

APPROVAL SHEET

MULTILAYER CERAMIC CAPACITORS

Automotive Capacitors Series (MT)

Qualified to AEC-Q200

0201 to 1210 Sizes (10V to 1000V)

X8G, NP0 & X7R Dielectrics

Halogen Free & RoHS Compliance

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

1. DESCRIPTION

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

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

2. FEATURES

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

3. APPLICATIONS

- For Navigation & Information equipments.
- For entertainment equipments
- For comfortable equipments.
- For Automotive electronic equipment.

4. HOW TO ORDER

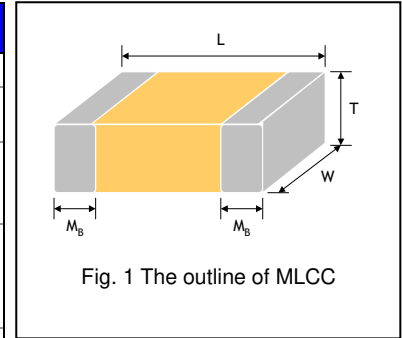
<u>MT</u>	<u>18</u>	<u>N</u>	<u>102</u>	<u>J</u>	<u>500</u>	<u>C</u>	<u>I</u>
<u>Series</u>	<u>Size</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging style</u>
MT= Automotive safe concern (with AEC-Q200 qualification)	03=0201 (0603) 15=0402 (1005) 18=0603 (1608) 21=0805 (2012) 31=1206 (3216) 32=1210 (3225)	G=X8G N=NP0 (C0G) B=X7R	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: 0R5=0.5pF 1R0=1.0pF 102=10x10 ² =1000pF	A=±0.05pF B=±0.1pF C=±0.25pF D=±0.5pF F=±1% G=±2% J=±5% K=±10% M=±20%	Two significant digits followed by no. of zeros. And R is in place of decimal point. 100=10 VDC 160=16 VDC 250=25 VDC 500=50 VDC 101=100 VDC 201=200 VDC 251=250 VDC 501=500 VDC 631=630 VDC 102=1000 VDC	C=Cu/Ni/Sn	T=7" reeled G=13" reeled

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5. EXTERNAL DIMENSIONS

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



Reflow soldering only is recommended.

* For 1206(100V)/Cap≥1.2μF products.

** For 1210(200V & 250V)/Cap>0.47μF

6. GENERAL ELECTRICAL DATA*

Dielectric	X8G	NP0	X7R
Size	0201, 0402, 0603, 0805, 1206, 1210		
Capacitance range*	0.1pF to 0.015uF	0.1pF to 0.047uF	100pF to 10μF
Capacitance tolerance**	Cap≤5pF ^{#1} : A (±0.05pF), B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: B (±0.1pF), C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%)		J (±5%), K (±10%), M (±20%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	10V, 16V, 25V, 50V, 100V, 200V, 250, 500, 630, 1000	
Operating temperature	-55 to +150°C	-55 to +125°C	
Capacitance characteristic	±30ppm/°C		±15%
Termination	Ni/Sn (lead-free termination)		

#1: X8G/NP0, 0.1pF product only provide B tolerance.

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

X8G/NP0: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap≤1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25°C at ambient temperature

X7R: 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, then leave in ambient condition for 24±2 hours before measurement.

7. CAPACITANCE RANGE

X8G Dielectric

DIELECTRIC		X8G												
SIZE		0402				0603				0805				
RATED VOLTAGE (VDC)		10	16	25	50	10	16	25	50	10	16	25	50	100
Capacitance	0.1pF (0R1)	N	N	N	N									
	0.2pF (0R2)	N	N	N	N									
	0.3pF (0R3)	N	N	N	N									
	0.4pF (0R4)	N	N	N	N									
	0.5pF (0R5)	N	N	N	N	S	S	S	S	A	A	A	A	A
	1.0pF (1R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	1.2pF (1R2)	N	N	N	N	S	S	S	S	A	A	A	A	A
	1.5pF (1R5)	N	N	N	N	S	S	S	S	A	A	A	A	A
	1.8pF (1R8)	N	N	N	N	S	S	S	S	A	A	A	A	A
	2.0pF (2R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	2.2pF (2R2)	N	N	N	N	S	S	S	S	A	A	A	A	A
	2.7pF (2R7)	N	N	N	N	S	S	S	S	A	A	A	A	A
	3.0pF (3R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	3.3pF (3R3)	N	N	N	N	S	S	S	S	A	A	A	A	A
	3.9pF (3R9)	N	N	N	N	S	S	S	S	A	A	A	A	A
	4.0pF (4R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	4.7pF (4R7)	N	N	N	N	S	S	S	S	A	A	A	A	A
	5.0pF (5R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	5.6pF (5R6)	N	N	N	N	S	S	S	S	A	A	A	A	A
	6.0pF (6R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	6.8pF (6R8)	N	N	N	N	S	S	S	S	A	A	A	A	A
	7.0pF (7R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	8.0pF (8R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	8.2pF (8R2)	N	N	N	N	S	S	S	S	A	A	A	A	A
	9.0pF (9R0)	N	N	N	N	S	S	S	S	A	A	A	A	A
	10pF (100)	N	N	N	N	S	S	S	S	A	A	A	A	A
	12pF (120)	N	N	N	N	S	S	S	S	A	A	A	A	A
	15pF (150)	N	N	N	N	S	S	S	S	A	A	A	A	A
	18pF (180)	N	N	N	N	S	S	S	S	A	A	A	A	A
	22pF (220)	N	N	N	N	S	S	S	S	A	A	A	A	A
	27pF (270)	N	N	N	N	S	S	S	S	A	A	A	A	A
	33pF (330)	N	N	N	N	S	S	S	S	A	A	A	A	A
	39pF (390)	N	N	N	N	S	S	S	S	A	A	A	A	A
	47pF (470)	N	N	N	N	S	S	S	S	A	A	A	A	A
	56pF (560)	N	N	N	N	S	S	S	S	A	A	A	A	A
	68pF (680)	N	N	N	N	S	S	S	S	A	A	A	A	A
	82pF (820)	N	N	N	N	S	S	S	S	A	A	A	A	A
	100pF (101)	N	N	N	N	S	S	S	S	A	A	A	A	A
	120pF (121)	N	N	N	N	S	S	S	S	A	A	A	A	A
	150pF (151)	N	N	N	N	S	S	S	S	A	A	A	A	A
	180pF (181)	N	N	N	N	S	S	S	S	A	A	A	A	A
	220pF (221)	N	N	N	N	S	S	S	S	A	A	A	A	A
	270pF (271)	N	N	N	N	S	S	S	S	A	A	A	A	A
	330pF (331)	N	N	N	N	S	S	S	S	A	A	A	A	A
	390pF (391)	N	N	N	N	S	S	S	S	B	B	B	B	B
	470pF (471)	N	N	N	N	S	S	S	S	B	B	B	B	B
	560pF (561)	N	N	N	N	S	S	S	S	B	B	B	B	B
	680pF (681)	N	N	N	N	S	S	S	S	B	B	B	B	B
	820pF (821)	N	N	N	N	S	S	S	S	B	B	B	B	B
	1,000pF (102)	N	N	N	N	S	S	S	S	B	B	B	B	B
	1,200pF (122)					X	X	X	X	B	B	B	B	B
	1,500pF (152)					X	X	X	X	B	B	B	B	B
	1,800pF (182)					X	X	X	X	B	B	B	B	B
	2,200pF (222)					X	X	X	X	B	B	B	B	B
	2,700pF (272)					X	X	X	X	D	D	D	D	D
	3,300pF (332)					X	X	X	X	D	D	D	D	D
	3,900pF (392)									D	D	D	D	D
	4,700pF (472)									D	D	D	D	D
	5,600pF (562)									D	D	D	D	
	6,800pF (682)									D	D	D	D	
	8,200pF (822)									D	D	D	D	
	0.010uF (103)									D	D	D	D	

* X8G: 0.1pF product only provide B tolerance

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

Multilayer Ceramic Capacitors

Approval Sheet

X8G Dielectric

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

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

2. For more information about products with special capacitance or other data, please contact WTC local representative.

NP0 Dielectric

DIELECTRIC		NP0																
SIZE		0201					0402					0603						
RATED VOLTAGE		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100	200	250
Capacitance	0.1pF (0R1)	L	L	L	L	L	N	N	N	N	N							
	0.2pF (0R2)	L	L	L	L	L	N	N	N	N	N							
	0.3pF (0R3)	L	L	L	L	L	N	N	N	N	N							
	0.4pF (0R4)	L	L	L	L	L	N	N	N	N	N							
	0.5pF (0R5)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.6pF (0R6)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.7pF (0R7)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.8pF (0R8)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	0.9pF (0R9)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.0pF (1R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.2pF (1R2)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.5pF (1R5)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	1.8pF (1R8)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	2.0pF (2R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	2.2pF (2R2)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	2.7pF (2R7)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	3.0pF (3R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	3.3pF (3R3)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	3.9pF (3R9)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	4.0pF (4R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	4.7pF (4R7)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	5.0pF (5R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	5.6pF (5R6)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	6.0pF (6R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	6.8pF (6R8)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	7.0pF (7R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	8.0pF (8R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	8.2pF (8R2)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	9.0pF (9R0)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	10pF (100)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	12pF (120)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	15pF (150)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	18pF (180)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	22pF (220)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	27pF (270)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	33pF (330)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	39pF (390)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	47pF (470)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	56pF (560)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	68pF (680)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	82pF (820)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	100pF (101)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	120pF (121)	L	L	L	L	L	N	N	N	N	N	S	S	S	S	S	S	S
	150pF (151)						N	N	N	N	N	S	S	S	S	S	S	S
	180pF (181)						N	N	N	N	N	S	S	S	S	S	S	S
	220pF (221)						N	N	N	N	N	S	S	S	S	S	S	S
	270pF (271)						N	N	N	N	N	S	S	S	S	S	X	X
	330pF (331)						N	N	N	N	N	S	S	S	S	S	X	X
	390pF (391)						N	N	N	N	N	S	S	S	S	S	X	X
	470pF (471)						N	N	N	N	N	S	S	S	S	S	X	X
560pF (561)						N	N	N	N	N	S	S	S	S	S	X	X	
680pF (681)						N	N	N	N	N	S	S	S	S	S	X	X	
820pF (821)						N	N	N	N	N	S	S	S	S	S	X	X	
1,000pF (102)						N	N	N	N	N	S	S	S	S	S	X	X	
1,200pF (122)											X	X	X	X	X	X	X	
1,500pF (152)											X	X	X	X	X	X	X	
1,800pF (182)											X	X	X	X	X	X	X	
2,200pF (222)											X	X	X	X	X			
2,700pF (272)											X	X	X	X	X			
3,300pF (332)											X	X	X	X	X			
3,900pF (392)											X	X	X	X	X			
4,700pF (472)											X	X	X	X	X			
5,600pF (562)											X	X	X	X	X			
6,800pF (682)											X	X	X	X	X			
8,200pF (822)											X	X	X	X	X			
0.01uF (103)											X	X	X	X	X			

* NP0, 0.1pF product only provide B tolerance.

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

2. For more information about products with special capacitance or other data, please contact WTC local representative.

NP0 Dielectric

DIELECTRIC		NP0								
SIZE		0805								
RATED VOLTAGE		10	16	25	50	100	200	250	500	630
Capacitance	0.5pF (0R5)	A	A	A	A	A	A	A	A	A
	0.6pF (0R6)	A	A	A	A	A	A	A	A	A
	0.7pF (0R7)	A	A	A	A	A	A	A	A	A
	0.8pF (0R8)	A	A	A	A	A	A	A	A	A
	0.9pF (0R9)	A	A	A	A	A	A	A	A	A
	1.0pF (1R0)	A	A	A	A	A	A	A	A	A
	1.2pF (1R2)	A	A	A	A	A	A	A	A	A
	1.5pF (1R5)	A	A	A	A	A	A	A	A	A
	1.8pF (1R8)	A	A	A	A	A	A	A	A	A
	2.2pF (2R2)	A	A	A	A	A	A	A	A	A
	2.7pF (2R7)	A	A	A	A	A	A	A	A	A
	3.3pF (3R3)	A	A	A	A	A	A	A	A	A
	3.9pF (3R9)	A	A	A	A	A	A	A	A	A
	4.7pF (4R7)	A	A	A	A	A	A	A	A	A
	5.6pF (5R6)	A	A	A	A	A	A	A	A	A
	6.8pF (6R8)	A	A	A	A	A	A	A	A	A
	8.2pF (8R2)	A	A	A	A	A	A	A	A	A
	10pF (100)	A	A	A	A	A	A	A	A	A
	12pF (120)	A	A	A	A	A	A	A	A	A
	15pF (150)	A	A	A	A	A	A	A	A	A
	18pF (180)	A	A	A	A	A	A	A	A	A
	22pF (220)	A	A	A	A	A	A	A	A	A
	27pF (270)	A	A	A	A	A	A	A	A	A
	33pF (330)	A	A	A	A	A	A	A	A	A
	39pF (390)	A	A	A	A	A	A	A	A	A
	47pF (470)	A	A	A	A	A	A	A	A	A
	56pF (560)	A	A	A	A	A	A	A	A	A
	68pF (680)	A	A	A	A	A	A	A	A	A
	82pF (820)	A	A	A	A	A	A	A	B	B
	100pF (101)	A	A	A	A	A	B	B	B	B
	120pF (121)	A	A	A	A	A	B	B	D	D
	150pF (151)	A	A	A	A	A	D	D	D	D
	180pF (181)	A	A	A	A	A	D	D	D	D
	220pF (221)	A	A	A	A	A	D	D	D	D
	270pF (271)	A	A	A	A	A	D	D	D	D
	330pF (331)	A	A	A	A	A	D	D	D	D
	390pF (391)	B	B	B	B	B	D	D	D	D
	470pF (471)	B	B	B	B	B	D	D	I	I
	560pF (561)	B	B	B	B	B	D	D	I	I
	680pF (681)	B	B	B	B	B	D	D	I	I
	820pF (821)	B	B	B	B	B	D	D	I	I
	1,000pF (102)	B	B	B	B	B	D	D	I	I
	1,200pF (122)	B	B	B	B	B	D	D	I	I
	1,500pF (152)	B	B	B	B	B	D	D	I	I
	1,800pF (182)	B	B	B	B	B	D	D	I	I
	2,200pF (222)	B	B	B	B	B	D	D	I	I
	2,700pF (272)	D	D	D	D	D	I	I		
	3,300pF (332)	D	D	D	D	D	I	I		
	3,900pF (392)	D	D	D	D	D	I	I		
	4,700pF (472)	D	D	D	D	D	I	I		
	5,600pF (562)	D	D	D	D	D				
	6,800pF (682)	D	D	D	D	D				
	8,200pF (822)	D	D	D	D	D				
	0.01μF (103)	D	D	D	D	D				
	0.012μF (123)	D	D	D	D	D				
	0.015μF (153)	D	D	D	D	D				
	0.018μF (183)	D	D	D	D	D				
	0.022μF (223)	D	D	D	D	D				

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

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Multilayer Ceramic Capacitors

Approval Sheet

NP0 Dielectric

DIELECTRIC		NP0									
SIZE		1206									
RATED VOLTAGE		10	16	25	50	100	200	250	500	630	1000
Capacitance	1.0pF (1R0)										
	1.2pF (1R2)	B	B	B	B	B	B	B	B	B	
	1.5pF (1R5)	B	B	B	B	B	B	B	B	B	B
	1.8pF (1R8)	B	B	B	B	B	B	B	B	B	B
	2.2pF (2R2)	B	B	B	B	B	B	B	B	B	B
	2.7pF (2R7)	B	B	B	B	B	B	B	B	B	B
	3.3pF (3R3)	B	B	B	B	B	B	B	B	B	B
	3.9pF (3R9)	B	B	B	B	B	B	B	B	B	B
	4.7pF (4R7)	B	B	B	B	B	B	B	B	B	B
	5.6pF (5R6)	B	B	B	B	B	B	B	B	B	B
	6.8pF (6R8)	B	B	B	B	B	B	B	B	B	B
	8.2pF (8R2)	B	B	B	B	B	B	B	B	B	B
	10pF (100)	B	B	B	B	B	B	B	B	B	B
	12pF (120)	B	B	B	B	B	B	B	B	B	B
	15pF (150)	B	B	B	B	B	B	B	B	B	B
	18pF (180)	B	B	B	B	B	B	B	B	B	B
	22pF (220)	B	B	B	B	B	B	B	B	B	D
	27pF (270)	B	B	B	B	B	B	B	B	B	D
	33pF (330)	B	B	B	B	B	B	B	B	B	D
	39pF (390)	B	B	B	B	B	B	B	B	B	D
	47pF (470)	B	B	B	B	B	B	B	B	B	D
	56pF (560)	B	B	B	B	B	B	B	B	B	D
	68pF (680)	B	B	B	B	B	B	B	B	B	D
	82pF (820)	B	B	B	B	B	B	B	B	B	D
	100pF (101)	B	B	B	B	B	B	B	B	B	D
	120pF (121)	B	B	B	B	B	B	B	B	B	D
	150pF (151)	B	B	B	B	B	B	B	B	B	D
	180pF (181)	B	B	B	B	B	B	B	B	B	G
	220pF (221)	B	B	B	B	B	B	B	B	B	G
	270pF (271)	B	B	B	B	B	B	C	C	C	G
	330pF (331)	B	B	B	B	B	B	C	C	C	G
	390pF (391)	B	B	B	B	B	B	C	C	C	G
	470pF (471)	B	B	B	B	B	B	C	C	C	G
	560pF (561)	B	B	B	B	B	C	D	D	D	G
	680pF (681)	B	B	B	B	B	C	D	D	D	G
	820pF (821)	B	B	B	B	B	C	G	G	G	G
	1,000pF (102)	B	B	B	B	B	C	G	G	G	G
	1,200pF (122)	B	B	B	B	B	C	G	G	G	
	1,500pF (152)	B	B	B	B	B	D	G	G	G	
	1,800pF (182)	B	B	B	B	B	D	G	G	G	
	2,200pF (222)	B	B	B	B	B	D	G	G	G	
	2,700pF (272)	B	B	B	B	B	D	G	G	G	
	3,300pF (332)	B	B	B	B	B	D	G	G	G	
	3,900pF (392)	B	B	B	B	B	D	G	G	G	
	4,700pF (472)	B	B	B	B	B	D	G	G	G	
	5,600pF (562)	B	B	B	B	B	G	G	G	G	
	6,800pF (682)	C	C	C	C	C	G	G	G	G	
	8,200pF (822)	D	D	D	D	D	G	G	G	G	
	0.01μF (103)	D	D	D	D	D	G	G	G	G	

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NP0 Dielectric

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

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Multilayer Ceramic Capacitors

Approval Sheet

X7R Dielectric

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

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Multilayer Ceramic Capacitors

Approval Sheet

X7R Dielectric

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

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

2. For more information about products with special capacitance or other data, please contact WTC local representative.

X7R Dielectric

Multilayer Ceramic Capacitors

Approval Sheet

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

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

2. For more information about products with special capacitance or other data, please contact WTC local representative.

8. PACKAGING STYLE AND QUANTITY

Size	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0201 (0603)	0.30±0.03	L	15k	70k	-	-
0402 (1005)	0.50±0.05	N	10k	50k	-	-
0603 (1608)	0.80±0.07	S	4k	15k	-	-
	0.80±0.15/-0.10	X	4k	15k	-	-
0805 (2012)	0.60±0.10	A	4k	15k	-	-
	0.80±0.10	B	4k	15k	-	-
	1.25±0.10	D	-	-	3k	10k
	1.25±0.20	I	-	-	3k	10k
1206 (3216)	0.80±0.10	B	4k	15k	-	-
	0.95±0.10	C	-	-	3k	10k
	1.15±0.15	J	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	10k
	1.60±0.30/-0.10	P	-	-	2k	9k
1210 (3225)	0.95±0.10	C	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	8k
	2.00±0.20	K	-	-	1k	6k
	2.50±0.30	M	-	-	1k	6k

Unit: pieces



9. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																
1.	Pre-and Post-Stress Electrical Test	---																																																	
2.	High Temperature Exposure (Storage) MIL-STD-202 Method 108	* Test temp.: 150±3°C * Unpowered. * Test time: 1000+24/-0 hrs. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change : X8G/NPO: within ±2.5% or ±0.25pF whichever is larger. X7R: within ±10.00%. * Q/D.F. value: X8G/NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <table><tr><th>Rated vol.</th><th>D.F. ≤</th><th>Exception of D.F. ≤</th></tr><tr><td rowspan="4">≥ 100V</td><td rowspan="4">≤ 3%</td><td>≤ 6% 1206 ≥ 0.47μF</td></tr><tr><td>≤ 7% 1812 ≥ 4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td></tr><tr><td>≤ 7.5% 0603 ≥ 0.068μF;0805 > 0.1μF;1206 ≥ 1μF;1210 ≥ 2.2μF</td></tr><tr><td>≤ 20% 0805 > 0.22μF;1210 ≥ 3.3μF</td></tr><tr><td rowspan="4">50V</td><td rowspan="4">≤ 3%</td><td>≤ 6% 0201(50V);0603 ≥ 0.047μF;0805 ≥ 0.18μF;1206 ≥ 0.47μF</td></tr><tr><td>≤ 7% 1812 ≥ 4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td></tr><tr><td>≤ 10% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF;1210 ≥ 3.3μF</td></tr><tr><td>≤ 20% 0402 ≥ 0.047μF;0603>0.1μF;0805 ≥ 1μF(0805/X7R>0.47μF); 1206 ≥ 2.2μF;1210 ≥ 10μF;</td></tr><tr><td>35V</td><td>≤ 5%</td><td>≤ 20% 0603 ≥ 1μF;0805≥2.2μF;1206 ≥ 2.2μF;1210 ≥ 10μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤ 5%</td><td>≤ 10% 0201 ≥ 0.01μF(0201/X5R=0.01μF;0805 ≥ 1μF;1210 ≥ 10μF*</td></tr><tr><td>≤ 14% 0603 ≥ 0.33μF</td></tr><tr><td>≤ 15% 0201 ≥ 0.1μF(0201/X5R>0.01μF);0603 ≥ 0.47μF; 0402 ≥ 0.10μF(0402/X7R ≥ 0.056μF);0805 ≥ 2.2μF; 1206 ≥ 4.7μF;1210 ≥ 22μF(1210/X5R ≥ 10μF)*</td></tr><tr><td>≤ 20% 0402 ≥ 0.33μF</td></tr><tr><td>16V</td><td>≤ 5%</td><td>≤ 10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">≤ 7.5%</td><td>≤ 15% 0201 ≥ 0.012μF;0402 ≥ 0.22μF (0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF;0805 ≥ 2.2μF;1206 ≥ 2.2μF;1210 ≥ 22μF</td></tr><tr><td>≤ 20% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603/X5R ≥ 10μF;01R5/X5R</td></tr><tr><td>6.3V</td><td>≤ 15%</td><td>≤ 30% 0201 ≥ 0.1μF;0402 ≥ 1μF(0402/X6S ≥ 0.47μF); 0603 ≥ 10μF;0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF</td></tr><tr><td>4V</td><td>≤ 20%</td><td>---</td></tr></table> * I.R.: ≥10GΩ or RxC≥500Ω·F whichever is smaller. Class II (X7R) <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: All X7R;1210≥3.3μF</td><td rowspan="6">1GΩ or RxC ≥ 10 Ω·F whichever is smaller.</td></tr><tr><td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td></tr><tr><td>35V: 0603≥1μF;0805≥2.2μF;1206≥2.2μF;1210≥10μF</td></tr><tr><td>25V: 0201≥0.1uF;0402≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF</td></tr><tr><td>16V: 0201≥0.1uF;0402≥0.22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</td></tr><tr><td>10V: 0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF; 1206≥4.7μF;1210≥47μF</td></tr><tr><td>6.3V; 4V; Size≥1812</td><td></td></tr></table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF	≤ 7% 1812 ≥ 4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤ 7.5% 0603 ≥ 0.068μF;0805 > 0.1μF;1206 ≥ 1μF;1210 ≥ 2.2μF	≤ 20% 0805 > 0.22μF;1210 ≥ 3.3μF	50V	≤ 3%	≤ 6% 0201(50V);0603 ≥ 0.047μF;0805 ≥ 0.18μF;1206 ≥ 0.47μF	≤ 7% 1812 ≥ 4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤ 10% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF;1210 ≥ 3.3μF	≤ 20% 0402 ≥ 0.047μF;0603>0.1μF;0805 ≥ 1μF(0805/X7R>0.47μF); 1206 ≥ 2.2μF;1210 ≥ 10μF;	35V	≤ 5%	≤ 20% 0603 ≥ 1μF;0805≥2.2μF;1206 ≥ 2.2μF;1210 ≥ 10μF	25V	≤ 5%	≤ 10% 0201 ≥ 0.01μF(0201/X5R=0.01μF;0805 ≥ 1μF;1210 ≥ 10μF*	≤ 14% 0603 ≥ 0.33μF	≤ 15% 0201 ≥ 0.1μF(0201/X5R>0.01μF);0603 ≥ 0.47μF; 0402 ≥ 0.10μF(0402/X7R ≥ 0.056μF);0805 ≥ 2.2μF; 1206 ≥ 4.7μF;1210 ≥ 22μF(1210/X5R ≥ 10μF)*	≤ 20% 0402 ≥ 0.33μF	16V	≤ 5%	≤ 10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.012μF;0402 ≥ 0.22μF (0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF;0805 ≥ 2.2μF;1206 ≥ 2.2μF;1210 ≥ 22μF	≤ 20% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603/X5R ≥ 10μF;01R5/X5R	6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF;0402 ≥ 1μF(0402/X6S ≥ 0.47μF); 0603 ≥ 10μF;0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF	4V	≤ 20%	---	Rated voltage	Insulation Resistance	100V: All X7R;1210≥3.3μF	1GΩ or RxC ≥ 10 Ω·F whichever is smaller.	50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	35V: 0603≥1μF;0805≥2.2μF;1206≥2.2μF;1210≥10μF	25V: 0201≥0.1uF;0402≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF	16V: 0201≥0.1uF;0402≥0.22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF	10V: 0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF; 1206≥4.7μF;1210≥47μF	6.3V; 4V; Size≥1812	
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6.3V; 4V; Size≥1812																																																			

* "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. <table><tr><th>Step</th><th>Temp. (°C)</th><th>Time (min.)</th></tr><tr><td>1</td><td>Min. operating temp +0/-3</td><td>5±1</td></tr><tr><td>2</td><td>Max. operating temp +3/-0</td><td>5±1</td></tr></table>	Step	Temp. (°C)	Time (min.)	1	Min. operating temp +0/-3	5±1	2	Max. operating temp +3/-0	5±1	* No remarkable damage. * Cap change : X8G/NPO: within ±2.5% or 0.25pF whichever is larger. X7R: within ±10.0%. * Q/D.F. value: X8G/NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C.																												
		Step	Temp. (°C)	Time (min.)																																				
		1	Min. operating temp +0/-3	5±1																																				
		2	Max. operating temp +3/-0	5±1																																				
		* 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.	X7R:																																					
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* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

Multilayer Ceramic Capacitors

Approval Sheet

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	* Test temp.: 25~65°C * Humidity: 80~100% RH * Test time: 10 cycles, t=24hrs/cycle. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change : X8G/NPO: within ±3.0% or 0.30pF whichever is larger X7R: within ±12.5%. * Q/D.F. value: X8G/NPO: More than 30pF Q≥350 ; 10pF≤C<30pF, Q≥275+2.5C Less than 10pF Q≥200+10C X7R: <table><tr><th>Rated vol.</th><th>D.F. ≤</th><th>Exception of D.F. ≤</th></tr><tr><td rowspan="4">≥ 100V</td><td rowspan="4">≤ 3%</td><td>≤ 6% 1206 ≥ 0.47μF</td></tr><tr><td>≤ 7% 1812 ≥ 4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td></tr><tr><td>≤ 7.5% 0603 ≥ 0.068μF;0805 > 0.1μF;1206 ≥ 1μF;1210 ≥ 2.2μF</td></tr><tr><td>≤ 20% 0805 > 0.22μF;1210 ≥ 3.3μF</td></tr><tr><td rowspan="4">50V</td><td rowspan="4">≤ 3%</td><td>≤ 6% 0201(50V);0603 ≥ 0.047μF;0805 ≥ 0.18μF;1206 ≥ 0.47μF</td></tr><tr><td>≤ 7% 1812 ≥ 4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td></tr><tr><td>≤ 10% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF;1210 ≥ 3.3μF</td></tr><tr><td>≤ 20% 0402 ≥ 0.047μF;0603>0.1μF;0805 ≥ 1μF(0805/X7R>0.47μF); 1206 ≥ 2.2μF;1210 ≥ 10μF;</td></tr><tr><td>35V</td><td>≤ 5%</td><td>≤ 20% 0603 ≥ 1μF;0805≥2.2μF;1206 ≥ 2.2μF;1210 ≥ 10μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤ 5%</td><td>≤ 10% 0201 ≥ 0.01μF(0201/X5R=0.01μF;0805 ≥ 1μF;1210 ≥ 10μF*</td></tr><tr><td>≤ 14% 0603 ≥ 0.33μF</td></tr><tr><td>≤ 15% 0201 ≥ 0.1μF(0201/X5R>0.01μF);0603 ≥ 0.47μF; 0402 ≥ 0.10μF(0402/X7R ≥ 0.056μF);0805 ≥ 2.2μF; 1206 ≥ 4.7μF;1210 ≥ 22μF(1210/X5R ≥ 10μF)*</td></tr><tr><td>≤ 20% 0402 ≥ 0.33μF</td></tr><tr><td>16V</td><td>≤ 5%</td><td>≤ 10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF</td></tr><tr><td rowspan="3">10V</td><td rowspan="3">≤ 7.5%</td><td>≤ 15% 0201 ≥ 0.01μF(0201/X7R ≥ 0.022μF);0402 ≥ 0.033μF; 0603>0.47μF;0805 ≥ 2.2μF;1206 ≥ 4.7μF;1210 ≥ 22μF</td></tr><tr><td>≤ 15% 0201 ≥ 0.012μF;0402 ≥ 0.22μF (0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF;0805 ≥ 2.2μF;1206 ≥ 2.2μF;1210 ≥ 22μF</td></tr><tr><td>≤ 20% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603/X5R ≥ 10μF;01R5/X5R</td></tr><tr><td>6.3V</td><td>≤ 15%</td><td>≤ 30% 0201 ≥ 0.1μF;0402 ≥ 1μF(0402/X6S ≥ 0.47μF); 0603 ≥ 10μF;0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF</td></tr><tr><td>4V</td><td>≤ 20%</td><td>---</td></tr></table> * I.R.: ≥10GΩ or RxC≥500Ω·F whichever is smaller. Class II (X7R) <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: All X7R;1210≥3.3μF</td><td rowspan="7">1GΩ or RxC ≥ 10 Ω·F whichever is smaller.</td></tr><tr><td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td></tr><tr><td>35V: 0603≥1μF;0805≥2.2μF;1206≥2.2μF;1210≥10μF</td></tr><tr><td>25V: 0201≥0.1uF;0402≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF</td></tr><tr><td>16V: 0201≥0.1uF;0402≥0.22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</td></tr><tr><td>10V: 0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF; 1206≥4.7μF;1210≥47μF</td></tr><tr><td>6.3V; 4V; Size≥1812</td></tr></table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF	≤ 7% 1812 ≥ 4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤ 7.5% 0603 ≥ 0.068μF;0805 > 0.1μF;1206 ≥ 1μF;1210 ≥ 2.2μF	≤ 20% 0805 > 0.22μF;1210 ≥ 3.3μF	50V	≤ 3%	≤ 6% 0201(50V);0603 ≥ 0.047μF;0805 ≥ 0.18μF;1206 ≥ 0.47μF	≤ 7% 1812 ≥ 4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤ 10% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF;1210 ≥ 3.3μF	≤ 20% 0402 ≥ 0.047μF;0603>0.1μF;0805 ≥ 1μF(0805/X7R>0.47μF); 1206 ≥ 2.2μF;1210 ≥ 10μF;	35V	≤ 5%	≤ 20% 0603 ≥ 1μF;0805≥2.2μF;1206 ≥ 2.2μF;1210 ≥ 10μF	25V	≤ 5%	≤ 10% 0201 ≥ 0.01μF(0201/X5R=0.01μF;0805 ≥ 1μF;1210 ≥ 10μF*	≤ 14% 0603 ≥ 0.33μF	≤ 15% 0201 ≥ 0.1μF(0201/X5R>0.01μF);0603 ≥ 0.47μF; 0402 ≥ 0.10μF(0402/X7R ≥ 0.056μF);0805 ≥ 2.2μF; 1206 ≥ 4.7μF;1210 ≥ 22μF(1210/X5R ≥ 10μF)*	≤ 20% 0402 ≥ 0.33μF	16V	≤ 5%	≤ 10% 0603 ≥ 0.15μF;0805 ≥ 0.68μF;1206 ≥ 2.2μF;1210 ≥ 4.7μF	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.01μF(0201/X7R ≥ 0.022μF);0402 ≥ 0.033μF; 0603>0.47μF;0805 ≥ 2.2μF;1206 ≥ 4.7μF;1210 ≥ 22μF	≤ 15% 0201 ≥ 0.012μF;0402 ≥ 0.22μF (0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF;0805 ≥ 2.2μF;1206 ≥ 2.2μF;1210 ≥ 22μF	≤ 20% 0201 ≥ 0.1μF;0402 ≥ 1μF;0603/X5R ≥ 10μF;01R5/X5R	6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF;0402 ≥ 1μF(0402/X6S ≥ 0.47μF); 0603 ≥ 10μF;0805 ≥ 4.7μF;1206 ≥ 47μF;1210 ≥ 100μF	4V	≤ 20%	---	Rated voltage	Insulation Resistance	100V: All X7R;1210≥3.3μF	1GΩ or RxC ≥ 10 Ω·F whichever is smaller.	50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF	35V: 0603≥1μF;0805≥2.2μF;1206≥2.2μF;1210≥10μF	25V: 0201≥0.1uF;0402≥0.22μF;0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF	16V: 0201≥0.1uF;0402≥0.22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF	10V: 0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF; 1206≥4.7μF;1210≥47μF	6.3V; 4V; Size≥1812
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Multilayer Ceramic Capacitors

Approval Sheet

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																					
6.	Biased Humidity MIL-STD-202 Method 103	* Test temp.: 85±3°C	* No remarkable damage.																																					
		* Humidity: 85%RH	* Cap change: X8G/NPO: within ±3.0% or 0.30pF whichever is larger. X7R: within ±12.5%																																					
		* Test time: 1000+24/-0 hrs.	* Q/D.F. value:																																					
		* To apply voltage : rated voltage and 1.3~1.5Vdc.	X8G/NPO: C≥30pF , Q≥200 ; C<30pF , Q≥100+10/3C																																					
		(add 100k ohm resistor)	X7R:																																					
		* 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.	<table><tr><th>Rated vol.</th><th>D.F. ≤</th><th>Exception of D.F. ≤</th></tr><tr><td rowspan="4">100V</td><td rowspan="4">≤ 3%</td><td>≤ 6% 1206 ≥ 0.47μF</td></tr><tr><td>≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤ 7.5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td></tr><tr><td>≤ 20% 0805 ≥ 0.22μF; 1210 ≥ 3.3μF</td></tr><tr><td rowspan="4">50V</td><td rowspan="4">≤ 3%</td><td>≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td></tr><tr><td>≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤ 10% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF</td></tr><tr><td>≤ 20% 0402 ≥ 0.047μF; 0603 > 0.1μF; 0805 ≥ 1μF (0805/X7R > 0.47μF); 1206 ≥ 2.2μF; 1210 ≥ 10μF;</td></tr><tr><td>35V</td><td>≤ 5%</td><td>≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤ 5%</td><td>≤ 10% 0201 ≥ 0.01μF (0201/X5R = 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF*</td></tr><tr><td>≤ 14% 0603 ≥ 0.33μF</td></tr><tr><td>≤ 15% 0201 ≥ 0.1μF (0201/X5R > 0.01μF); 0603 ≥ 0.47μF; 0402 ≥ 0.10μF (0402/X7R ≥ 0.056μF); 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF (1210/X5R ≥ 10μF)*</td></tr><tr><td>≤ 20% 0402 ≥ 0.33μF</td></tr><tr><td>16V</td><td>≤ 5%</td><td>≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">≤ 7.5%</td><td>≤ 15% 0201 ≥ 0.01μF (0201/X7R ≥ 0.022μF); 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 20% 0201 ≥ 0.012μF; 0402 ≥ 0.22μF (0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td></tr><tr><td>6.3V</td><td>≤ 15%</td><td>≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; 01R5/X5R</td></tr><tr><td>4V</td><td>≤ 20%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td></tr></table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	100V	≤ 3%	≤ 6% 1206 ≥ 0.47μF	≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 7.5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤ 20% 0805 ≥ 0.22μF; 1210 ≥ 3.3μF	50V	≤ 3%	≤ 6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 7% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 10% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF	≤ 20% 0402 ≥ 0.047μF; 0603 > 0.1μF; 0805 ≥ 1μF (0805/X7R > 0.47μF); 1206 ≥ 2.2μF; 1210 ≥ 10μF;	35V	≤ 5%	≤ 20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤ 5%	≤ 10% 0201 ≥ 0.01μF (0201/X5R = 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF*	≤ 14% 0603 ≥ 0.33μF	≤ 15% 0201 ≥ 0.1μF (0201/X5R > 0.01μF); 0603 ≥ 0.47μF; 0402 ≥ 0.10μF (0402/X7R ≥ 0.056μF); 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF (1210/X5R ≥ 10μF)*	≤ 20% 0402 ≥ 0.33μF	16V	≤ 5%	≤ 10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	10V	≤ 7.5%	≤ 15% 0201 ≥ 0.01μF (0201/X7R ≥ 0.022μF); 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 20% 0201 ≥ 0.012μF; 0402 ≥ 0.22μF (0402/X7R ≥ 0.15μF); 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	6.3V	≤ 15%	≤ 30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603/X5R ≥ 10μF; 01R5/X5R	4V	≤ 20%	0201 ≥ 0.1μF; 0402 ≥ 1μF (0402/X6S ≥ 0.47μF); 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF
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Multilayer Ceramic Capacitors

Approval Sheet

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7.	Operational Life MIL-STD-202 Method 108	* Test temp.: Maximum Operating Temperature $\pm 3^{\circ}\text{C}$ * 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) <table><tr><th>Size</th><th>Dielectric</th><th>Rated Voltage</th><th>Capacitance</th></tr><tr><td>0402</td><td>X7R</td><td>50V</td><td>$C > 0.01\mu\text{F}$</td></tr><tr><td rowspan="2">0603</td><td rowspan="2">X7R</td><td>$\leq 25\text{V}$</td><td>$C \geq 1.0\mu\text{F}$</td></tr><tr><td>50V</td><td>$C > 0.1\mu\text{F}$</td></tr><tr><td rowspan="2">0805</td><td rowspan="2">X7R</td><td>50V</td><td>$C \geq 0.68\mu\text{F}$</td></tr><tr><td>$\geq 100\text{V}$</td><td>$C \geq 0.12\mu\text{F}$</td></tr><tr><td rowspan="2">1206</td><td rowspan="2">X7R</td><td>$\leq 50\text{V}$</td><td>$C > 1.0\mu\text{F}^*$</td></tr><tr><td>100V</td><td>$C \geq 1.0\mu\text{F}$</td></tr><tr><td rowspan="2">1210</td><td rowspan="2">X7R</td><td>$\leq 50\text{V}$</td><td>$C > 1.0\mu\text{F}$</td></tr><tr><td>100V</td><td>$C \geq 1.0\mu\text{F}$</td></tr><tr><td rowspan="2"></td><td rowspan="2"></td><td>$> 100\text{V}$</td><td>$C \geq 0.22\mu\text{F}$</td></tr><tr><td></td><td></td></tr><tr><td rowspan="2">1812</td><td rowspan="2">X7R</td><td>$\leq 50\text{V}$</td><td>$C \geq 4.7\mu\text{F}$</td></tr><tr><td>100V</td><td>$C \geq 1.0\mu\text{F}$</td></tr><tr><td rowspan="2">1825 2220 2225</td><td rowspan="2">X7R</td><td>$\geq 100\text{V}$</td><td>$C \geq 1.0\mu\text{F}$</td></tr><tr><td></td><td></td></tr><tr><td>ALL</td><td>X7R</td><td>ALL</td><td>$C \geq 10\mu\text{F}$</td></tr></table> * Excluding ST31B105/50V $\Rightarrow$ "150% of rated voltage." (3) $400\text{V}/450\text{V}/630\text{V}$: 120% of rated voltage. (4) $U_r \geq 1000\text{V}^*$: 110% of rated voltage. Excluding NP0(1kV): 1206/Cap ≤ 102 & 1210/Cap ≤ 153 ; X7R(1kV) 1210/Cap ≤ 103 $\Rightarrow$ "120% of rated voltage." * 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 $\pm$ 2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24 $\pm$ 2 hrs.	Size	Dielectric	Rated Voltage	Capacitance	0402	X7R	50V	$C > 0.01\mu\text{F}$	0603	X7R	$\leq 25\text{V}$	$C \geq 1.0\mu\text{F}$	50V	$C > 0.1\mu\text{F}$	0805	X7R	50V	$C \geq 0.68\mu\text{F}$	$\geq 100\text{V}$	$C \geq 0.12\mu\text{F}$	1206	X7R	$\leq 50\text{V}$	$C > 1.0\mu\text{F}^*$	100V	$C \geq 1.0\mu\text{F}$	1210	X7R	$\leq 50\text{V}$	$C > 1.0\mu\text{F}$	100V	$C \geq 1.0\mu\text{F}$			$> 100\text{V}$	$C \geq 0.22\mu\text{F}$			1812	X7R	$\leq 50\text{V}$	$C \geq 4.7\mu\text{F}$	100V	$C \geq 1.0\mu\text{F}$	1825 2220 2225	X7R	$\geq 100\text{V}$	$C \geq 1.0\mu\text{F}$			ALL	X7R	ALL	$C \geq 10\mu\text{F}$	* No remarkable damage. * Cap change: X8G/NPO: within $\pm 3.0\%$ or $\pm 0.3\text{pF}$ whichever is larger X7R: within $\pm 12.5\%$. * Q/D.F. value: X8G/NPO: More than 30pF, $Q \geq 350$; 10pF $\leq C < 30\text{pF}$, $Q \geq 275 + 2.5C$ Less than 10pF, $Q \geq 200 + 10C$ X7R: <table><tr><th>Rated vol.</th><th>D.F. $\leq$</th><th>Exception of D.F. $\leq$</th></tr><tr><td rowspan="4">$\geq 100\text{V}$</td><td rowspan="4">$\leq 3\%$</td><td>$\leq 6\%$ 1206 $\geq 0.47\mu\text{F}$</td></tr><tr><td>$\leq 7\%$ 1812 $\geq 4.7\mu\text{F}$; 1825 $\geq 4.7\mu\text{F}$; 2220 $\geq 4.7\mu\text{F}$; 2225 $\geq 4.7\mu\text{F}$</td></tr><tr><td>$\leq 7.5\%$ 0603 $\geq 0.068\mu\text{F}$; 0805 $> 0.1\mu\text{F}$; 1206 $\geq 1\mu\text{F}$; 1210 $\geq 2.2\mu\text{F}$</td></tr><tr><td>$\leq 20\%$ 0805 $> 0.22\mu\text{F}$; 1210 $\geq 3.3\mu\text{F}$</td></tr><tr><td rowspan="4">50V</td><td rowspan="4">$\leq 3\%$</td><td>$\leq 6\%$ 0201(50V); 0603 $\geq 0.047\mu\text{F}$; 0805 $\geq 0.18\mu\text{F}$; 1206 $\geq 0.47\mu\text{F}$</td></tr><tr><td>$\leq 7\%$ 1812 $\geq 4.7\mu\text{F}$; 1825 $\geq 4.7\mu\text{F}$; 2220 $\geq 4.7\mu\text{F}$; 2225 $\geq 4.7\mu\text{F}$</td></tr><tr><td>$\leq 10\%$ 0201 $\geq 0.01\mu\text{F}$; 0402 $\geq 0.012\mu\text{F}$; 1210 $\geq 3.3\mu\text{F}$</td></tr><tr><td>$\leq 20\%$ 0402 $\geq 0.047\mu\text{F}$; 0603 $> 0.1\mu\text{F}$; 0805 $\geq 1\mu\text{F}$ (0805/X7R $> 0.47\mu\text{F}$); 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$;</td></tr><tr><td>35V</td><td>$\leq 5\%$</td><td>$\leq 20\%$ 0603 $\geq 1\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$</td></tr><tr><td rowspan="3">25V</td><td rowspan="3">$\leq 5\%$</td><td>$\leq 10\%$ 0201 $\geq 0.01\mu\text{F}$ (0201/X5R $= 0.01\mu\text{F}$; 0805 $\geq 1\mu\text{F}$; 1210 $\geq 10\mu\text{F}^*$</td></tr><tr><td>$\leq 14\%$ 0603 $\geq 0.33\mu\text{F}$</td></tr><tr><td>0201 $\geq 0.1\mu\text{F}$ (0201/X5R $> 0.01\mu\text{F}$); 0603 $\geq 0.47\mu\text{F}$; 0402 $\geq 0.10\mu\text{F}$ (0402/X7R $\geq 0.056\mu\text{F}$); 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 22\mu\text{F}$ (1210/X5R $\geq 10\mu\text{F}$) $\leq 20\%$ 0402 $\geq 0.33\mu\text{F}$</td></tr><tr><td>16V</td><td>$\leq 5\%$</td><td>$\leq 10\%$ 0603 $\geq 0.15\mu\text{F}$; 0805 $\geq 0.68\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 4.7\mu\text{F}$</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">$\leq 7.5\%$</td><td>$\leq 15\%$ 0201 $\geq 0.01\mu\text{F}$ (0201/X7R $\geq 0.022\mu\text{F}$); 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><tr><td>$\leq 20\%$ 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 1\mu\text{F}$; 0603/X5R $\geq 10\mu\text{F}$; 01R5/X5R</td></tr><tr><td>6.3V</td><td>$\leq 15\%$</td><td>$\leq 30\%$ 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 1\mu\text{F}$ (0402/X6S $\geq 0.47\mu\text{F}$); 0603 $\geq 10\mu\text{F}$; 0805 $\geq 4.7\mu\text{F}$; 1206 $\geq 47\mu\text{F}$; 1210 $\geq 100\mu\text{F}$</td></tr><tr><td>4V</td><td>$\leq 20\%$</td><td>--</td></tr></table> * I.R.: $\geq 1\text{G}\Omega$ or $R_x C \geq 50\Omega \cdot \text{F}$ whichever is smaller. Class-II (X7R) TANCE <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: All X7R; 1210 $\geq 3.3\mu\text{F}$</td><td rowspan="6">1GΩ or $R_x C \geq 10 \Omega \cdot \text{F}$ 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>35V: 0603 $\geq 1\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$</td></tr><tr><td>25V: 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 0.22\mu\text{F}$; 0603 $\geq 2.2\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 10\mu\text{F}$; 1210 $\geq 10\mu\text{F}$</td></tr><tr><td>16V: 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 0.22\mu\text{F}$; 0603 $\geq 1\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 10\mu\text{F}$; 1210 $\geq 47\mu\text{F}$</td></tr><tr><td>10V: 0201 $\geq 47\text{nF}$; 0402 $\geq 0.47\mu\text{F}$; 0603 $\geq 0.47\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 47\mu\text{F}$</td></tr><tr><td>6.3V; 4V; Size ≥ 1812</td><td></td></tr></table>	Rated vol.	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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.

Multilayer Ceramic Capacitors

Approval Sheet

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><tr><th>Rated vol.</th><th>D.F. ≤</th><th colspan="2">Exception of D.F. ≤</th></tr><tr><td rowspan="4">≥ 100V</td><td rowspan="4">≤ 2.5%</td><td>≤ 3%</td><td>1206 ≥ 0.47μF</td></tr><tr><td>≤ 3.5%</td><td>1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</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="4">50V</td><td rowspan="4">≤ 2.5%</td><td>≤ 3%</td><td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td></tr><tr><td>≤ 3.5%</td><td>1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤ 5%</td><td>0201 ≥ 0.01μF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF</td></tr><tr><td>≤ 10%</td><td>0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td>35V</td><td>≤ 3.5%</td><td>≤ 10%</td><td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td rowspan="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/X7R ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">≤ 5%</td><td>≤ 10%</td><td>0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 15%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td></tr><tr><td rowspan="2">6.3V</td><td rowspan="2">≤ 10%</td><td>≤ 15%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td></tr><tr><td>≤ 20%</td><td>0402 ≥ 2.2μF</td></tr><tr><td>4V</td><td>≤ 15%</td><td>--</td><td>--</td></tr></table>	Rated vol.	D.F. ≤	Exception of D.F. ≤		≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF	≤ 3.5%	1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF;	≤ 10%	0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 3.5%	1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF	≤ 10%	0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 7%	0603 ≥ 0.33μF	≤ 10%	0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 12.5%	0402 ≥ 0.33μF	16V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤ 10%	0201/X7R ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	10V	≤ 5%	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF	6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	≤ 20%	0402 ≥ 2.2μF	4V	≤ 15%	--	--
			Rated vol.	D.F. ≤	Exception of D.F. ≤																																																										
			≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF																																																									
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			50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF																																																									
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			35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF																																																									
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16V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF																																																												
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6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF																																																												
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4V	≤ 15%	--	--																																																												
* I.R.: ≥10GΩ or RxC≥500Ω·F whichever is smaller.																																																															
Class II (X7R)																																																															
Rated voltage		Insulation Resistance																																																													
100V: All X7R		10GΩ or RxC≥100 Ω·F whichever is smaller.																																																													
50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF																																																															
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16V: 0201≥0.1μF;0402≥0.22μF;0603≥1μF;0805≥2.2μF;1206≥10μF;1210≥47μF																																																															
10V: 0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF;1206≥4.7μF;1210≥47μF																																																															
6.3V; 4V; Size≥1812																																																															
Rated voltage		Insulation Resistance																																																													
		RxC≥50 Ω·F.																																																													
100V: 1210≥3.3μF																																																															
50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF																																																															
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4V: 0603≥22μF;0805≥47μF;1206≥100μF																																																															

* "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.	* No remarkable damage.																																														
		* Wave: 1/2 sine.	* Cap.: within the specified tolerance.																																														
		* Velocity: 15.4 ft/sec	* Q/D.F. value:																																														
		* Three shocks in each direction should be applied along	X8G/NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C.																																														
		3 mutually perpendicular axes of the test specimen	X7R:																																														
		(18 shocks)	<table><tr><th>Rated vol.</th><th>D.F. ≤</th><th>Exception of D.F. ≤</th></tr><tr><td rowspan="5">≥ 100V</td><td rowspan="5">≤ 2.5%</td><td>≤3% 1206 ≥ 0.47μF</td></tr><tr><td>≤3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF;</td></tr><tr><td>≤10% 0805 > 0.22μF; 1210 ≥ 3.3μF</td></tr><tr><td></td></tr><tr><td rowspan="5">50V</td><td rowspan="5">≤ 2.5%</td><td>≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td></tr><tr><td>≤3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤5% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF</td></tr><tr><td>≤10% 0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td></td></tr><tr><td rowspan="4">35V</td><td rowspan="4">≤ 3.5%</td><td>≤10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td>≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td></tr><tr><td>≤7% 0603 ≥ 0.33μF</td></tr><tr><td>≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤ 3.5%</td><td>≤12.5% 0402 ≥ 0.33μF</td></tr><tr><td>≤5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td></tr><tr><td>≤10% 0201/X7R ≥ 0.022μF; 0402 ≥ 0.15uF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td>≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td></tr><tr><td rowspan="3">16V</td><td rowspan="3">≤ 3.5%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td></tr><tr><td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td></tr><tr><td>0402 ≥ 2.2μF</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">≤ 5%</td><td>---</td></tr><tr><td>---</td></tr><tr><td rowspan="2">6.3V</td><td rowspan="2">≤ 10%</td><td>---</td></tr><tr><td>---</td></tr><tr><td rowspan="2">4V</td><td rowspan="2">≤ 15%</td><td>---</td></tr><tr><td>---</td></tr></table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 100V	≤ 2.5%	≤3% 1206 ≥ 0.47μF	≤3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF;	≤10% 0805 > 0.22μF; 1210 ≥ 3.3μF		50V	≤ 2.5%	≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤5% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF	≤10% 0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF		35V	≤ 3.5%	≤10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤7% 0603 ≥ 0.33μF	≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	25V	≤ 3.5%	≤12.5% 0402 ≥ 0.33μF	≤5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤10% 0201/X7R ≥ 0.022μF; 0402 ≥ 0.15uF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	16V	≤ 3.5%	0201 ≥ 0.1μF; 0402 ≥ 1μF	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	0402 ≥ 2.2μF	10V	≤ 5%	---	---	6.3V	≤ 10%	---	---	4V	≤ 15%	---	---
		Rated vol.	D.F. ≤	Exception of D.F. ≤																																													
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16V	≤ 3.5%	0201 ≥ 0.1μF; 0402 ≥ 1μF																																															
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* "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≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <table><tr><th>Rated vol.</th><th>D.F. ≤</th><th>Exception of D.F. ≤</th></tr><tr><td rowspan="4">≥ 100V</td><td rowspan="4">≤ 2.5%</td><td>≤ 3% 1206 ≥ 0.47μF</td></tr><tr><td>≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤ 5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF;</td></tr><tr><td>≤ 10% 0805 > 0.22μF; 1210 ≥ 3.3μF</td></tr><tr><td rowspan="4">50V</td><td rowspan="4">≤ 2.5%</td><td>≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td></tr><tr><td>≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF</td></tr><tr><td>≤ 10% 0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td>35V</td><td>≤ 3.5%</td><td>≤ 10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤ 3.5%</td><td>≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td></tr><tr><td>≤ 7% 0603 ≥ 0.33μF</td></tr><tr><td>≤ 10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 12.5% 0402 ≥ 0.33μF</td></tr><tr><td>16V</td><td>≤ 3.5%</td><td>≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">≤ 5%</td><td>≤ 10% 0201/X7R ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td></tr><tr><td>6.3V</td><td>≤ 10%</td><td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td></tr><tr><td>4V</td><td>≤ 15%</td><td>≤ 20% 0402 ≥ 2.2μF</td></tr></table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 100V	≤ 2.5%	≤ 3% 1206 ≥ 0.47μF	≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF;	≤ 10% 0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤ 2.5%	≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF	≤ 10% 0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤ 3.5%	≤ 10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 7% 0603 ≥ 0.33μF	≤ 10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 12.5% 0402 ≥ 0.33μF	16V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	10V	≤ 5%	≤ 10% 0201/X7R ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	6.3V	≤ 10%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	4V	≤ 15%	≤ 20% 0402 ≥ 2.2μF
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* "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	* Solder temperature: 260±5°C	* No remarkable damage.	
		* Dipping time: 10±1 sec	* Cap change: X8G/NPO: within ±2.5% or 0.25pF whichever is larger X7R: within ±7.5%	
		* Before initial measurement (X7R only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp.	* Q/D.F. value: X8G/NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R:	
		* Measurement to be made after keeping at room temp. for 24±2 hrs.		
		Rated vol.	D.F. ≤	Exception of D.F. ≤
		≥ 100V	≤ 2.5%	≤ 3% 1206 ≥ 0.47μF
				≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF
				≤ 5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF;
				≤ 10% 0805 > 0.22μF; 1210 ≥ 3.3μF
		50V	≤ 2.5%	≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF
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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/X7R ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF		
10V	≤ 5%	≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF		
		≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF		
6.3V	≤ 10%	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF		
		≤ 20% 0402 ≥ 2.2μF		
4V	≤ 15%	---		
		* I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller. Class II (X7R)		
		Rated voltage	Insulation Resistance	
		100V: All X7R	10GΩ or RxC≥100 Ω-F whichever is smaller.	
		50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF		
		35V: 0805≥2.2μF;1206≥2.2μF;1210≥10μF		
		25V: 0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF		
		16V: 0201≥0.1μF;0402≥0.22μF;0603≥1μF;0805≥2.2μF;1206≥10μF;1210≥47μF		
		10V: 0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF;1206≥4.7μF;1210≥47μF		
		6.3V; 4V; Size≥1812		
		Rated voltage	Insulation Resistance	
			RxC≥50 Ω-F.	
		100V: 1210≥3.3μF		
		50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF		
		35V: 0603≥1μF;		
		25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF		
		16V: 0603≥10μF;0402≥1μF;0201≥0.22μF		
		10V: 0201>0.1μF;0402≥1μF;0603≥10μF;0805≥47μF		
		6.3V: 0201≥0.1μF;0402≥1μF;0603>4.7μF;0805≥47μF;1206≥10μF		
		4V: 0603≥22μF;0805≥47μF;1206≥100μF		

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

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 ±2.5% or 0.25pF whichever is larger X7R: within ±10.0%																																								
		<table><tr><th>Step</th><th>Temp. (°C)</th><th>Time (min.)</th></tr><tr><td>1</td><td>Min. operating temp +0/-3</td><td>15±3</td></tr><tr><td>2</td><td>Max. operating temp +3/-0</td><td>15±3</td></tr></table>	Step	Temp. (°C)	Time (min.)	1	Min. operating temp +0/-3	15±3	2	Max. operating temp +3/-0	15±3	* Q/D.F. value: X8G/NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R:																															
		Step	Temp. (°C)	Time (min.)																																							
		1	Min. operating temp +0/-3	15±3																																							
		2	Max. operating temp +3/-0	15±3																																							
		* Max. transfer time: 20 sec.	<table><tr><th>Rated vol.</th><th>D.F. ≤</th><th>Exception of D.F. ≤</th></tr><tr><td rowspan="4">≥ 100V</td><td rowspan="4">≤ 2.5%</td><td>≤ 3% 1206 ≥ 0.47μF</td></tr><tr><td>≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤ 5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF;</td></tr><tr><td>≤ 10% 0805 ≥ 0.22μF; 1210 ≥ 3.3μF</td></tr><tr><td rowspan="4">50V</td><td rowspan="4">≤ 2.5%</td><td>≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td></tr><tr><td>≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤ 5% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF</td></tr><tr><td>≤ 10% 0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td>35V</td><td>≤ 3.5%</td><td>≤ 10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤ 3.5%</td><td>≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td></tr><tr><td>≤ 7% 0603 ≥ 0.33μF</td></tr><tr><td>≤ 10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 12.5% 0402 ≥ 0.33μF</td></tr><tr><td>16V</td><td>≤ 3.5%</td><td>≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td></tr><tr><td rowspan="4">10V</td><td rowspan="4">≤ 5%</td><td>≤ 10% 0201/X7R ≥ 0.022μF; 0402 ≥ 0.15uF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td></tr><tr><td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td></tr><tr><td>6.3V</td><td>≤ 10%</td><td>≤ 20% 0402 ≥ 2.2μF</td></tr><tr><td>4V</td><td>≤ 15%</td><td>---</td></tr></table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 100V	≤ 2.5%	≤ 3% 1206 ≥ 0.47μF	≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF;	≤ 10% 0805 ≥ 0.22μF; 1210 ≥ 3.3μF	50V	≤ 2.5%	≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 5% 0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF	≤ 10% 0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤ 3.5%	≤ 10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 7% 0603 ≥ 0.33μF	≤ 10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 12.5% 0402 ≥ 0.33μF	16V	≤ 3.5%	≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	10V	≤ 5%	≤ 10% 0201/X7R ≥ 0.022μF; 0402 ≥ 0.15uF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	6.3V	≤ 10%	≤ 20% 0402 ≥ 2.2μF	4V	≤ 15%	---	* I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller. Class II (X7R)
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* "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	* No remarkable damage.																																						
			* Cap.: within the specified tolerance.																																						
			* Q/D.F. value:																																						
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* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

Multilayer Ceramic Capacitors

Approval Sheet

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/NP0) Cap≤1000pF 1.0±0.2Vrms, 1MHz±10% Cap>1000pF 1.0±0.2Vrms, 1KHz±10% Class II: (X7R) Cap ≤10μF, 1.0±0.2Vrms · 1KHz±10% Cap> 10μF, 0.5±0.2Vrms · 120Hz±20% * Insulation Resistance *Test temp.: Room Temperature. 100V:To apply rated voltage for max. 120 sec. ≥200V:To apply rated voltage (Max.500V) for 60 sec. * Dielectric Strength To apply voltage: ≤100 ≥2.5 times VDC 200V~300V ≥2 times VDC 400V~450V ≥1.2 times VDC 500V~999V ≥1.5 times VDC 1000V~3000V ≥1.2 times VDC , duration 1~5 sec, charge and discharge current less than 50mA. * Temperature Coefficient (with no electrical load) Operation temperature: Min. operating temp. to Max. operating temp. at 25°C	* Capacitance within the specified tolerance. * Q/D.F. value: X8G/NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <table><tr><th>Rated vol.</th><th>D.F. ≤</th><th>Exception of D.F. ≤</th></tr><tr><td rowspan="4">≥ 100V</td><td rowspan="4">≤ 2.5%</td><td>≤ 3% 1206 ≥ 0.47μF</td></tr><tr><td>≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤ 5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF;</td></tr><tr><td>≤ 10% 0805 > 0.22μF; 1210 ≥ 3.3μF</td></tr><tr><td rowspan="4">50V</td><td rowspan="4">≤ 2.5%</td><td>≤ 3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td></tr><tr><td>≤ 3.5% 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF</td></tr><tr><td>≤ 10% 0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td>35V</td><td>≤ 3.5%</td><td>≤ 10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤ 3.5%</td><td>≤ 5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td></tr><tr><td>≤ 7% 0603 ≥ 0.33μF</td></tr><tr><td>≤ 10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 12.5% 0402 ≥ 0.33μF</td></tr><tr><td>16V</td><td>≤ 3.5%</td><td>≤ 5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td></tr><tr><td rowspan="3">10V</td><td rowspan="3">≤ 5%</td><td>≤ 10% 0201/X7R ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td></tr><tr><td>6.3V</td><td>≤ 10%</td><td>≤ 15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td></tr><tr><td>4V</td><td>≤ 15%</td><td>≤ 20% 0402 ≥ 2.2μF</td></tr></table> * IR. ≥10GΩ or RxC≥500Ω·F whichever is smaller. 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100V: 1210≥3.3μF	RxC≥50 Ω·F.																																																															
50V: 0402≥0.1μF;0603≥2.2μF;0805≥10μF;1206≥10μF																																																																
35V: 0603≥1μF;																																																																
25V: 0201≥0.1μF;0402≥2.2μF;0603≥10μF;0805≥10μF;1206≥22μF																																																																
16V: 0603≥10μF;0402≥1μF;0201≥0.22μF																																																																
10V: 0201>0.1μF;0402≥1μF;0603≥10μF;0805≥47μF																																																																
6.3V: 0201≥0.1μF;0402≥1μF;0603>4.7μF;0805≥47μF;1206≥10μF																																																																
4V: 0603≥22μF;0805≥47μF;1206≥100μF																																																																

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

Multilayer Ceramic Capacitors

Approval Sheet

No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																																																				
18.	Board Flex AEC-Q200-005	* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 3mm (2mm for X7R) and then the pressure shall be maintained for 60±1 sec. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change : X8G/NPO: within ±5% or 0.5pF whichever is larger X7R: within ±12.5% (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)																																																																																				
19.	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><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F. ≤</th></tr><tr><td rowspan="4">≥ 100V</td><td rowspan="4">≤ 2.5%</td><td>≤ 3%</td><td>1206 ≥ 0.47μF</td></tr><tr><td>≤ 3.5%</td><td>1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</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="4">50V</td><td rowspan="4">≤ 2.5%</td><td>≤ 3%</td><td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td></tr><tr><td>≤ 3.5%</td><td>1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF</td></tr><tr><td>≤ 5%</td><td>0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF</td></tr><tr><td>≤ 10%</td><td>0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td rowspan="4">35V</td><td rowspan="4">≤ 3.5%</td><td>≤ 10%</td><td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td>≤ 5%</td><td>0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td></tr><tr><td>≤ 7%</td><td>0603 ≥ 0.33μF</td></tr><tr><td>≤ 10%</td><td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤ 3.5%</td><td>≤ 12.5%</td><td>0402 ≥ 0.33μF</td></tr><tr><td>≤ 5%</td><td>0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td></tr><tr><td>≤ 10%</td><td>0201/X7R ≥ 0.022μF; 0402 ≥ 0.15uF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td>≤ 15%</td><td>0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td></tr><tr><td rowspan="4">16V</td><td rowspan="4">≤ 3.5%</td><td>≤ 10%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td></tr><tr><td>≤ 15%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td></tr><tr><td>≤ 20%</td><td>0402 ≥ 2.2μF</td></tr><tr><td>≤ 15%</td><td>---</td></tr><tr><td rowspan="4">10V</td><td rowspan="4">≤ 5%</td><td>≤ 10%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td></tr><tr><td>≤ 15%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td></tr><tr><td>≤ 20%</td><td>0402 ≥ 2.2μF</td></tr><tr><td>≤ 15%</td><td>---</td></tr><tr><td rowspan="4">6.3V</td><td rowspan="4">≤ 10%</td><td>≤ 15%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td></tr><tr><td>≤ 20%</td><td>0402 ≥ 2.2μF</td></tr><tr><td>≤ 15%</td><td>---</td></tr><tr><td>≤ 15%</td><td>---</td></tr><tr><td rowspan="4">4V</td><td rowspan="4">≤ 15%</td><td>≤ 15%</td><td>---</td></tr><tr><td>≤ 15%</td><td>---</td></tr><tr><td>≤ 15%</td><td>---</td></tr><tr><td>≤ 15%</td><td>---</td></tr></table>	Rated vol.	D.F.≤	Exception of D.F. ≤		≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF	≤ 3.5%	1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF;	≤ 10%	0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤ 3.5%	1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF	≤ 5%	0201 ≥ 0.01uF; 0402 ≥ 0.012μF; 1210 ≥ 3.3μF	≤ 10%	0402 > 0.047μF; 0603 > 0.1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤ 7%	0603 ≥ 0.33μF	≤ 10%	0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	25V	≤ 3.5%	≤ 12.5%	0402 ≥ 0.33μF	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤ 10%	0201/X7R ≥ 0.022μF; 0402 ≥ 0.15uF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤ 15%	0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	16V	≤ 3.5%	≤ 10%	0201 ≥ 0.1μF; 0402 ≥ 1μF	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF	≤ 20%	0402 ≥ 2.2μF	≤ 15%	---	10V	≤ 5%	≤ 10%	0201 ≥ 0.1μF; 0402 ≥ 1μF	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF	≤ 20%	0402 ≥ 2.2μF	≤ 15%	---	6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	≤ 20%	0402 ≥ 2.2μF	≤ 15%	---	≤ 15%	---	4V	≤ 15%	≤ 15%	---	≤ 15%	---	≤ 15%	---	≤ 15%	---
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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

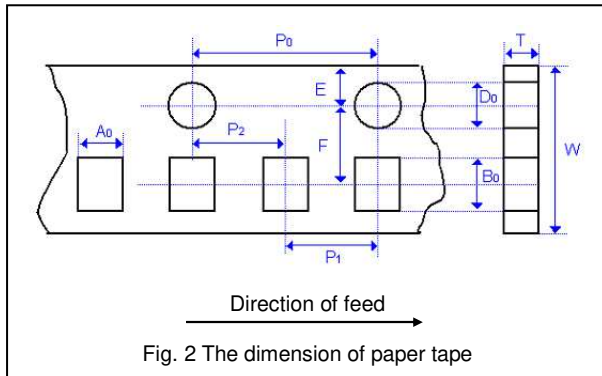


Fig. 2 The dimension of paper tape

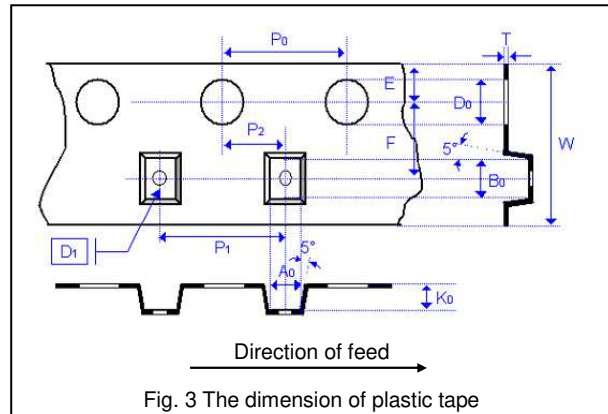


Fig. 3 The dimension of plastic tape

Size	0201	0402	0603	0805			1206			1210				1808			1812		
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	D,F	G,K	M	D,F	G,K	M,U
A ₀	0.40 +/-0.10	0.70 +/-0.20	1.05 +/-0.30	1.50 +/-0.20	1.50 +/-0.20	< 1.80	1.90 +/-0.50	< 2.00	< 2.30	< 3.05	< 3.05	< 3.05	< 3.20	< 2.50	< 2.50	< 3.90	< 3.90	< 3.90	< 3.90
B ₀	0.70 +/-0.10	1.20 +/-0.20	1.80 +/-0.30	2.30 +/-0.20	2.30 +/-0.20	< 2.70	3.50 +/-0.50	< 3.70	< 4.00	< 3.80	< 3.80	< 3.80	< 4.00	< 5.30	< 5.30	< 5.30	< 5.30	< 5.30	< 5.30
T	≤ 0.55	≤ 0.80	≤ 1.20	≤ 1.20	≤ 1.20	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.23 +/-0.1	0.25 +/-0.1	0.25 +/-0.1	0.25 +/-0.1	0.25 +/-0.1	0.25 +/-0.1	0.25 +/-0.1
K ₀	0.44 +/-0.05	-	-	-	-	< 2.50	< 2.50	< 2.50	< 2.50	< 1.50	< 2.00	< 2.50	< 3.20	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 3.50
W	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	8.00 +/-0.30	12.00 +/-0.30	12.00 +/-0.30	12.00 +/-0.30	12.00 +/-0.30	12.00 +/-0.30	12.00 +/-0.30
P ₀	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10	4.00 +/-0.10
10xP ₀	40.00 +/-0.10	40.00 +/-0.10	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20	40.00 +/-0.20
P ₁	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10	2.00 +/-0.10
P ₂	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05	2.00 +/-0.05
D ₀	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0	1.50 +0.1/-0
D ₁	-	-	-	-	-	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10	1.00 +/-0.10
E	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10	1.75 +/-0.10
F	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	3.50 +/-0.05	5.50 +/-0.05	5.50 +/-0.05	5.50 +/-0.05	5.50 +/-0.05	5.50 +/-0.05	5.50 +/-0.05

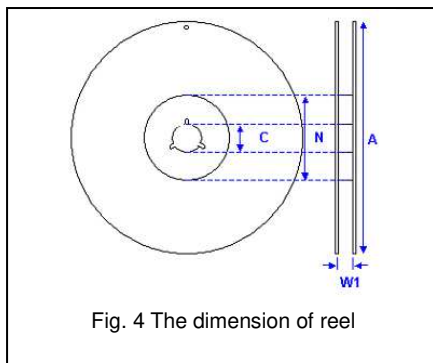
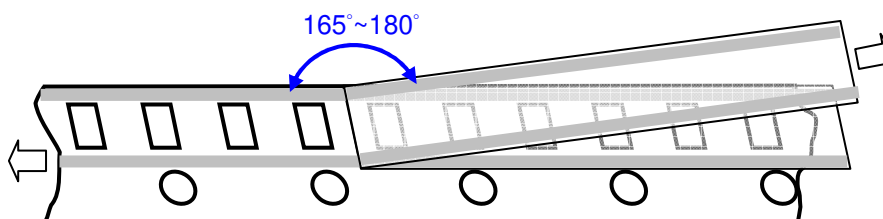


Fig. 4 The dimension of reel

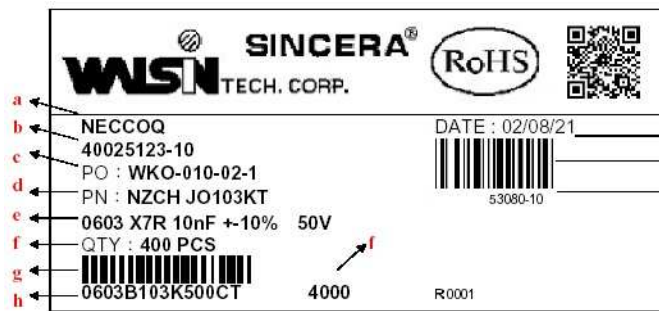
Size	0201, 0402, 0603, 0805, 1206, 1210	1812
Reel size	7", 10", 13"	7"
C	13.0±0.5	13.0±0.5
W ₁	10.0±1.5	10.0±1.5
A	178.0±2.0	178.0±2.0
N	60.0±1.0/-0	60.0±1.0/-0

■ Peeling force (EIA-481)

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



Example of customer label



*Customized label is available upon request

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

Constructions

No.	Name	X8G, 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 (Matt)

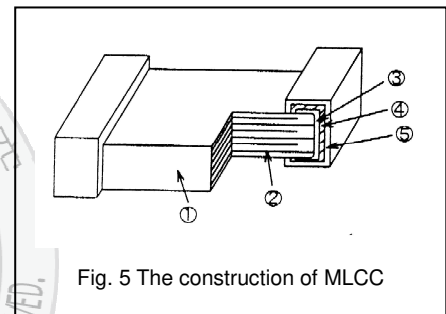


Fig. 5 The construction of MLCC

Storage and handling conditions

- (1) To store products at 5 to 40°C ambient temperature and 20 to 70% related humidity conditions; 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 N_2 within oven are recommended.

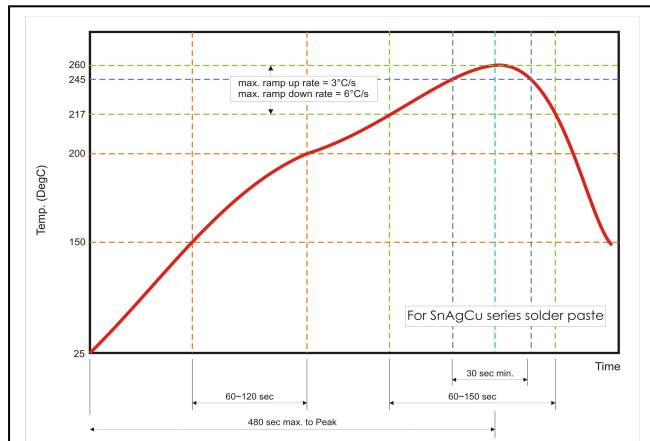


Fig. 5 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.

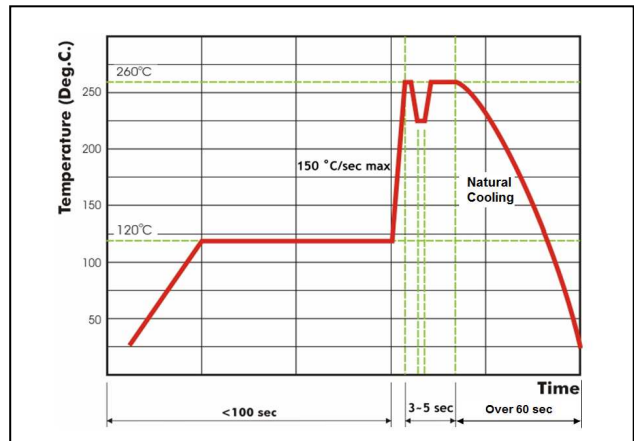


Fig. 6 Recommended wave soldering profile for SMT process with SnAgCu series solder.



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[MT15N390J500CT](#) [MT03N100J500CT](#) [MT03N150J500CT](#) [MT15B104K250CT](#) [MT15B153K250CT](#)
[MT15B331K500CT](#) [MT15B473J250CT](#) [MT15B683K250CT](#) [MT15B821K500CT](#) [MT15N0R1B500CT](#)
[MT15N0R5C500CT](#) [MT15N0R6B500CT](#) [MT15N0R7C500CT](#) [MT15N0R8A500CT](#) [MT15N110J500CT](#)
[MT15N150F500CT](#) [MT15N180F500CT](#) [MT15N1R2A500CT](#) [MT15N1R5A500CT](#) [MT15N240J500CT](#)
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