	S	S	S	S
	3,900pF (392)	N	N	N	N	S	S	S	S	S
	4,700pF (472)	N	N	N	N	S	S	S	S	S
	5,600pF (562)	N	N	N	N	S	S	S	S	S
	6,800pF (682)	N	N	N	N	S	S	S	S	S
	8,200pF (822)	N	N	N	N	S	S	S	S	S
	0.010μF (103)	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.



SMD Multilayer Ceramic Capacitors Automotive

multicomp PRO

Dielectric		X7R								
SIZE		0805								
Rated Voltage (VDC)		10	16	25	50	100	200	250	500	630
Capacitance	100pF (101)	B	B	B	B	B	B	B	B	B
	120pF (121)	B	B	B	B	B	B	B	B	B
	150pF (151)	B	B	B	B	B	B	B	B	B
	180pF (181)	B	B	B	B	B	B	B	B	B
	220pF (221)	B	B	B	B	B	B	B	B	B
	270pF (271)	B	B	B	B	B	B	B	B	B
	330pF (331)	B	B	B	B	B	B	B	B	B
	390pF (391)	B	B	B	B	B	B	B	B	B
	470pF (471)	B	B	B	B	B	B	B	B	B
	560pF (561)	B	B	B	B	B	B	B	B	B
	680pF (681)	B	B	B	B	B	B	B	B	B
	820pF (821)	B	B	B	B	B	B	B	B	B
	1,000pF (102)	B	B	B	B	B	B	B	B	B
	1,200pF (122)	B	B	B	B	B	B	B	B	B
	1,500pF (152)	B	B	B	B	B	B	B	B	B
	1,800pF (182)	B	B	B	B	B	B	B	B	B
	2,200pF (222)	B	B	B	B	B	B	B	B	B
	2,700pF (272)	B	B	B	B	B	B	B	B	B
	3,300pF (332)	B	B	B	B	B	B	B	B	B
	3,900pF (392)	B	B	B	B	B	B	B	B	B
	4,700pF (472)	B	B	B	B	B	B	B	D	D
	5,600pF (562)	B	B	B	B	B	D	D	D	D
	6,800pF (682)	B	B	B	B	B	D	D	D	D
	8,200pF (822)	B	B	B	B	B	D	D	D	D
	0.010μF (103)	B	B	B	B	B	D	D	D	D
	0.012μF (123)	B	B	B	B	B	D	D		
	0.015μF (153)	B	B	B	B	B	D	D		
	0.018μF (183)	B	B	B	B	B	D	D		
	0.022μF (223)	B	B	B	B	B	D	D		
	0.027μF (273)	B	B	B	B	D				
0.033μF (333)	B	B	B	B	D					
0.039μF (393)	B	B	B	B	D					
0.047μF (473)	B	B	B	B	D					
0.056μF (563)	B	B	B	B	D					
0.068μF (683)	B	B	B	B	D					
0.082μF (823)	B	B	B	B	D					
0.10μF (104)	B	B	B	B	D					

SMD Multilayer Ceramic Capacitors Automotive

multicomp PRO

Dielectric		X7R								
SIZE		0805								
Rated Voltage (VDC)		10	16	25	50	100	200	250	500	630
Capacitance	0.12µF (124)	B	B	B	D					
	0.15µF (154)	D	D	D	D					
	0.18µF (184)	D	D	D	D					
	0.22µF (224)	D	D	D	D					
	0.27µF (274)	D	D	D	I					
	0.33µF (334)	D	D	D	I					
	0.39µF (394)	D	D	D	I					
	0.47µF (474)	D	D	D	I					
	0.56µF (564)	D	D	D						
	0.68µF (684)	D	D	D	I					
	0.82µF (824)	D	D	D						
	1.0µF (105)	D	D	D	I					
	2.2µF (225)									
	4.7µF (475)									
10µF (106)										

X7R Dielectric 1206 Size

Dielectric		X7R								
Size		1206								
Rated Voltage (VDC)		10	16	25	50	100	200	250	500	630
Capacitance	100pF (101)						D	D	D	D
	120pF (121)						D	D	D	D
	150pF (151)	B	B	B	B	B	D	D	D	D
	180pF (181)	B	B	B	B	B	D	D	D	D
	220pF (221)	B	B	B	B	B	D	D	D	D
	270pF (271)	B	B	B	B	B	D	D	D	D
	330pF (331)	B	B	B	B	B	D	D	D	D
	390pF (391)	B	B	B	B	B	D	D	D	D
	470pF (471)	B	B	B	B	B	D	D	D	D
	560pF (561)	B	B	B	B	B	D	D	D	D
	680pF (681)	B	B	B	B	B	D	D	D	D
	820pF (821)	B	B	B	B	B	D	D	D	D
	1,000pF (102)	B	B	B	B	B	D	D	D	D
	1,200pF (122)	B	B	B	B	B	D	D	D	D
	1,500pF (152)	B	B	B	B	B	D	D	D	D
1,800pF (182)	B	B	B	B	B	D	D	D	D	

Newark.com/multicomp-pro
Farnell.com/multicomp-pro
sg.element14.com/b/multicomp-pro

multicomp PRO

SMD Multilayer Ceramic Capacitors Automotive

multicomp PRO

Dielectric		X7R								
Size		1206								
Rated Voltage (VDC)		10	16	25	50	100	200	250	500	630
Capacitance	2,200pF (222)	B	B	B	B	B	D	D	D	D
	2,700pF (272)	B	B	B	B	B	D	D	D	D
	3,300pF (332)	B	B	B	B	B	D	D	D	D
	3,900pF (392)	B	B	B	B	B	D	D	D	D
	4,700pF (472)	B	B	B	B	B	D	D	D	D
	5,600pF (562)	B	B	B	B	B	D	D	D	D
	6,800pF (682)	B	B	B	B	B	D	D	D	D
	8,200pF (822)	B	B	B	B	B	D	D	D	D
	0.010μF (103)	B	B	B	B	B	D	D	D	D
	0.012μF (123)	B	B	B	B	B	D	D		
	0.015μF (153)	B	B	B	B	B	D	D		
	0.018μF (183)	B	B	B	B	B	D	D		
	0.022μF (223)	B	B	B	B	B	D	D		
	0.027μF (273)	B	B	B	B	B				
	0.033μF (333)	B	B	B	B	B				
	0.039μF (393)	B	B	B	B	B				
	0.047μF (473)	B	B	B	B	B				
	0.056μF (563)	B	B	B	B	B				
	0.068μF (683)	B	B	B	B	B				
	0.082μF (823)	B	B	B	B	D				
	0.10μF (104)	B	B	B	B	D				
	0.12μF (124)	B	B	B	B	D				
	0.15μF (154)	C	C	C	C	G				
	0.18μF (184)	C	C	C	C	G				
	0.22μF (224)	C	C	C	C	G				
	0.27μF (274)	C	C	C	D					
	0.33μF (334)	C	C	C	D					
	0.39μF (394)	C	C	J	P					
	0.47μF (474)	J	J	J	P					
	0.56μF (564)	J	J	J	P					
0.68μF (684)	J	J	J	P						
0.82μF (824)	J	J	J	P						
1.0μF (105)	J	J	J	P						
2.2μF (225)				P	P					
4.7μF (475)										
10μF (106)										

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed product not in 10% (code "K") tolerance.

Newark.com/multicomp-pro
Farnell.com/multicomp-pro
sg.element14.com/b/multicomp-pro

multicomp PRO

SMD Multilayer Ceramic Capacitors Automotive

multicomp PRO

Dielectric		X7R							
Size		1210							
Rated Voltage (VDC)		10	16	25	50	100	250	500	1000
Capacitance	100pF (101)					D	D	D	
	120pF (121)					D	D	D	
	150pF (151)					D	D	D	
	180pF (181)					D	D	D	
	220pF (221)					D	D	D	
	270pF (271)					D	D	D	
	330pF (331)					D	D	D	
	390pF (391)					D	D	D	
	470pF (471)					D	D	D	
	560pF (561)					D	D	D	
	680pF (681)					C	D	D	
	820pF (821)					C	D	D	
	1,000pF (102)	C	C	C	C	C	C	D	D
	1,200pF (122)	C	C	C	C	C	C	D	D
	1,500pF (152)	C	C	C	C	C	C	D	D
	1,800pF (182)	C	C	C	C	C	C	D	D
	2,200pF (222)	C	C	C	C	C	C	D	D
	2,700pF (272)	C	C	C	C	C	C	D	D
	3,300pF (332)	C	C	C	C	C	C	D	D
	3,900pF (392)	C	C	C	C	C	C	D	G
	4,700pF (472)	C	C	C	C	C	C	D	G
	5,600pF (562)	C	C	C	C	C	C	D	G
	6,800pF (682)	C	C	C	C	C	C	D	G
	8,200pF (822)	C	C	C	C	C	C	D	G
	0.010µF (103)	C	C	C	C	C	C	D	G
	0.012µF (123)	C	C	C	C	C	C	D	
	0.015µF (153)	C	C	C	C	C	C	D	
	0.018µF (183)	C	C	C	C	C	C	D	
	0.022µF (223)	C	C	C	C	C	C	D	
	0.027µF (273)	C	C	C	C	C	C		
	0.033µF (333)	C	C	C	C	C	C		
	0.039µF (393)	C	C	C	C	C	C		
0.047µF (473)	C	C	C	C	C	D			
0.056µF (563)	C	C	C	C	C				
0.068µF (683)	C	C	C	C	C				
0.082µF (823)	C	C	C	C	C				
0.10µF (104)	C	C	C	C	C				

Newark.com/multicomp-pro
Farnell.com/multicomp-pro
sg.element14.com/b/multicomp-pro

multicomp PRO

SMD Multilayer Ceramic Capacitors Automotive



Dielectric		X7R							
Size		1210							
Rated Voltage (VDC)		10	16	25	50	100	250	500	1000
Capacitance	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.



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	<ul style="list-style-type: none"> * 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. 	<ul style="list-style-type: none"> * 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" 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">≤3%</td> <td>≤6%</td> <td>1206≥0.47μF</td> </tr> <tr> <td>≤7.5%</td> <td>0603≥0.068μF; 0805>0.1μF; 1206≥1μF; 1210≥2.2μF</td> </tr> <tr> <td>≤20%</td> <td>0805>0.22μF; 1210≥3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6%</td> <td>0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.01uF; 1210≥3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.012μF; 0603>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF; 1210≥10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤5%</td> <td>≤10%</td> <td>0201≥0.01μF; 0805≥1μF; 1210≥10μF</td> </tr> <tr> <td>≤14%</td> <td>0603≥0.33μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.1μF; 0402≥0.056μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.33μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤5%</td> <td>≤10%</td> <td>0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.022μF; 0402≥0.033μF; 0603>0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> </tbody> </table> <p>* I.R.: 10GΩ or Rx500Ω-F whichever is smaller. Class II (X7R)</p> <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; 1210≥3.3μF</td> <td rowspan="4" style="text-align: center; vertical-align: middle;">1GΩ or R × C ≥10Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01μF; 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>25V: 02010≥1uF; 04020≥0.22μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1uF; 0402≥22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</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≥0.01uF; 1210≥3.3μF	≤20%	0402≥0.012μF; 0603>0.1μF; 0805/X7R>0.47μF; 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	≤20%	0402≥0.33μF	16V	≤5%	≤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	Rated voltage	Insulation Resistance	100V: All X7R; 1210≥3.3μF	1GΩ or R × C ≥10Ω-F whichever is smaller.	50V: 0402>0.01μF; 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF	25V: 02010≥1uF; 04020≥0.22μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF	16V: 0201≥0.1uF; 0402≥22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF
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≥0.01uF; 1210≥3.3μF																																											
		≤20%	0402≥0.012μF; 0603>0.1μF; 0805/X7R>0.47μF; 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																																											
		≤20%	0402≥0.33μF																																											
16V	≤5%	≤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																																											
Rated voltage	Insulation Resistance																																													
100V: All X7R; 1210≥3.3μF	1GΩ or R × C ≥10Ω-F whichever is smaller.																																													
50V: 0402>0.01μF; 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF																																														
25V: 02010≥1uF; 04020≥0.22μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF																																														
16V: 0201≥0.1uF; 0402≥22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF																																														

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

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																					
3.	Temperature Cycling JESD22 Method JA-104	* Conduct 1000 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 $\pm 10.0\%$. * Q/D.F. value: X8G/NPO: $\text{Cap} \geq 30\text{pF}$, $Q \geq 1000$; $\text{Cap} < 30\text{pF}$, $Q \geq 400 + 20C$. X7R:																																					
		<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>5\pm1</td> </tr> <tr> <td>2</td> <td>Max. operating temp. +3/-0</td> <td>5\pm1</td> </tr> </tbody> </table>	Step	Temp.(°C)	Time (min.)	1	Min. operating temp. +0/-3	5 \pm 1	2	Max. operating temp. +3/-0	5 \pm 1																													
		Step	Temp.(°C)	Time (min.)																																				
		1	Min. operating temp. +0/-3	5 \pm 1																																				
		2	Max. operating temp. +3/-0	5 \pm 1																																				
		* Before initial measurement (X7R only): Perform $150 \pm 0 / -10^\circ\text{C}$ 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.	<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">≤3%</td> <td>≤6%</td> <td>1206≥0.47μF</td> </tr> <tr> <td>≤7.5%</td> <td>0603≥0.068μF;0805>0.1μF;1206≥1μF;1210≥2.2μF</td> </tr> <tr> <td>≤20%</td> <td>0805>0.22μF;1210≥3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6%</td> <td>0201(50V);0603≥0.047μF;0805≥0.18μF;1206≥0.47μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.01uF;1210≥3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤5%</td> <td>≤10%</td> <td>0201≥0.01μF;0805≥1μF;1210≥10μF</td> </tr> <tr> <td>≤14%</td> <td>0603≥0.33μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.1μF; 0402≥0.056μF;0603≥0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.33μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤5%</td> <td>≤10%</td> <td>0603≥0.15μF;0805≥0.68μF;1206≥2.2μF;1210≥4.7μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.022μF;0402≥0.033μF; 0603>0.47μF;0805≥2.2μF;1206≥4.7μF;1210≥22μF</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≥0.01uF;1210≥3.3μF	≤20%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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	≤20%	0402≥0.33μF	16V	≤5%	≤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	
		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≥0.01uF;1210≥3.3μF																																					
		≤20%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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																																					
		≤20%	0402≥0.33μF																																					
16V	≤5%	≤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																																					
* I.R.: 10GΩ or $R \times C500\Omega \cdot F$ 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="4">1GΩ or $R \times C \geq 10\Omega \cdot F$ whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R;1210≥3.3μF	1GΩ or $R \times C \geq 10\Omega \cdot F$ whichever is smaller.	50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF	16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																	
Rated voltage	Insulation Resistance																																							
100V: All X7R;1210≥3.3μF	1GΩ or $R \times C \geq 10\Omega \cdot F$ whichever is smaller.																																							
50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																								
25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF																																								
16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																								

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

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																											
4.	Destructive Physical Analysis EIA-469	Per EIA-469	No defects or abnormalities																																											
5.	Moisture Resistance MIL-STD-202 Method 106	<ul style="list-style-type: none"> * 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. 	<ul style="list-style-type: none"> * 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 colspan="2">Exception of D.F.≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥ 100V</td> <td rowspan="3">≤3%</td> <td>≤6%</td> <td>1206≥0.47μF</td> </tr> <tr> <td>≤7.5%</td> <td>0603≥0.068μF;0805>0.1μF;1206≥1μF;1210≥2.2μF</td> </tr> <tr> <td>≤20%</td> <td>0805>0.22μF;1210≥3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6%</td> <td>0201(50V);0603≥0.047μF;0805≥0.18μF;1206≥0.47μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.01uF;1210≥3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤5%</td> <td>≤10%</td> <td>0201≥0.01μF;0805≥1μF;1210≥10μF</td> </tr> <tr> <td>≤14%</td> <td>0603≥0.33μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.1μF; 0402≥0.056μF;0603≥0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.33μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤5%</td> <td>≤10%</td> <td>0603≥0.15μF;0805≥0.68μF;1206≥2.2μF;1210≥4.7μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.022μF;0402≥0.033μF; 0603>0.47μF;0805≥2.2μF;1206≥4.7μF;1210≥22μF</td> </tr> </tbody> </table> <ul style="list-style-type: none"> * I.R.: 10GΩ or Rx500Ω-F whichever is smaller. <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≥3.3μF</td> <td rowspan="4">1GΩ or R × C ≥10Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</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≥0.01uF;1210≥3.3μF	≤20%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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	≤20%	0402≥0.33μF	16V	≤5%	≤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	Rated voltage	Insulation Resistance	100V: All X7R;1210≥3.3μF	1GΩ or R × C ≥10Ω-F whichever is smaller.	50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF	16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF
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≥0.01uF;1210≥3.3μF																																											
		≤20%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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																																											
		≤20%	0402≥0.33μF																																											
16V	≤5%	≤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																																											
Rated voltage	Insulation Resistance																																													
100V: All X7R;1210≥3.3μF	1GΩ or R × C ≥10Ω-F whichever is smaller.																																													
50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																														
25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF																																														
16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																														
			<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="4">1GΩ or R × C ≥10Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R;1210≥3.3μF	1GΩ or R × C ≥10Ω-F whichever is smaller.	50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF	16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																				
Rated voltage	Insulation Resistance																																													
100V: All X7R;1210≥3.3μF	1GΩ or R × C ≥10Ω-F whichever is smaller.																																													
50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																														
25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF																																														
16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																														

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

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																		
6.	Biased Humidity MIL-STD-202 Method 103	<ul style="list-style-type: none"> * 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. 	<ul style="list-style-type: none"> * No remarkable damage. * Cap change: X8G/NPO: within ±3% or 0.3pF 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 colspan="2">Exception of D.F.≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥ 100V</td> <td rowspan="3">≤3%</td> <td>≤6%</td> <td>1206≥0.47μF</td> </tr> <tr> <td>≤7.5%</td> <td>0603≥0.068μF;0805>0.1μF;1206≥1μF;1210≥2.2μF</td> </tr> <tr> <td>≤20%</td> <td>0805>0.22μF;1210≥3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6%</td> <td>0201(50V);0603≥0.047μF;0805≥0.18μF;1206≥0.47μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.01uF;1210≥3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤5%</td> <td>≤10%</td> <td>0201≥0.01μF;0805≥1μF;1210≥10μF</td> </tr> <tr> <td>≤14%</td> <td>0603≥0.33μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.1μF; 0402≥0.056μF;0603≥0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.33μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤5%</td> <td>≤10%</td> <td>0603≥0.15μF;0805≥0.68μF;1206≥2.2μF;1210≥4.7μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.022μF;0402≥0.033μF; 0603>0.47μF;0805≥2.2μF;1206≥4.7μF;1210≥22μF</td> </tr> </tbody> </table> <ul style="list-style-type: none"> * I.R.: 1GΩ or RxC50Ω-F whichever is smaller. <p>Class II (X7R) for rated voltage test</p> <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="4">500MQ or RxC≥5 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</td> </tr> </tbody> </table> <p>Class II (X7R) for 1.3~1.5Vdc</p> <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="4">1GΩ or RxC≥10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</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≥0.01uF;1210≥3.3μF	≤20%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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	≤20%	0402≥0.33μF	16V	≤5%	≤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	Rated voltage	Insulation Resistance	100V: All X7R;1210≥3.3μF	500MQ or RxC≥5 Ω-F whichever is smaller.	50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF	16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF	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	25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF	16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF
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≥0.01uF;1210≥3.3μF																																																		
		≤20%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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																																																		
		≤20%	0402≥0.33μF																																																		
16V	≤5%	≤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																																																		
Rated voltage	Insulation Resistance																																																				
100V: All X7R;1210≥3.3μF	500MQ or RxC≥5 Ω-F whichever is smaller.																																																				
50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																																					
25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF																																																					
16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																																					
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																																																					
25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF																																																					
16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																																					

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

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																											
7.	Operational Life MIL-STD-202 Method 108	<p>* Test temp.: Maximum Operating Temperature $\pm 3^{\circ}\text{C}$</p> <p>* To apply voltage: (1) $10\text{V} \leq U_r \leq 250\text{V}$: 200% of rated voltage. (2) 150% of rated voltage: a) 500V b) $\leq 6.3\text{V}$ or $C \geq 10\mu\text{F}$ c) 0603/X7R/50V/Cap.$>0.1\mu\text{F}$ 0603/X7R/$\leq 25\text{V}$/Cap.$\geq 1.0\mu\text{F}$ d) 0805/X7R/50V/Cap.$\geq 0.68\mu\text{F}$ e) 1206/X7R/100V/Cap.$\geq 1.0\mu\text{F}$ f) 1210/X7R/50V&100V/ Cap.$\geq 2.2\mu\text{F}$ (3) $630\text{V} \leq U_r \leq 1000\text{V}$: 120% of rated voltage.</p> <p>* Test time: 1000+24/-0 hrs. * Before initial measurement (X7R only): Apply test voltage for 1 hr at 125°C. Remove and let set for 24 ± 2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24 ± 2 hrs.</p>	<p>* No remarkable damage.</p> <p>* Cap change: X8G/NPO: within $\pm 3\%$ or 0.3pF whichever is larger. X7R: within $\pm 12.5\%$.</p> <p>* Q/D.F. value: More than 30pF, $Q \geq 350$; $10\text{pF} \leq C < 30\text{pF}$, $Q \geq 275 + 2.5C$ Less than 10pF, $Q \geq 200 + 10C$, X7R:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F. \leq</th> <th colspan="2">Exception of D.F. \leq</th> </tr> </thead> <tbody> <tr> <td rowspan="3">$\geq 100\text{V}$</td> <td rowspan="3">$\leq 3\%$</td> <td>$\leq 6\%$</td> <td>$1206 \geq 0.47\mu\text{F}$</td> </tr> <tr> <td>$\leq 7.5\%$</td> <td>$0603 \geq 0.068\mu\text{F}$; $0805 > 0.1\mu\text{F}$; $1206 \geq 1\mu\text{F}$; $1210 \geq 2.2\mu\text{F}$</td> </tr> <tr> <td>$\leq 20\%$</td> <td>$0805 > 0.22\mu\text{F}$; $1210 \geq 3.3\mu\text{F}$</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">$\leq 3\%$</td> <td>$\leq 6\%$</td> <td>$0201(50\text{V})$; $0603 \geq 0.047\mu\text{F}$; $0805 \geq 0.18\mu\text{F}$; $1206 \geq 0.47\mu\text{F}$</td> </tr> <tr> <td>$\leq 10\%$</td> <td>$0201 \geq 0.01\mu\text{F}$; $1210 \geq 3.3\mu\text{F}$</td> </tr> <tr> <td>$\leq 20\%$</td> <td>$0402 \geq 0.012\mu\text{F}$; $0603 > 0.1\mu\text{F}$; $0805/X7R > 0.47\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 10\mu\text{F}$</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">$\leq 5\%$</td> <td>$\leq 10\%$</td> <td>$0201 \geq 0.01\mu\text{F}$; $0805 \geq 1\mu\text{F}$; $1210 \geq 10\mu\text{F}$</td> </tr> <tr> <td>$\leq 14\%$</td> <td>$0603 \geq 0.33\mu\text{F}$</td> </tr> <tr> <td>$\leq 15\%$</td> <td>$0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.056\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$</td> </tr> <tr> <td>$\leq 20\%$</td> <td>$0402 \geq 0.33\mu\text{F}$</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">$\leq 5\%$</td> <td>$\leq 10\%$</td> <td>$0603 \geq 0.15\mu\text{F}$; $0805 \geq 0.68\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$</td> </tr> <tr> <td>$\leq 15\%$</td> <td>$0201 \geq 0.022\mu\text{F}$; $0402 \geq 0.033\mu\text{F}$; $0603 > 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$</td> </tr> </tbody> </table> <p>* I.R.: $1\text{G}\Omega$ or $R \times C 50\Omega\text{-F}$ whichever is smaller. Class II (X7R)</p> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; $1210 \geq 3.3\mu\text{F}$</td> <td rowspan="4">$1\text{G}\Omega$ or $R \times C \geq 10\Omega\text{-F}$ whichever is smaller.</td> </tr> <tr> <td>50V: $0402 > 0.01\mu\text{F}$; $0603 \geq 1\mu\text{F}$; $0805 \geq 1\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$</td> </tr> <tr> <td>25V: $0201 \geq 1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 2.2\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 10\mu\text{F}$</td> </tr> <tr> <td>16V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 22\mu\text{F}$; $0603 \geq 1\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 47\mu\text{F}$</td> </tr> </tbody> </table>	Rated vol.	D.F. \leq	Exception of D.F. \leq		$\geq 100\text{V}$	$\leq 3\%$	$\leq 6\%$	$1206 \geq 0.47\mu\text{F}$	$\leq 7.5\%$	$0603 \geq 0.068\mu\text{F}$; $0805 > 0.1\mu\text{F}$; $1206 \geq 1\mu\text{F}$; $1210 \geq 2.2\mu\text{F}$	$\leq 20\%$	$0805 > 0.22\mu\text{F}$; $1210 \geq 3.3\mu\text{F}$	50V	$\leq 3\%$	$\leq 6\%$	$0201(50\text{V})$; $0603 \geq 0.047\mu\text{F}$; $0805 \geq 0.18\mu\text{F}$; $1206 \geq 0.47\mu\text{F}$	$\leq 10\%$	$0201 \geq 0.01\mu\text{F}$; $1210 \geq 3.3\mu\text{F}$	$\leq 20\%$	$0402 \geq 0.012\mu\text{F}$; $0603 > 0.1\mu\text{F}$; $0805/X7R > 0.47\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 10\mu\text{F}$	25V	$\leq 5\%$	$\leq 10\%$	$0201 \geq 0.01\mu\text{F}$; $0805 \geq 1\mu\text{F}$; $1210 \geq 10\mu\text{F}$	$\leq 14\%$	$0603 \geq 0.33\mu\text{F}$	$\leq 15\%$	$0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.056\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$	$\leq 20\%$	$0402 \geq 0.33\mu\text{F}$	16V	$\leq 5\%$	$\leq 10\%$	$0603 \geq 0.15\mu\text{F}$; $0805 \geq 0.68\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$	$\leq 15\%$	$0201 \geq 0.022\mu\text{F}$; $0402 \geq 0.033\mu\text{F}$; $0603 > 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$	Rated voltage	Insulation Resistance	100V: All X7R; $1210 \geq 3.3\mu\text{F}$	$1\text{G}\Omega$ or $R \times C \geq 10\Omega\text{-F}$ whichever is smaller.	50V: $0402 > 0.01\mu\text{F}$; $0603 \geq 1\mu\text{F}$; $0805 \geq 1\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$	25V: $0201 \geq 1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 2.2\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 10\mu\text{F}$	16V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 22\mu\text{F}$; $0603 \geq 1\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 47\mu\text{F}$
Rated vol.	D.F. \leq	Exception of D.F. \leq																																												
$\geq 100\text{V}$	$\leq 3\%$	$\leq 6\%$	$1206 \geq 0.47\mu\text{F}$																																											
		$\leq 7.5\%$	$0603 \geq 0.068\mu\text{F}$; $0805 > 0.1\mu\text{F}$; $1206 \geq 1\mu\text{F}$; $1210 \geq 2.2\mu\text{F}$																																											
		$\leq 20\%$	$0805 > 0.22\mu\text{F}$; $1210 \geq 3.3\mu\text{F}$																																											
50V	$\leq 3\%$	$\leq 6\%$	$0201(50\text{V})$; $0603 \geq 0.047\mu\text{F}$; $0805 \geq 0.18\mu\text{F}$; $1206 \geq 0.47\mu\text{F}$																																											
		$\leq 10\%$	$0201 \geq 0.01\mu\text{F}$; $1210 \geq 3.3\mu\text{F}$																																											
		$\leq 20\%$	$0402 \geq 0.012\mu\text{F}$; $0603 > 0.1\mu\text{F}$; $0805/X7R > 0.47\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 10\mu\text{F}$																																											
25V	$\leq 5\%$	$\leq 10\%$	$0201 \geq 0.01\mu\text{F}$; $0805 \geq 1\mu\text{F}$; $1210 \geq 10\mu\text{F}$																																											
		$\leq 14\%$	$0603 \geq 0.33\mu\text{F}$																																											
		$\leq 15\%$	$0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.056\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$																																											
		$\leq 20\%$	$0402 \geq 0.33\mu\text{F}$																																											
16V	$\leq 5\%$	$\leq 10\%$	$0603 \geq 0.15\mu\text{F}$; $0805 \geq 0.68\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$																																											
		$\leq 15\%$	$0201 \geq 0.022\mu\text{F}$; $0402 \geq 0.033\mu\text{F}$; $0603 > 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$																																											
Rated voltage	Insulation Resistance																																													
100V: All X7R; $1210 \geq 3.3\mu\text{F}$	$1\text{G}\Omega$ or $R \times C \geq 10\Omega\text{-F}$ whichever is smaller.																																													
50V: $0402 > 0.01\mu\text{F}$; $0603 \geq 1\mu\text{F}$; $0805 \geq 1\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$																																														
25V: $0201 \geq 1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 2.2\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 10\mu\text{F}$																																														
16V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 22\mu\text{F}$; $0603 \geq 1\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 47\mu\text{F}$																																														
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°C , Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa .

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:																																				
			<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>0.1μF;1206≥1μF;1210≥2.2μF</td> </tr> <tr> <td>≤10%</td> <td>0805>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≥0.01uF;1210≥3.3μF</td> </tr> <tr> <td>≤10%</td> <td>0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤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>≤12.5%</td> <td>0402≥0.47μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤3.5%</td> <td>≤5%</td> <td>0201≥0.01μF;0402≥0.033μF;0603≥0.15μF; 0805≥0.68μF;1206≥2.2μF;1210≥4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.022μF; 0402≥0.15uF;0603>0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF</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≥0.01uF;1210≥3.3μF	≤10%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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≥0.47μF	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≥0.15uF;0603>0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF
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≥0.01uF;1210≥3.3μF																																				
		≤10%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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≥0.47μF																																				
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≥0.15uF;0603>0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF																																				
			* 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</td> <td rowspan="4">10GΩ or RxC≥100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</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	25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF	16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																													
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																																							
25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF																																							
16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																							
			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: 1210≥3.3μF</td> <td rowspan="4">RxC≥50 Ω-F.</td> </tr> <tr> <td>50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF</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> </tbody> </table>	Rated voltage	Insulation Resistance	100V: 1210≥3.3μF	RxC≥50 Ω-F.	50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF	25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF	16V: 0603≥10μF;0402≥1μF;0201≥0.22μF																													
Rated voltage	Insulation Resistance																																						
100V: 1210≥3.3μF	RxC≥50 Ω-F.																																						
50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF																																							
25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF																																							
16V: 0603≥10μF;0402≥1μF;0201≥0.22μF																																							

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

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																				
11.	Mechanical Shock 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≥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>0.1μF;1206≥1μF;1210≥2.2μF</td> </tr> <tr> <td>≤10%</td> <td>0805>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>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤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>≤12.5%</td> <td>0402≥0.47μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤3.5%</td> <td>≤5%</td> <td>0201≥0.01μF;0402≥0.033μF;0603≥0.15μF; 0805≥0.68μF;1206≥2.2μF;1210≥4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.022μF; 0402≥0.15μF;0603>0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF</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/X7R>0.47μF; 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≥0.47μF	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
			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/X7R>0.47μF; 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≥0.47μF																																						
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																																				
* 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</td> <td rowspan="4">10GΩ or RxC≥100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1μF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</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	25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF	16V: 0201≥0.1μF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																															
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																																							
25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF																																							
16V: 0201≥0.1μF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																							
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: 1210≥3.3μF</td> <td rowspan="4">RxC≥50 Ω-F.</td> </tr> <tr> <td>50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF</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> </tbody> </table>		Rated voltage	Insulation Resistance	100V: 1210≥3.3μF	RxC≥50 Ω-F.	50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF	25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF	16V: 0603≥10μF;0402≥1μF;0201≥0.22μF																															
Rated voltage	Insulation Resistance																																						
100V: 1210≥3.3μF	RxC≥50 Ω-F.																																						
50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF																																							
25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF																																							
16V: 0603≥10μF;0402≥1μF;0201≥0.22μF																																							

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

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																				
12.	Vibration MIL-STD-202 Method 204	* Vibration frequency: 10~2000 Hz/min. (5g's for 20 min) * Total amplitude: 1.5mm * 12 cycles each of 3 orientations (36 times)	No remarkable damage. * Cap.: within the specified tolerance. * Q/D.F. value: 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.\leq</th> <th colspan="2">Exception of D.F.\leq</th> </tr> </thead> <tbody> <tr> <td rowspan="3">$\geq 100V$</td> <td rowspan="3">$\leq 2.5\%$</td> <td>$\leq 3\%$</td> <td>1206\geq0.47μF</td> </tr> <tr> <td>$\leq 5\%$</td> <td>0603\geq0.068μF;0805$>$0.1μF;1206\geq1μF;1210\geq2.2μF</td> </tr> <tr> <td>$\leq 10\%$</td> <td>0805$>$0.22μF;1210\geq3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">$\leq 2.5\%$</td> <td>$\leq 3\%$</td> <td>0201(50V);0603\geq0.047μF;0805\geq0.18μF;1206\geq0.47μF</td> </tr> <tr> <td>$\leq 5\%$</td> <td>0201\geq0.01μF;1210\geq3.3μF</td> </tr> <tr> <td>$\leq 10\%$</td> <td>0402\geq0.012μF;0603$>$0.1μF; 0805/X7R$>$0.47μF; 1206\geq2.2μF;1210\geq10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">$\leq 3.5\%$</td> <td>$\leq 5\%$</td> <td>0201\geq0.01μF;0805\geq1μF;1210\geq10μF</td> </tr> <tr> <td>$\leq 7\%$</td> <td>0603\geq0.33μF</td> </tr> <tr> <td>$\leq 10\%$</td> <td>0201\geq0.1μF; 0402\geq0.056μF;0603\geq0.47μF; 0805\geq2.2μF;1206\geq4.7μF;1210\geq22μF</td> </tr> <tr> <td>$\leq 12.5\%$</td> <td>0402\geq0.33μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">$\leq 3.5\%$</td> <td>$\leq 5\%$</td> <td>0201\geq0.01μF;0402\geq0.033μF;0603\geq0.15μF; 0805\geq0.68μF;1206\geq2.2μF;1210\geq4.7μF</td> </tr> <tr> <td>$\leq 10\%$</td> <td>0201\geq0.022μF; 0402\geq0.15μF;0603$>$0.47μF; 0805\geq2.2μF;1206\geq4.7μF;1210\geq22μF</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 μ F	$\leq 5\%$	0603 \geq 0.068 μ F;0805 $>$ 0.1 μ F;1206 \geq 1 μ F;1210 \geq 2.2 μ F	$\leq 10\%$	0805 $>$ 0.22 μ F;1210 \geq 3.3 μ F	50V	$\leq 2.5\%$	$\leq 3\%$	0201(50V);0603 \geq 0.047 μ F;0805 \geq 0.18 μ F;1206 \geq 0.47 μ F	$\leq 5\%$	0201 \geq 0.01 μ F;1210 \geq 3.3 μ F	$\leq 10\%$	0402 \geq 0.012 μ F;0603 $>$ 0.1 μ F; 0805/X7R $>$ 0.47 μ F; 1206 \geq 2.2 μ F;1210 \geq 10 μ F	25V	$\leq 3.5\%$	$\leq 5\%$	0201 \geq 0.01 μ F;0805 \geq 1 μ F;1210 \geq 10 μ F	$\leq 7\%$	0603 \geq 0.33 μ F	$\leq 10\%$	0201 \geq 0.1 μ F; 0402 \geq 0.056 μ F;0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F;1206 \geq 4.7 μ F;1210 \geq 22 μ F	$\leq 12.5\%$	0402 \geq 0.33 μ F	16V	$\leq 3.5\%$	$\leq 5\%$	0201 \geq 0.01 μ F;0402 \geq 0.033 μ F;0603 \geq 0.15 μ F; 0805 \geq 0.68 μ F;1206 \geq 2.2 μ F;1210 \geq 4.7 μ F	$\leq 10\%$	0201 \geq 0.022 μ F; 0402 \geq 0.15 μ F;0603 $>$ 0.47 μ F; 0805 \geq 2.2 μ F;1206 \geq 4.7 μ F;1210 \geq 22 μ F
Rated vol.	D.F. \leq	Exception of D.F. \leq																																					
$\geq 100V$	$\leq 2.5\%$	$\leq 3\%$	1206 \geq 0.47 μ F																																				
		$\leq 5\%$	0603 \geq 0.068 μ F;0805 $>$ 0.1 μ F;1206 \geq 1 μ F;1210 \geq 2.2 μ F																																				
		$\leq 10\%$	0805 $>$ 0.22 μ F;1210 \geq 3.3 μ F																																				
50V	$\leq 2.5\%$	$\leq 3\%$	0201(50V);0603 \geq 0.047 μ F;0805 \geq 0.18 μ F;1206 \geq 0.47 μ F																																				
		$\leq 5\%$	0201 \geq 0.01 μ F;1210 \geq 3.3 μ F																																				
		$\leq 10\%$	0402 \geq 0.012 μ F;0603 $>$ 0.1 μ F; 0805/X7R $>$ 0.47 μ F; 1206 \geq 2.2 μ F;1210 \geq 10 μ F																																				
25V	$\leq 3.5\%$	$\leq 5\%$	0201 \geq 0.01 μ F;0805 \geq 1 μ F;1210 \geq 10 μ F																																				
		$\leq 7\%$	0603 \geq 0.33 μ F																																				
		$\leq 10\%$	0201 \geq 0.1 μ F; 0402 \geq 0.056 μ F;0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F;1206 \geq 4.7 μ F;1210 \geq 22 μ F																																				
		$\leq 12.5\%$	0402 \geq 0.33 μ F																																				
16V	$\leq 3.5\%$	$\leq 5\%$	0201 \geq 0.01 μ F;0402 \geq 0.033 μ F;0603 \geq 0.15 μ F; 0805 \geq 0.68 μ F;1206 \geq 2.2 μ F;1210 \geq 4.7 μ F																																				
		$\leq 10\%$	0201 \geq 0.022 μ F; 0402 \geq 0.15 μ F;0603 $>$ 0.47 μ F; 0805 \geq 2.2 μ F;1206 \geq 4.7 μ F;1210 \geq 22 μ F																																				
			* 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="4">10GΩ or $RxC \geq 100 \Omega-F$ whichever is smaller.</td> </tr> <tr> <td>50V: 0402$>$0.01μF;0603\geq1μF;0805\geq1μF;1206\geq4.7μF;1210\geq4.7μF</td> </tr> <tr> <td>25V: 0402\geq1μF;0603\geq2.2μF;0805\geq2.2μF;1206\geq10μF;1210\geq10μF</td> </tr> <tr> <td>16V: 0201\geq0.1μF;0402\geq22μF;0603\geq1μF;0805\geq2.2μF; 1206\geq10μF;1210\geq47μF</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R	10G Ω or $RxC \geq 100 \Omega-F$ whichever is smaller.	50V: 0402 $>$ 0.01 μ F;0603 \geq 1 μ F;0805 \geq 1 μ F;1206 \geq 4.7 μ F;1210 \geq 4.7 μ F	25V: 0402 \geq 1 μ F;0603 \geq 2.2 μ F;0805 \geq 2.2 μ F;1206 \geq 10 μ F;1210 \geq 10 μ F	16V: 0201 \geq 0.1 μ F;0402 \geq 22 μ F;0603 \geq 1 μ F;0805 \geq 2.2 μ F; 1206 \geq 10 μ F;1210 \geq 47 μ F																													
Rated voltage	Insulation Resistance																																						
100V: All X7R	10G Ω or $RxC \geq 100 \Omega-F$ whichever is smaller.																																						
50V: 0402 $>$ 0.01 μ F;0603 \geq 1 μ F;0805 \geq 1 μ F;1206 \geq 4.7 μ F;1210 \geq 4.7 μ F																																							
25V: 0402 \geq 1 μ F;0603 \geq 2.2 μ F;0805 \geq 2.2 μ F;1206 \geq 10 μ F;1210 \geq 10 μ F																																							
16V: 0201 \geq 0.1 μ F;0402 \geq 22 μ F;0603 \geq 1 μ F;0805 \geq 2.2 μ F; 1206 \geq 10 μ F;1210 \geq 47 μ F																																							
			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: 1210\geq3.3μF</td> <td rowspan="4">$RxC \geq 50 \Omega-F$.</td> </tr> <tr> <td>50V: 0402\geq0.1μF;0603\geq2.2μF;0805\geq10μF;1206\geq10μF</td> </tr> <tr> <td>25V: 0201\geq0.1μF;0402\geq2.2μF;0603\geq10μF;0805\geq10μF;1206\geq22μF</td> </tr> <tr> <td>16V: 0603\geq10μF;0402\geq1μF;0201\geq0.22μF</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: 1210 \geq 3.3 μ F	$RxC \geq 50 \Omega-F$.	50V: 0402 \geq 0.1 μ F;0603 \geq 2.2 μ F;0805 \geq 10 μ F;1206 \geq 10 μ F	25V: 0201 \geq 0.1 μ F;0402 \geq 2.2 μ F;0603 \geq 10 μ F;0805 \geq 10 μ F;1206 \geq 22 μ F	16V: 0603 \geq 10 μ F;0402 \geq 1 μ F;0201 \geq 0.22 μ F																													
Rated voltage	Insulation Resistance																																						
100V: 1210 \geq 3.3 μ F	$RxC \geq 50 \Omega-F$.																																						
50V: 0402 \geq 0.1 μ F;0603 \geq 2.2 μ F;0805 \geq 10 μ F;1206 \geq 10 μ F																																							
25V: 0201 \geq 0.1 μ F;0402 \geq 2.2 μ F;0603 \geq 10 μ F;0805 \geq 10 μ F;1206 \geq 22 μ F																																							
16V: 0603 \geq 10 μ F;0402 \geq 1 μ F;0201 \geq 0.22 μ F																																							

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

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																		
13.	Resistance to Soldering Heat MIL-STD-202 Method 210	<ul style="list-style-type: none"> * 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. 	<p>No remarkable damage.</p> <p>* Cap change: X8G/NPO: within ±2.5% or 0.25pF whichever is larger X7R: within ±7.5%</p> <p>* Q/D.F. value: X8G/NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R:</p> <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>0.1μF;1206≥1μF;1210≥2.2μF</td> </tr> <tr> <td>≤10%</td> <td>0805>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>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤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>≤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≥0.01μF;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>0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF</td> </tr> </tbody> </table> <p>* I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller. Class II (X7R)</p> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R</td> <td rowspan="4">10GΩ or RxC≥100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1μF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</td> </tr> </tbody> </table> <p>Class II (X7R) for 1.3~1.5Vdc</p> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: 1210≥3.3μF</td> <td rowspan="4">RxC≥50 Ω-F.</td> </tr> <tr> <td>50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF</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> </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/X7R>0.47μF; 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	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	25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF	16V: 0201≥0.1μF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF	Rated voltage	Insulation Resistance	100V: 1210≥3.3μF	RxC≥50 Ω-F.	50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF	25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF	16V: 0603≥10μF;0402≥1μF;0201≥0.22μF
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/X7R>0.47μF; 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																																																		
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																																																					
25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF																																																					
16V: 0201≥0.1μF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																																					
Rated voltage	Insulation Resistance																																																				
100V: 1210≥3.3μF	RxC≥50 Ω-F.																																																				
50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF																																																					
25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF																																																					
16V: 0603≥10μF;0402≥1μF;0201≥0.22μF																																																					

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

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																				
14.	Thermal Shock 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 $\pm 10.0\%$. * Q/D.F. value: X8G/NPO: $\text{Cap} \geq 30\text{pF}$, $Q \geq 1000$; $\text{Cap} < 30\text{pF}$, $Q \geq 400 + 20C$. X7R:																																				
		<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\pm3</td> </tr> <tr> <td>2</td> <td>Max. operating temp. +3/-0</td> <td>15\pm3</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																												
		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 $150+0/-10^\circ\text{C}$ 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.	<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">≤3%</td> <td>≤6%</td> <td>1206≥0.47μF</td> </tr> <tr> <td>≤7.5%</td> <td>0603≥0.068μF;0805>0.1μF;1206≥1μF;1210≥2.2μF</td> </tr> <tr> <td>≤20%</td> <td>0805>0.22μF;1210≥3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6%</td> <td>0201(50V);0603≥0.047μF;0805≥0.18μF;1206≥0.47μF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.01uF;1210≥3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤5%</td> <td>≤10%</td> <td>0201≥0.01μF;0805≥1μF;1210≥10μF</td> </tr> <tr> <td>≤14%</td> <td>0603≥0.33μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.1μF; 0402≥0.056μF;0603≥0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥0.33μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤5%</td> <td>≤10%</td> <td>0603≥0.15μF;0805≥0.68μF;1206≥2.2μF;1210≥4.7μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.022μF;0402≥0.033μF; 0603>0.47μF;0805≥2.2μF;1206≥4.7μF;1210≥22μF</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≥0.01uF;1210≥3.3μF	≤20%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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	≤20%	0402≥0.33μF	16V	≤5%	≤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
		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≥0.01uF;1210≥3.3μF																																				
		≤20%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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																																				
		≤20%	0402≥0.33μF																																				
16V	≤5%	≤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																																				
* I.R.: 10GΩ or Rx500Ω-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="4">1GΩ or R × C ≥10Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: All X7R;1210≥3.3μF	1GΩ or R × C ≥10Ω-F whichever is smaller.	50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF	16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																
Rated voltage	Insulation Resistance																																						
100V: All X7R;1210≥3.3μF	1GΩ or R × C ≥10Ω-F whichever is smaller.																																						
50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																							
25V: 02010≥1uF;04020≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF																																							
16V: 0201≥0.1uF;0402≥22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF																																							

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

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																		
15.	ESD AEC-Q200-002	Per AEC-Q200-002	<p>* No remarkable damage. * Cap.: within the specified tolerance. * Q/D.F. value: X8G/NPO: Cap\geq30pF, Q\geq1000 ; Cap$<$30pF, Q\geq400+20C. X7R:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.\leq</th> <th colspan="2">Exception of D.F.\leq</th> </tr> </thead> <tbody> <tr> <td rowspan="3">\geq 100V</td> <td rowspan="3">\leq2.5%</td> <td>\leq3%</td> <td>1206\geq0.47μF</td> </tr> <tr> <td>\leq5%</td> <td>0603\geq0.068μF;0805$>$0.1μF;1206\geq1μF;1210\geq2.2μF</td> </tr> <tr> <td>\leq10%</td> <td>0805$>$0.22μF;1210\geq3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">\leq2.5%</td> <td>\leq3%</td> <td>0201(50V);0603\geq0.047μF;0805\geq0.18μF;1206\geq0.47μF</td> </tr> <tr> <td>\leq5%</td> <td>0201\geq0.01μF;1210\geq3.3μF</td> </tr> <tr> <td>\leq10%</td> <td>0402\geq0.012μF;0603$>$0.1μF; 0805/X7R$>$0.47μF; 1206\geq2.2μF;1210\geq10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">\leq3.5%</td> <td>\leq5%</td> <td>0201\geq0.01μF;0805\geq1μF;1210\geq10μF</td> </tr> <tr> <td>\leq7%</td> <td>0603\geq0.33μF</td> </tr> <tr> <td>\leq10%</td> <td>0201\geq0.1μF; 0402\geq0.056μF;0603\geq0.47μF; 0805\geq2.2μF;1206\geq4.7μF;1210\geq22μF</td> </tr> <tr> <td>\leq12.5%</td> <td>0402\geq0.33μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">\leq3.5%</td> <td>\leq5%</td> <td>0201\geq0.01μF;0402\geq0.033μF;0603\geq0.15μF; 0805\geq0.68μF;1206\geq2.2μF;1210\geq4.7μF</td> </tr> <tr> <td>\leq10%</td> <td>0201\geq0.022μF; 0402\geq0.15μF;0603$>$0.47μF; 0805\geq2.2μF;1206\geq4.7μF;1210\geq22μF</td> </tr> </tbody> </table> <p>* I.R.: \geq10GΩ or RxC\geq500Ω-F whichever is smaller. Class II (X7R)</p> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R</td> <td rowspan="4">10GΩ or RxC\geq100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402$>$0.01μF;0603\geq1μF;0805\geq1μF;1206\geq4.7μF;1210\geq4.7μF</td> </tr> <tr> <td>25V: 0402\geq1μF;0603\geq2.2μF;0805\geq2.2μF;1206\geq10μF;1210\geq10μF</td> </tr> <tr> <td>16V: 0201\geq0.1μF;0402\geq22μF;0603\geq1μF;0805\geq2.2μF; 1206\geq10μF;1210\geq47μF</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: 1210\geq3.3μF</td> <td rowspan="4">RxC\geq50 Ω-F.</td> </tr> <tr> <td>50V: 0402\geq0.1μF;0603\geq2.2μF;0805\geq10μF;1206\geq10μF</td> </tr> <tr> <td>25V: 0201\geq0.1μF;0402\geq2.2μF;0603\geq10μF;0805\geq10μF;1206\geq22μF</td> </tr> <tr> <td>16V: 0603\geq10μF;0402\geq1μF;0201\geq0.22μF</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 μ F	\leq 5%	0603 \geq 0.068 μ F;0805 $>$ 0.1 μ F;1206 \geq 1 μ F;1210 \geq 2.2 μ F	\leq 10%	0805 $>$ 0.22 μ F;1210 \geq 3.3 μ F	50V	\leq 2.5%	\leq 3%	0201(50V);0603 \geq 0.047 μ F;0805 \geq 0.18 μ F;1206 \geq 0.47 μ F	\leq 5%	0201 \geq 0.01 μ F;1210 \geq 3.3 μ F	\leq 10%	0402 \geq 0.012 μ F;0603 $>$ 0.1 μ F; 0805/X7R $>$ 0.47 μ F; 1206 \geq 2.2 μ F;1210 \geq 10 μ F	25V	\leq 3.5%	\leq 5%	0201 \geq 0.01 μ F;0805 \geq 1 μ F;1210 \geq 10 μ F	\leq 7%	0603 \geq 0.33 μ F	\leq 10%	0201 \geq 0.1 μ F; 0402 \geq 0.056 μ F;0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F;1206 \geq 4.7 μ F;1210 \geq 22 μ F	\leq 12.5%	0402 \geq 0.33 μ F	16V	\leq 3.5%	\leq 5%	0201 \geq 0.01 μ F;0402 \geq 0.033 μ F;0603 \geq 0.15 μ F; 0805 \geq 0.68 μ F;1206 \geq 2.2 μ F;1210 \geq 4.7 μ F	\leq 10%	0201 \geq 0.022 μ F; 0402 \geq 0.15 μ F;0603 $>$ 0.47 μ F; 0805 \geq 2.2 μ F;1206 \geq 4.7 μ F;1210 \geq 22 μ F	Rated voltage	Insulation Resistance	100V: All X7R	10G Ω or RxC \geq 100 Ω -F whichever is smaller.	50V: 0402 $>$ 0.01 μ F;0603 \geq 1 μ F;0805 \geq 1 μ F;1206 \geq 4.7 μ F;1210 \geq 4.7 μ F	25V: 0402 \geq 1 μ F;0603 \geq 2.2 μ F;0805 \geq 2.2 μ F;1206 \geq 10 μ F;1210 \geq 10 μ F	16V: 0201 \geq 0.1 μ F;0402 \geq 22 μ F;0603 \geq 1 μ F;0805 \geq 2.2 μ F; 1206 \geq 10 μ F;1210 \geq 47 μ F	Rated voltage	Insulation Resistance	100V: 1210 \geq 3.3 μ F	RxC \geq 50 Ω -F.	50V: 0402 \geq 0.1 μ F;0603 \geq 2.2 μ F;0805 \geq 10 μ F;1206 \geq 10 μ F	25V: 0201 \geq 0.1 μ F;0402 \geq 2.2 μ F;0603 \geq 10 μ F;0805 \geq 10 μ F;1206 \geq 22 μ F	16V: 0603 \geq 10 μ F;0402 \geq 1 μ F;0201 \geq 0.22 μ F
Rated vol.	D.F. \leq	Exception of D.F. \leq																																																			
\geq 100V	\leq 2.5%	\leq 3%	1206 \geq 0.47 μ F																																																		
		\leq 5%	0603 \geq 0.068 μ F;0805 $>$ 0.1 μ F;1206 \geq 1 μ F;1210 \geq 2.2 μ F																																																		
		\leq 10%	0805 $>$ 0.22 μ F;1210 \geq 3.3 μ F																																																		
50V	\leq 2.5%	\leq 3%	0201(50V);0603 \geq 0.047 μ F;0805 \geq 0.18 μ F;1206 \geq 0.47 μ F																																																		
		\leq 5%	0201 \geq 0.01 μ F;1210 \geq 3.3 μ F																																																		
		\leq 10%	0402 \geq 0.012 μ F;0603 $>$ 0.1 μ F; 0805/X7R $>$ 0.47 μ F; 1206 \geq 2.2 μ F;1210 \geq 10 μ F																																																		
25V	\leq 3.5%	\leq 5%	0201 \geq 0.01 μ F;0805 \geq 1 μ F;1210 \geq 10 μ F																																																		
		\leq 7%	0603 \geq 0.33 μ F																																																		
		\leq 10%	0201 \geq 0.1 μ F; 0402 \geq 0.056 μ F;0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F;1206 \geq 4.7 μ F;1210 \geq 22 μ F																																																		
		\leq 12.5%	0402 \geq 0.33 μ F																																																		
16V	\leq 3.5%	\leq 5%	0201 \geq 0.01 μ F;0402 \geq 0.033 μ F;0603 \geq 0.15 μ F; 0805 \geq 0.68 μ F;1206 \geq 2.2 μ F;1210 \geq 4.7 μ F																																																		
		\leq 10%	0201 \geq 0.022 μ F; 0402 \geq 0.15 μ F;0603 $>$ 0.47 μ F; 0805 \geq 2.2 μ F;1206 \geq 4.7 μ F;1210 \geq 22 μ F																																																		
Rated voltage	Insulation Resistance																																																				
100V: All X7R	10G Ω or RxC \geq 100 Ω -F whichever is smaller.																																																				
50V: 0402 $>$ 0.01 μ F;0603 \geq 1 μ F;0805 \geq 1 μ F;1206 \geq 4.7 μ F;1210 \geq 4.7 μ F																																																					
25V: 0402 \geq 1 μ F;0603 \geq 2.2 μ F;0805 \geq 2.2 μ F;1206 \geq 10 μ F;1210 \geq 10 μ F																																																					
16V: 0201 \geq 0.1 μ F;0402 \geq 22 μ F;0603 \geq 1 μ F;0805 \geq 2.2 μ F; 1206 \geq 10 μ F;1210 \geq 47 μ F																																																					
Rated voltage	Insulation Resistance																																																				
100V: 1210 \geq 3.3 μ F	RxC \geq 50 Ω -F.																																																				
50V: 0402 \geq 0.1 μ F;0603 \geq 2.2 μ F;0805 \geq 10 μ F;1206 \geq 10 μ F																																																					
25V: 0201 \geq 0.1 μ F;0402 \geq 2.2 μ F;0603 \geq 10 μ F;0805 \geq 10 μ F;1206 \geq 22 μ F																																																					
16V: 0603 \geq 10 μ F;0402 \geq 1 μ F;0201 \geq 0.22 μ F																																																					

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

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements
16.	Solderability J-STD-002 JESD22- B102E	* Condition A 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.	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.

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																				
17.	Electrical Characterization	* 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%	* 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>0.1µF;1206≥1µF;1210≥2.2µF</td> </tr> <tr> <td>≤10%</td> <td>0805>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>0.1µF; 0805/X7R>0.47µF; 1206≥2.2µF;1210≥10µF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤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>≤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≥0.01µF;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>0.47µF; 0805≥2.2µF;1206≥4.7µF;1210≥22µF</td> </tr> </tbody> </table> <p>* I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller. Class II (X7R)</p>	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/X7R>0.47µF; 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
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/X7R>0.47µF; 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																																				

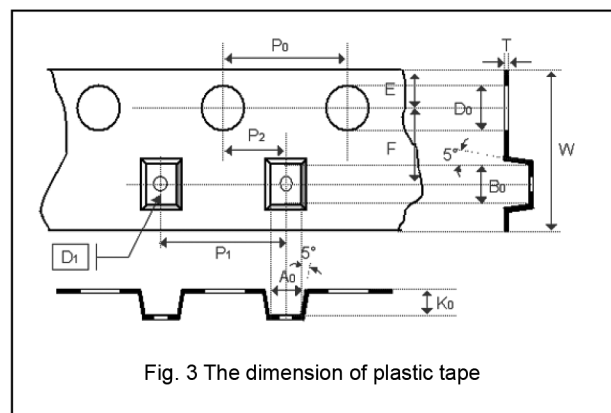
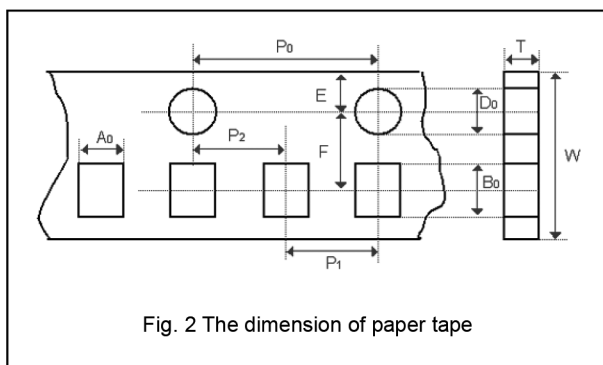
No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements								
		<p>* Insulation Resistance * Test temp.: Room Temperature. * Test voltage: ≤100V: To apply rated voltage for max. 120 sec. ≥200V: To apply rated voltage (Max.500V) for 60 sec.</p> <p>* Dielectric Strength To apply voltage: ≤100V ≥2.5 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</p>	<table border="1"> <thead> <tr> <th data-bbox="722 427 1294 479">Rated voltage</th> <th data-bbox="1294 427 1461 479">Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td data-bbox="722 479 1294 517">100V: All X7R</td> <td data-bbox="1294 479 1461 651" rowspan="4">10GΩ or RxC≥100 Ω-F whichever is smaller.</td> </tr> <tr> <td data-bbox="722 517 1294 555">50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td data-bbox="722 555 1294 593">25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF</td> </tr> <tr> <td data-bbox="722 593 1294 651">16V: 0201≥0.1μF;0402≥22μF;0603≥1μF;0805≥2.2μF;1206≥10μF;1210≥47μF</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	25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF	16V: 0201≥0.1μF;0402≥22μF;0603≥1μF;0805≥2.2μF;1206≥10μF;1210≥47μF	
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											
25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF											
16V: 0201≥0.1μF;0402≥22μF;0603≥1μF;0805≥2.2μF;1206≥10μF;1210≥47μF											
			<table border="1"> <thead> <tr> <th data-bbox="722 667 1294 719">Rated voltage</th> <th data-bbox="1294 667 1461 719">Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td data-bbox="722 719 1294 757">100V: 1210≥3.3μF</td> <td data-bbox="1294 719 1461 869" rowspan="4">RxC≥50 Ω-F.</td> </tr> <tr> <td data-bbox="722 757 1294 795">50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF</td> </tr> <tr> <td data-bbox="722 795 1294 833">25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF</td> </tr> <tr> <td data-bbox="722 833 1294 869">16V: 0603≥10μF;0402≥1μF;0201≥0.22μF</td> </tr> </tbody> </table>	Rated voltage	Insulation Resistance	100V: 1210≥3.3μF	RxC≥50 Ω-F.	50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF	25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF	16V: 0603≥10μF;0402≥1μF;0201≥0.22μF	
Rated voltage	Insulation Resistance										
100V: 1210≥3.3μF	RxC≥50 Ω-F.										
50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF											
25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF											
16V: 0603≥10μF;0402≥1μF;0201≥0.22μF											
			<p>* Dielectric strength No evidence of damage or flash over during test.</p> <p>* Temperature Coefficient Capacitance Change: X8G/NPO: Within ±30ppm/°C X7R: Within ±15%</p>								
18.	Board Flex AEC-Q200-005	<p>* 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.</p>	<p>* 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.)</p>								

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																	
19.	Terminal Strength 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"> <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>0.1μF;1206≥1μF;1210≥2.2μF</td> </tr> <tr> <td>≤10%</td> <td>0805>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≥0.01uF;1210≥3.3μF</td> </tr> <tr> <td>≤10%</td> <td>0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF;1210≥10μF</td> </tr> <tr> <td rowspan="4">25V</td> <td rowspan="4">≤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>≤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≥0.01μF;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≥0.15uF;0603>0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF</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≥0.01uF;1210≥3.3μF	≤10%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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%
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≥0.01uF;1210≥3.3μF																																	
		≤10%	0402≥0.012μF;0603>0.1μF; 0805/X7R>0.47μF; 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≥0.15uF;0603>0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF																																	
20	Beam Load Test 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.

APPENDIXES

Tape & reel dimensions



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
A0	0.4 +/-0.1	0.7 +/-0.2	1.05 +/-0.3	1.5 +/-0.2	1.5 +/-0.2	< 1.8	1.9 +/-0.5	< 2	<2.3	< 3.05	< 3.05	< 3.2
B0	0.7 +/-0.1	1.2 +/-0.2	1.8 +/-0.3	2.3 +/-0.2	2.3 +/-0.2	< 2.7	3.5 +/-0.5	< 3.7	< 4	< 3.8	< 3.8	<4
T	≤0.55	≤0.8	≤1.2	≤1.15	≤1.2	0.23 +/-0.1	≤1.2	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1
K0	-	-	-	-	-	< 2.5	-	< 2.5	< 2.5	< 1.5	< 2.5	< 3.2
W	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3	8 +/-0.3
P0	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1
10xP0	40 +/-0.1	40 +/-0.1	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2	40 +/-0.2
P1	2 +/-0.05	2 +/-0.05	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1	4 +/-0.1
P2	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05	2 +/-0.05
D0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0	1.5 +0.1/-0
D1	-	-	-	-	-	1 +/-0.1	-	1 +/-0.1	1 +/-0.1	1 +/-0.1	1 +/-0.1	1 +/-0.1
E	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1	1.75 +/-0.1
F	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05	3.5 +/-0.05

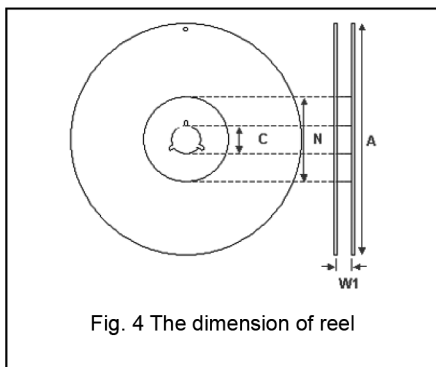
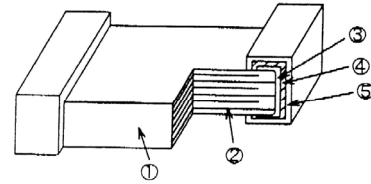


Fig. 4 The dimension of reel

Size	0402, 0603, 0805, 1206, 1210		
Reel size	7"	10"	13"
C	13 ±0.5	13 ±0.5	13 ±0.5
W ₁	10 ±1.5	10 ±1.5	10 ±1.5
A	178 ±2	250 ±2	330 ±2
N	60 +1/-0	50 min	50 min

Constructions

No.	Name	NP0	X7R
1	Ceramic material	CaZrO ₃ based	BaTiO ₃ based
2	Inner electrode	Ni	
3	Termination	Inner layer	Cu
4		Middle layer	Ni
5		Outer layer	Sn



The construction of MLCC

Application Notes

Storage and handling conditions

- (1) To store products at 5°C 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.

Recommended soldering conditions

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

Recommended soldering conditions

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

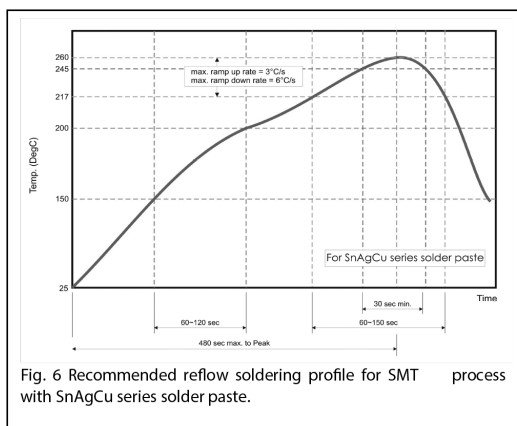


Fig. 6 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.

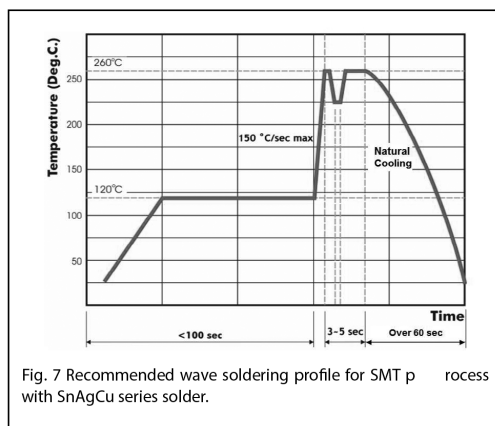


Fig. 7 Recommended wave soldering profile for SMT process with SnAgCu series solder.

Part Number Table

Description	Part Number
SMD Multilayer Ceramic Capacitors, Automotive , 0402, X7R, 100pF, 10%, 50V	MCMT15B101K500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0402, NPO, 100pF, 10%, 50V	MCMT15N101K500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0603, X7R, 10nF, 10%, 100V	MCMT18B103K101CT
SMD Multilayer Ceramic Capacitors, Automotive , 0603, X7R, 10nF, 20%, 50V	MCMT18B103M500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0603, X7R, 100nF, 5%, 50V	MCMT18B104J500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0603, X7R, 220pF, 10%, 50V	MCMT18B221K500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0603, X7R, 22nF, 10%, 50V	MCMT18B223K500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0603, X7R, 3300pF, 10%, 50V	MCMT18B332K500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0603, NPO, 10pF, 5%, 50V	MCMT18N100J500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0603, NPO, 1nF, 5%, 50V	MCMT18N102J500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0805, X7R, 10nF, 5%, 50V	MCMT21B103J500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0805, X7R, 100nF, 5%, 50V	MCMT21B104J500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0805, X7R, 100nF, 20%, 50V	MCMT21B104M500CT
SMD Multilayer Ceramic Capacitors, Automotive , 0805, X7R, 1uF, 10%, 16V	MCMT21B105K160CT
SMD Multilayer Ceramic Capacitors, Automotive , 0805, X7R, 1uF, 10%, 25V	MCMT21B105K250CT
SMD Multilayer Ceramic Capacitors, Automotive , 0805, X7R, 1uF, 10%, 50V	MCMT21B105K500CT
SMD Multilayer Ceramic Capacitors, Automotive , 1206, X7R, 100nF, 10%, 100V	MCMT31B104K101CT
SMD Multilayer Ceramic Capacitors, Automotive , 1206, X7R, 1uF, 10%, 50V	MCMT31B105K500CT
SMD Multilayer Ceramic Capacitors, Automotive , 1206, X7R, 2.2uF, 10%, 50V	MCMT31B225K500CT
SMD Multilayer Ceramic Capacitors, Automotive , 1210, X7R, 2.2uF, 10%, 100V	MCMT32B225K101CT
SMD Multilayer Ceramic Capacitors, Automotive , 1210, X7R, 2.2uF, 10%, 50V	MCMT32B225K500CT

Important Notice : This data sheet and its contents (the "Information") belong to the members of the AVNET group of companies (the "Group") or are licensed to it. No licence is granted for the use of it other than for information purposes in connection with the products to which it relates. No licence of any intellectual property rights is granted. The Information is subject to change without notice and replaces all data sheets previously supplied. The Information supplied is believed to be accurate but the Group assumes no responsibility for its accuracy or completeness, any error in or omission from it or for any use made of it. Users of this data sheet should check for themselves the Information and the suitability of the products for their purpose and not make any assumptions based on information included or omitted. Liability for loss or damage resulting from any reliance on the Information or use of it (including liability resulting from negligence or where the Group was aware of the possibility of such loss or damage arising) is excluded. This will not operate to limit or restrict the Group's liability for death or personal injury resulting from its negligence. Multicomp Pro is the registered trademark of Premier Farnell Limited 2019.