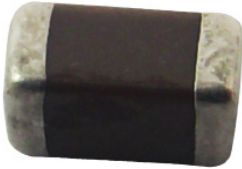


Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

multicompPRO

**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.

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.

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.

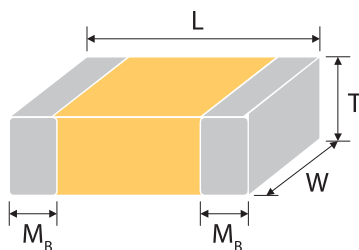
Applications

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

How To Order

MT	18	N	102	J	500	C	T
Series	Size	Dielectric	Capacitance	Tolerance	Rated Voltage	Termination	Packaging
MT= Automotive safe concern (with AEC-Q200 qualification)	03=0201 (0603) 15=0402 (1005) 18=0603 (1608) 21=0805 (2012) 31=1206 (3216) 32=1210 (3225)	N= NP0 (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=10×10 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=10V DC 160=16V DC 250=25V DC 500=50V DC 101=100V DC 201=200V DC 251=250V DC 501=500V DC 631=630V DC 102=1000V DC	C=Cu/Ni/Sn	T=7" reeled G=13" reeled

External Dimensions



The outline of MLCC

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol		Remark	M _B (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		

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Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol		Remark	M _B (mm)
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	#	
	3.2 ±0.2	1.6 ±0.2	1.15 ±0.15	J	#	
			1.6 ±0.2	G	#	
1210 (3225)	3.2 ±0.3	2.5 ±0.2	1.6 ±0.3/-0.1	P	#	0.75 ±0.25
			0.95 ±0.1	C	#	
	3.2 ±0.4	2.5 ±0.3	1.25 ±0.1	D	#	
			1.6 ±0.2	G	#	
			2 ±0.2	K	#	
			2.5 ±0.3	M	#	

Reflow soldering only is recommended.

General Electrical Data

Dielectric	NP0	X7R
Size	0201, 0402, 0603, 0805, 1206, 1210	0402, 0603, 0805, 1206
Capacitance range*	0.1pF to 0.047uF	100pF to 2.2μF
Capacitance tolerance**	Cap≤5pF ^{#1} : A (±0.05pF), B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: B (±0.1pF), C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%)	J (±5%), K (±10%), M (±20%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V, 200V, 250, 500, 630, 1000	
Operating temperature	-55 to +125°C	
Capacitance characteristic	±30ppm/°C	±15%
Termination	Ni/Sn (lead-free termination)	

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

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

NP0: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25°C at ambient temperature

Measured at 1.0±0.2Vrms, 1.0kHz±10% for C10μF; 0.5±0.2Vrms, 120Hz±20% for C>10μF, 30~70% related humidity, 25°C ambient temperature for X7R.

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

Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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Capacitance Range

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	

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Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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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	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		N	N	N	N	N	S	S	S	S	S	S	S
	82pF (820)	L	L	L	L		N	N	N	N	N	S	S	S	S	S	S	S
	100pF (101)	L	L	L	L		N	N	N	N	N	S	S	S	S	S	S	S
	120pF (121)	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		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		
	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)											X	X	X	X			
	1,500pF (152)											X	X	X	X			
	1,800pF (182)											X	X	X	X			
	2,200pF (222)											X	X	X	X			
	2,700pF (272)											X	X	X	X			
	3,300pF (332)											X	X	X	X			
	3,900pF (392)																	
	4,700pF (472)																	
	5,600pF (562)																	
	6,800pF (682)																	
	8,200pF (822)																	
	0.01μF (103)																	

* NP0, 0.1pF product only provide B tolerance.

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

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

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Dielectric		NP0								
Size		0805								
Rated Voltage		10	16	25	50	100	200	250	500	630
Capacitance	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		
	1,500pF (152)	B	B	B	B	B	D	D		
	1,800pF (182)	B	B	B	B	B	D	D		
	2,200pF (222)	B	B	B	B	B	D	D		
	2,700pF (272)	D	D	D	D	D				
	3,300pF (332)	D	D	D	D	D				

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Dielectric		NP0								
Size		0805								
Rated Voltage		10	16	25	50	100	200	250	500	630
Capacitance	3,900pF (392)	D	D	D	D	D				
	4,700pF (472)	D	D	D	D	D				
	5,600pF (562)	D	D	D	D	D				
	6,800pF (682)	D	D	D	D	D				
	8,200pF (822)	D	D	D	D					
	0.01μF (103)	D	D	D	D					

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

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

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Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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Dielectric		NP0									
Size		1206									
Rated Voltage		10	16	25	50	100	200	250	500	630	1000
Capacitance	330pF (331)	B	B	B	B	B	B	C	C	C	G
	390pF (391)	B	B	B	B	B	B	C	C	C	G
	470pF (471)	B	B	B	B	B	C	C	C	C	G
	560pF (561)	B	B	B	B	B	C	D	D	D	G
	680pF (681)	B	B	B	B	B	C	D	D	D	G
	820pF (821)	B	B	B	B	B	C	G	G	G	G
	1,000pF (102)	B	B	B	B	B	C	G	G	G	G
	1,200pF (122)	B	B	B	B	B	C	G	G	G	
	1,500pF (152)	B	B	B	B	B	D	G	G	G	
	1,800pF (182)	B	B	B	B	B	D	G	G	G	
	2,200pF (222)	B	B	B	B	B	D	G	G	G	
	2,700pF (272)	B	B	B	B	B	D	G	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					
	6,800pF (682)	C	C	C	C	C					
	8,200pF (822)	D	D	D	D	D					
	0.01μF (103)	D	D	D	D	D					

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

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

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Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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Dielectric		NP0									
Size		1210									
Rated Voltage		10	16	25	50	100	200	250	500	630	1000
Capacitance	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	
	1,500pF (152)	C	C	C	C	C	D	D	D	D	
	1,800pF (182)	C	C	C	C	C	D	D	D	D	
	2,200pF (222)	C	C	C	C	C	D	D	D	D	
	2,700pF (272)	C	C	C	C	C	D	D	D	D	
	3,300pF (332)	C	C	C	C	C	D	D	D	D	
	3,900pF (392)	C	C	C	C	C	D	D	D	D	
	4,700pF (472)	C	C	C	C	C	G	G			
	5,600pF (562)	C	C	C	C	C	G	G			
	6,800pF (682)	C	C	C	C	C	G	G			
	8,200pF (822)	C	C	C	C	C	G	G			
	0.010μF (103)	C	C	C	C	C	G	G			
	0.012μF (123)	D	D	D	D	D					
	0.015μF (153)	D	D	D	D	D					
	0.018μF (183)	K	K	K	K	K					
	0.022μF (223)	K	K	K	K	K					
	0.027μF (273)	K	K	K	K	K					
	0.033μF (333)	K	K	K	K	K					
	0.039μF (393)	K	K	K	K	K					
	0.047μF (473)	K	K	K	K	K					

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

X7R Dielectric

Dielectric		X7R												
Size		0201				0402				0603				
Rated Voltage		10	16	25	50	10	16	25	50	10	16	25	50	100
Capacitance	100pF (101)	L	L	L	L	N	N	N	N	S	S	S	S	S
	120pF (121)	L	L	L	L	N	N	N	N	S	S	S	S	S
	150pF (151)	L	L	L	L	N	N	N	N	S	S	S	S	S
	180pF (181)	L	L	L	L	N	N	N	N	S	S	S	S	S
	220pF (221)	L	L	L	L	N	N	N	N	S	S	S	S	S
	270pF (271)	L	L	L	L	N	N	N	N	S	S	S	S	S
	330pF (331)	L	L	L	L	N	N	N	N	S	S	S	S	S

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Automotive Capacitors Series (MT)

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Dielectric		X7R												
Size		0201				0402				0603				
Rated Voltage		10	16	25	50	10	16	25	50	10	16	25	50	100
Capacitance	390pF (391)	L	L	L	L	N	N	N	N	S	S	S	S	S
	470pF (471)	L	L	L	L	N	N	N	N	S	S	S	S	S
	560pF (561)	L	L	L	L	N	N	N	N	S	S	S	S	S
	680pF (681)	L	L	L	L	N	N	N	N	S	S	S	S	S
	820pF (821)	L	L	L	L	N	N	N	N	S	S	S	S	S
	1,000pF (102)	L	L	L	L	N	N	N	N	S	S	S	S	S
	1,200pF (122)	L	L	L		N	N	N	N	S	S	S	S	S
	1,500pF (152)	L	L	L		N	N	N	N	S	S	S	S	S
	1,800pF (182)	L	L	L		N	N	N	N	S	S	S	S	S
	2,200pF (222)	L	L	L		N	N	N	N	S	S	S	S	S
	2,700pF (272)	L	L	L		N	N	N	N	S	S	S	S	S
	3,300pF (332)	L	L	L		N	N	N	N	S	S	S	S	S
	3,900pF (392)	L	L	L		N	N	N	N	S	S	S	S	S
	4,700pF (472)	L	L	L		N	N	N	N	S	S	S	S	S
	5,600pF (562)	L	L	L		N	N	N	N	S	S	S	S	S
	6,800pF (682)	L				N	N	N	N	S	S	S	S	S
	8,200pF (822)	L				N	N	N	N	S	S	S	S	S
	0.010μF (103)	L				N	N	N	N	S	S	S	S	S
	0.012μF (123)					N	N	N		S	S	S	S	X
	0.015μF (153)					N	N	N		S	S	S	S	X
	0.018μF (183)					N	N	N		S	S	S	S	X
	0.022μF (223)					N	N	N		S	S	S	S	X
	0.027μF (273)					N	N	N		S	S	S	S	X
	0.033μF (333)					N	N	N		S	S	S	X	X
	0.039μF (393)					N	N	N		S	S	S	X	X
	0.047μF (473)					N	N	N		S	S	S	X	X
	0.056μF (563)					N	N	N		S	S	S	X	
	0.068μF (683)					N	N	N		S	S	S	X	
	0.082μF (823)					N	N	N		S	S	S	X	
	0.10μF (104)					N	N	N		S	S	S	X	
	0.12μF (124)									X	X	X		
	0.15μF (154)									X	X	X	X	
	0.18μF (184)									X	X	X		
	0.22μF (224)									X	X	X	X	
	0.33μF (334)									X	X	X	X	

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

Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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Dielectric		X7R																	
Size		0805									1206								
Rated Voltage (V DC)		10	16	25	50	100	200	250	500	630	10	16	25	50	100	200	250	500	630
Capacitance	100pF (101)	B	B	B	B	B	B	B	B	B						D	D	D	D
	120pF (121)	B	B	B	B	B	B	B	B	B						D	D	D	D
	150pF (151)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	180pF (181)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	220pF (221)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	270pF (271)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	330pF (331)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	390pF (391)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	470pF (471)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	560pF (561)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	680pF (681)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	820pF (821)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	1,000pF (102)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	1,200pF (122)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	1,500pF (152)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	1,800pF (182)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	2,200pF (222)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	2,700pF (272)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	3,300pF (332)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	3,900pF (392)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	D	D
	4,700pF (472)	B	B	B	B	B	B	B	D	D	B	B	B	B	B	D	D	D	D
	5,600pF (562)	B	B	B	B	B	B	B	D	D	B	B	B	B	B	D	D	D	D
	6,800pF (682)	B	B	B	B	B	B	B	D	D	B	B	B	B	B	D	D	D	D
	8,200pF (822)	B	B	B	B	B	B	B	D	D	B	B	B	B	B	D	D	D	D
	0.010μF (103)	B	B	B	B	B	D	D	D	D	B	B	B	B	B	D	D	D	D
	0.012μF (123)	B	B	B	B	B	D	D			B	B	B	B	B	D	D		
	0.015μF (153)	B	B	B	B	B	D	D			B	B	B	B	B	D	D		
	0.018μF (183)	B	B	B	B	B	D	D			B	B	B	B	B	D	D		
	0.022μF (223)	B	B	B	B	B	D	D			B	B	B	B	B	D	D		
	0.027μF (273)	B	B	B	B	D					B	B	B	B	B				
	0.033μF (333)	B	B	B	B	D					B	B	B	B	B				
	0.039μF (393)	B	B	B	B	D					B	B	B	B	B				
	0.047μF (473)	B	B	B	B	D					B	B	B	B	B				
	0.056μF (563)	B	B	B	B	D					B	B	B	B	B				
	0.068μF (683)	B	B	B	B	D					B	B	B	B	B				
	0.082μF (823)	B	B	B	B	D					B	B	B	B	D				
0.10μF (104)	B	B	B	B	D					B	B	B	B	D					
0.12μF (124)	B	B	B	D						B	B	B	B	D					
0.15μF (154)	D	D	D	D						C	C	C	C	G					
0.18μF (184)	D	D	D	D						C	C	C	C	G					
0.22μF (224)	D	D	D	D						C	C	C	C	G					

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Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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Dielectric		X7R																	
Size		0805									1206								
Rated Voltage (V DC)		10	16	25	50	100	200	250	500	630	10	16	25	50	100	200	250	500	630
Capacitance	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)																		
	4.7µF (475)																		
	10µF (106)																		

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

Dielectric		X7R							
Size		1210							
Rated Voltage (V DC)		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

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Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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Dielectric		X7R							
Size		1210							
Rated Voltage (V DC)		10	16	25	50	100	250	500	1000
Capacitance	0.012μF (123)	C	C	C	C	C	C	D	
	0.015μF (153)	C	C	C	C	C	C	D	
	0.018μF (183)	C	C	C	C	C	C	D	
	0.022μF (223)	C	C	C	C	C	C	D	
	0.027μF (273)	C	C	C	C	C	C		
	0.033μF (333)	C	C	C	C	C	C		
	0.039μF (393)	C	C	C	C	C	C		
	0.047μF (473)	C	C	C	C	C	D		
	0.056μF (563)	C	C	C	C	C			
	0.068μF (683)	C	C	C	C	C			
	0.082μF (823)	C	C	C	C	C			
	0.10μF (104)	C	C	C	C	C			
	0.12μF (124)	C	C	C	C				
	0.15μF (154)	C	C	C	C				
	0.18μF (184)	C	C	C	C				
	0.22μF (224)	C	C	C	C				
	0.27μF (274)	C	C	C	C				
	0.33μF (334)	C	C	C	D				
	0.39μF (394)	C	C	C	D				
	0.47μF (474)	C	C	C	D				
	0.56μF (564)	D	D	D	D				
	0.68μF (684)	D	D	D	D				
	0.82μF (824)	D	D	D	D				
	1.0μF (105)	D	D	D	D				
	1.5μF (155)		K						
	2.2μF (225)		K						
	4.7μF (475)								
	10μF (106)								

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

Packaging Style and Quantity

Size	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0201 (0603)	0.3 ±0.03	L	15k	70k	-	-
0402 (1005)	0.5 ±0.05	N	10k	50k	-	-
0603 (1608)	0.8 ±0.07	S	4k	15k	-	-
	0.80±0.15/-0.1	X	4k	15k	-	-

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Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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Size	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0805 (2012)	0.6 ±0.1	A	4k	15k	-	-
	0.8 ±0.1	B	4k	15k	-	-
	1.25 ±0.1	D	-	-	3k	10k
	1.25 ±0.2	I	-	-	3k	10k
1206 (3216)	0.8 ±0.1	B	4k	15k	-	-
	0.95 ±0.1	C	-	-	3k	10k
	1.15 ±0.15	J	-	-	3k	10k
	1.25 ±0.1	D	-	-	3k	10k
	1.6 ±0.2	G	-	-	2k	10k
	1.6 +0.3/-0.1	P	-	-	2k	9k
1210 (3225)	0.95 ±0.1	C	-	-	3k	10k
	1.25 ±0.1	D	-	-	3k	10k
	1.6 ±0.2	G	-	-	2k	-
	2 ±0.2	K	-	-	1k	6k
	2.5 ±0.3	M	-	-	1k	6k

Reliability Test Conditions and Requirements

No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements
1	Pre-and Post-Stress Electrical Test	-	-

Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																								
2	High Temperature Exposure (Storage) MIL-STD-202 Method 108	* Test temp.: 150±3°C * Unpowered. * Test time: 1000+24/-0 hrs. * Measurement to be made after keeping at room temp. for 24±2 hrs.	No remarkable damage. Cap change: NPO: within ±2.5% or ±0.25pF whichever is larger. X7R: within ±10.00%. Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R:																																																								
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Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

multicomp PRO

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>-55°C +0/-3</td><td>5±1</td></tr><tr><td>2</td><td>+125°C +3/-0</td><td>5±1</td></tr></table>	Step	Temp. (°C)	Time (min.)	1	-55°C +0/-3	5±1	2	+125°C +3/-0	5±1	* No remarkable damage. * Cap change: NPO: within ±2.5% or ±0.25pF whichever is larger. X7R: within ±10.0%. * Q/D.F. value: NPO: Cap30≥pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R:																																													
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multicomp PRO

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

Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																																
6.	Biased Humidity MIL-STD-202 Method 103	* Test temp.: 85±3°C * Humidity: 85%RH * Test time: 1000+24/-0 hrs. * To apply voltage: rated voltage and 1.3~1.5V DC. (add 100kΩ resistor) * Before initial measurement (Class II only) : To apply test voltage for 1hr at test temp. and then set for 24±2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change: NPO: within ±3% or ±0.30pF whichever is larger. X7R: within ±12.5% * Q/D.F. value: NPO: C≥30pF , Q≥200 ; C<30pF , Q≥100+10/3C X7R: <table><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr><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>35V</td><td>≤5%</td><td>≤20%</td><td>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%</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≥0.47μF</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><tr><td rowspan="2">10V</td><td rowspan="2">≤7.5%</td><td>≤15%</td><td>0201≥0.012μF;0402≥0.22μF;0603≥0.33μF;0805≥2.2μF;1206≥2.2μF;1210≥22μF</td></tr><tr><td>≤20%</td><td>0201≥0.1μF;0402≥1μF</td></tr><tr><td>6.3V</td><td>≤15%</td><td>≤30%</td><td>0201≥0.1μF;0402≥1μF;0603≥10μF;0805≥4.7μF;1206≥47μF;1210≥100μF</td></tr><tr><td>4V</td><td>≤20%</td><td>-</td><td>-</td></tr></table> * I.R.: ≥1G or RxC≥50Ω-F whichever is smaller. Class II (X7R) for rated voltage test <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: All X7R;1210≥3.3μF</td><td rowspan="7">500MQ or RxC≡5Ω-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	≤7.5%	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	35V	≤5%	≤20%	0603≥1μF;0805≥2.2μF;1206≥2.2μF;1210≥10μF	25V	≤5%	≤10%	0201≥0.01μF;0805≥1μF;1210≥10μF	≤14%	0603≥0.33μF	≤15%	0201≥0.1μF; 0402≥0.056μF;0603≥0.47μF;0805≥2.2μF;1206≥4.7μF;1210≥22μF	≤20%	0402≥0.47μF	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	10V	≤7.5%	≤15%	0201≥0.012μF;0402≥0.22μF;0603≥0.33μF;0805≥2.2μF;1206≥2.2μF;1210≥22μF	≤20%	0201≥0.1μF;0402≥1μF	6.3V	≤15%	≤30%	0201≥0.1μF;0402≥1μF;0603≥10μF;0805≥4.7μF;1206≥47μF;1210≥100μF	4V	≤20%	-	-	Rated voltage	Insulation Resistance	100V: All X7R;1210≥3.3μF	500MQ or RxC≡5Ω-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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Automotive Capacitors Series (MT)

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7.	Operational Life MIL-STD-202 Method 108	* Test temp.: 125±3°C * To apply voltage: (1) 10VUr 250V: 200% of rated voltage. (2) 150% of rated voltage: a) 500V b) 0603/X7R/50V/Cap.>0.1μF c) 0805/X7R/50V/Cap.≥0.68μF (3) 630V≤Ur≤1000V: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±2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change: NPO: within ±3% or ±0.3pF whichever is larger X7R: within ±12.5%. * Q/D.F. value: NPO: More than 30pF, Q≥350 ; 10pF≤C<30pF, Q≥275+2.5C Less than 10pF, Q≥200+10C X7R: <table><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr><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>35V</td><td>≤5%</td><td>≤20%</td><td>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%</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 ≥0.47μF</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><tr><td rowspan="2">10V</td><td rowspan="2">≤7.5%</td><td>≤15%</td><td>0201 ≥0.012μF;0402 ≥0.22μF;0603 ≥0.33μF;0805 ≥2.2μF;1206 ≥2.2μF;1210 ≥22μF</td></tr><tr><td>≤20%</td><td>0201 ≥0.1μF;0402 ≥1μF</td></tr><tr><td>6.3V</td><td>≤15%</td><td>≤30%</td><td>0201 ≥0.1μF;0402 ≥1μF;0603 ≥10μF;0805 ≥4.7μF;1206 ≥47μF;1210 ≥100μF</td></tr><tr><td>4V</td><td>≤20%</td><td>-</td><td>-</td></tr></table> * I.R.: ≥1G or RxC≥50Ω·F whichever is smaller.	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	35V	≤5%	≤20%	0603 ≥1μF;0805≥2.2μF;1206 ≥2.2μF;1210 ≥10μF	25V	≤5%	≤10%	0201 ≥0.01μF;0805 ≥1μF;1210 ≥10μF	≤14%	0603 ≥0.33μF	≤15%	0201 ≥0.1μF; 0402 ≥0.056μF;0603 ≥0.47μF;0805 ≥2.2μF;1206 ≥4.7μF;1210 ≥22μF	≤20%	0402 ≥0.47μF	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	10V	≤7.5%	≤15%	0201 ≥0.012μF;0402 ≥0.22μF;0603 ≥0.33μF;0805 ≥2.2μF;1206 ≥2.2μF;1210 ≥22μF	≤20%	0201 ≥0.1μF;0402 ≥1μF	6.3V	≤15%	≤30%	0201 ≥0.1μF;0402 ≥1μF;0603 ≥10μF;0805 ≥4.7μF;1206 ≥47μF;1210 ≥100μF	4V	≤20%	-	-
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			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 ≧ 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>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 voltage	Insulation Resistance	100V: All X7R;1210≥3.3μF	1GΩ or RxC ≧ 10Ω·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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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																																														
10	Resistance to Solvents MIL-STD-202 Method 215	* Temperature: 25±5°C * Time: 3+0.5/-0 min. * Solvent: Iso-propyl alcohol.	* No remarkable damage. * Cap.: within the specified tolerance. * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <table><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr><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>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 ≧ 0.47μF</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 ≧ 0.033μF; 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 ≧ 0.22μF;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></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	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 ≧ 0.47μF	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 ≧ 0.033μF; 0603>0.47μF;0805 ≧ 2.2μF;1206 ≧ 4.7μF;1210 ≧ 22μF	10V	≧5%	≧10%	0201 ≧ 0.012μF;0402 ≧ 0.22μF;0603 ≧ 0.33μF;0805 ≧ 2.2μF;1206 ≧ 2.2μF;1210 ≧ 22μF	≧15%	0201 ≧ 0.1μF;0402 ≧ 1μF
Rated vol.	D.F.≤	Exception of D.F.≤																																															
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No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements				
			Rated vol.	D.F.≤	Exception of D.F.≤		
			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.: ≥10G or RxC≥500-F whichever is smaller. Class II (X7R)				
			Rated voltage			Insulation Resistance	
			100V: All X7R			10GΩ or RxC ≧ 10Ω-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: 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				
			Rated voltage			Insulation Resistance	
			100V: 1210≥3.3μF			RxC≥50Ω-F.	
			50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF				
			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				
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: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R:				
			Rated vol.	D.F.≤	Exception of D.F.≤		
			≧100V	≧2.5%	≧3%	1206 ≧ 0.47μF	
					≧5%	0603 ≧ 0.068μF;0805>0.1μF;1206 ≧ 1μF;1210 ≧ 2.2μF	
					≧10%	0805>0.22μF;1210 ≧ 3.3μF	
			50V	≧2.5%	≧3%	0201(50V);0603 ≧ 0.047μF;0805 ≧ 0.18μF; 1206 ≧ 0.47μF	
					≧5%	0201 ≧ 0.01uF;1210 ≧ 3.3μF	
					≧10%	0402 ≧ 0.012μF;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	

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No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements				
			Rated vol.	D.F.≤	Exception of D.F.≤		
			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 ≧ 0.033μF; 0603>0.47μF; 0805 ≧ 2.2μF;1206 ≧ 4.7μF;1210 ≧ 22μF	
			10V	≤5%	≤10%	0201 ≧ 0.012μF;0402 ≧ 0.22μF; 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.: ≥10G or RxC≥500-F whichever is smaller.				
			Class II (X7R)				
			Rated voltage			Insulation Resistance	
			100V: All X7R			10GΩ or RxC ≧ 10Ω-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: 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				
			Rated voltage			Insulation Resistance	
			100V: 1210≥3.3μF			RxC≥50Ω-F.	
			50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF				
			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				

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No	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																																		
13.	Resistance to Soldering Heat MIL-STD-202 Method 210	* Solder temperature: 260±5°C * Dipping time: 10±1 sec * Before initial measurement (X7R only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap change: NPO: within ±2.5% or 0.25pF whichever is larger X7R: within ±7.5% * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <table><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr><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>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 ≥0.47μF</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 ≥0.033μF; 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 ≥0.22μF;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> * I.R.:≥10G or RxC≥500-F whichever is smaller. Class II (X7R) <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: All X7R</td><td rowspan="7">10GΩ or RxC ≥ 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>35V: 0603≥1μF;0805≥2.2μF;1206≥2.2μF;1210≥10μF</td></tr><tr><td>25V: 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	≤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	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 ≥0.47μF	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 ≥0.033μF; 0603>0.47μF;0805 ≥2.2μF;1206 ≥4.7μF;1210 ≥22μF	10V	≤5%	≤10%	0201 ≥0.012μF;0402 ≥0.22μF;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 voltage	Insulation Resistance	100V: All X7R	10GΩ or RxC ≥ 10Ω-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: 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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Automotive Capacitors Series (MT)

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14.	Thermal Shock MIL-STD-202 Method 107	Step Temp. (°C) Time (min.) <table><tr><td>1</td><td>-55°C +0/-3</td><td>15±3</td></tr><tr><td>2</td><td>+125°C +3/-0</td><td>15±3</td></tr></table> * Conduct 300 cycles according to the temperatures and time. * Max. transfer time: 20 sec. * Before initial measurement (X7R only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs.	1	-55°C +0/-3	15±3	2	+125°C +3/-0	15±3	* No remarkable damage. * Cap change: NPO: within ±2.5% or 0.25pF whichever is larger X7R: within ±10.0% * Q/D.F. value: NPO: Cap≥30pF, Q≥1000 ; Cap<30pF, Q≥400+20C. X7R: <table><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr><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>35V</td><td>≤5%</td><td>≤20%</td><td>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%</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≥0.47μF</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><tr><td rowspan="2">10V</td><td rowspan="2">≤7.5%</td><td>≤15%</td><td>0201≥0.012μF;0402≥0.22μF; 0603≥0.33μF;0805≥2.2μF;1206≥2.2μF;1210≥22μF</td></tr><tr><td>≤20%</td><td>0201≥0.1μF;0402≥1μF</td></tr><tr><td>6.3V</td><td>≤15%</td><td>≤30%</td><td>0201≥0.1μF;0402≥1μF;0603≥10μF; 0805≥4.7μF;1206≥47μF;1210≥100μF</td></tr><tr><td>4V</td><td>≤20%</td><td>-</td><td>-</td></tr></table> * I.R.: ≥10G or RxC≥500-F whichever is smaller.	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	35V	≤5%	≤20%	0603≥1μF;0805≥2.2μF;1206≥2.2μF;1210≥10μF	25V	≤5%	≤10%	0201≥0.01μF;0805≥1μF;1210≥10μF	≤14%	0603≥0.33μF	≤15%	0201≥0.1μF; 0402≥0.056μF;0603≥0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF	≤20%	0402≥0.47μF	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	10V	≤7.5%	≤15%	0201≥0.012μF;0402≥0.22μF; 0603≥0.33μF;0805≥2.2μF;1206≥2.2μF;1210≥22μF	≤20%	0201≥0.1μF;0402≥1μF	6.3V	≤15%	≤30%	0201≥0.1μF;0402≥1μF;0603≥10μF; 0805≥4.7μF;1206≥47μF;1210≥100μF	4V	≤20%	-	-
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			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 ≧ 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>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 voltage	Insulation Resistance	100V: All X7R;1210≥3.3μF	1GΩ or RxC ≧ 10Ω·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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15.	ESD AEC-Q200-002	Per AEC-Q200-002	* No remarkable damage. * Cap.: within the specified tolerance. * Q/D.F. value: 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="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>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 ≧ 0.47μF</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 ≧ 0.033μF; 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 ≧ 0.22μF;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	≤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	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 ≧ 0.47μF	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 ≧ 0.033μF; 0603>0.47μF;0805 ≧ 2.2μF;1206 ≧ 4.7μF;1210 ≧ 22μF	10V	≤5%	≤10%	0201 ≧ 0.012μF;0402 ≧ 0.22μF;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%	-	-
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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.																							
17.	Electrical Characterization	* Capacitance * Q/ D.F. (Dissipation Factor) *Test temp.: Room Temperature. Class I: (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%	* Capacitance within the specified tolerance. * Q/D.F. value: 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="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></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			
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No.	AEC-Q200 Test Item	AEC-Q200 Test Condition	Requirements																																																																
		* Insulation Resistance *Test temp.: Room Temperature. *To apply rated voltage(500V max.) for max. 120 sec. * Dielectric Strength To apply voltage: ≤100 ≥2.5 times VDC 200V~300V ≥2 times VDC 400V~450V ≥1.2 times VDC 500V~999V ≥1.5 times VDC 1000V~3000V ≥1.2 times VDC , duration 1~5 sec, charge and discharge current less than 50mA. * Temperature Coefficient (with no electrical load) Operation temperature: -55~125°C at 25°C	<table><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></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 ≧ 0.47μF</td></tr><tr><td>16V</td><td>≦ 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></td><td></td><td>≦ 10%</td><td>0201 ≧ 0.022μF;0402 ≧ 0.033μF; 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 ≧ 0.22μF; 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.≤		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 ≧ 0.47μF	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 ≧ 0.033μF; 0603>0.47μF; 0805 ≧ 2.2μF;1206 ≧ 4.7μF;1210 ≧ 22μF	10V	≦ 5%	≦ 10%	0201 ≧ 0.012μF;0402 ≧ 0.22μF; 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%	-	-	* IR. ≥10G or RxC≥500-F whichever is smaller. Class II (X7R) <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: All X7R</td><td rowspan="7">10GΩ or RxC ≧ 100Ω-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: 0402≧0.22μF;0603≧2.2μF;0805≧2.2μF; 1206≧10μF;1210≧10μF</td></tr><tr><td>16V: 0201≧0.1μF;0402≧0.22μF;0603≧1μF;0805≧2.2μF; 1206≧10μF;1210≧47μF</td></tr><tr><td>10V: 0201≧47nF;0402≧0.47μF;0603≧0.47μF;0805≧2.2μF; 1206≧4.7μF;1210≧47μF</td></tr><tr><td>6.3V; 4V; Size≧1812</td></tr></table> <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: 1210≧3.3μF</td><td rowspan="8">RxC≧50Ω-F.</td></tr><tr><td>50V: 0402>0.01μF;0603≧1μF;0805≧1μF;1206≧4.7μF</td></tr><tr><td>35V: 0603≧1μF</td></tr><tr><td>25V: 0201≧0.1μF;0402≧2.2μF;0603≧10μF;0805≧10μF;1206≧22μF</td></tr><tr><td>16V: 0603≧10μF;0402≧1μF;0201≧0.22μF</td></tr><tr><td>10V: 0201>0.1μF;0402≧1μF;0603≧10μF;0805≧47μF</td></tr><tr><td>6.3V: 0201≧0.1μF;0402≧1μF;0603>4.7μF;0805≧47μF;1206≧10μF</td></tr><tr><td>4V: 0603≧22μF;0805≧47μF;1206≧100μF</td></tr></table>	Rated voltage	Insulation Resistance	100V: All X7R	10GΩ or RxC ≧ 100Ω-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: 0402≧0.22μF;0603≧2.2μF;0805≧2.2μF; 1206≧10μF;1210≧10μF	16V: 0201≧0.1μF;0402≧0.22μF;0603≧1μF;0805≧2.2μF; 1206≧10μF;1210≧47μF	10V: 0201≧47nF;0402≧0.47μF;0603≧0.47μF;0805≧2.2μF; 1206≧4.7μF;1210≧47μF	6.3V; 4V; Size≧1812	Rated voltage	Insulation Resistance	100V: 1210≧3.3μF	RxC≧50Ω-F.	50V: 0402>0.01μF;0603≧1μF;0805≧1μF;1206≧4.7μF	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
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		* Dielectric strength No evidence of damage or flash over during test. * Temperature Coefficient Capacitance Change: NPO: Within ±30ppm/°C X7R: Within ±15%																																																																	

Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

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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: 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: 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>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 ≥ 0.47μF</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 ≥ 0.033μF; 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 ≥ 0.22μF; 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> </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	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 ≥ 0.47μF	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 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	10V	≤ 5%	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.22μF; 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%	-	-
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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.

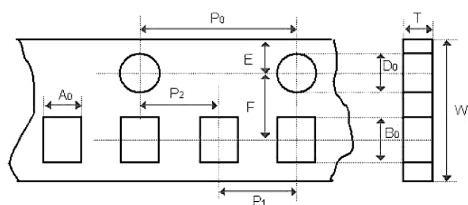
Multilayer Ceramic Capacitors

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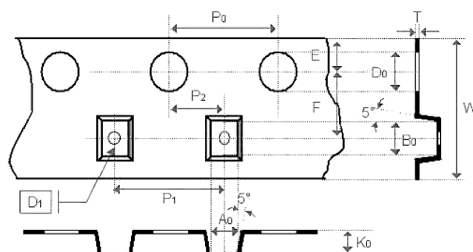
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Appendices

Tape & Reel Dimensions

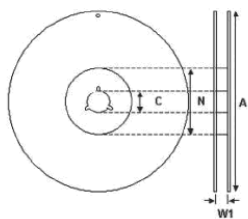


The dimension of paper tape



The dimension of plastic tape

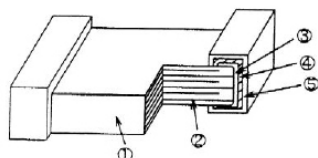
Size	0201	0402	0603	0805			1206			1210		
Thickness	L	N,E	S,H,X	A,H	B,T	D,I	B,T	C,J,D	G,P	T	C,D,G,K	M
A0	0.4 ±0.1	0.7 ±0.2	1.05 ±0.3	1.5 ±0.2	1.5 ±0.2	< 1.8	1.9 ±0.5	< 2	<2.3	< 3.05	< 3.05	< 3.2
B0	0.7 ±0.1	1.2 ±0.2	1.8 ±0.3	2.3 ±0.20	2.3 ±0.2	< 2.7	3.5 ±0.50	< 3.7	< 4	< 3.8	< 3.8	<4
T	≤0.55	≤0.8	≤1.2	≤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



The dimension of reel

Size	0201, 0402, 0603, 0805, 1206, 1210		
Reel size	7"	10"	13"
C	13 ±0.5	13 ±0.5	13 ±0.5
W1	10 ±1.5	10 ±1.5	10 ±1.5
A	178 ±2	250 ±2	330 ±2
N	60 +1.0/-0	50 min	50 min

Constructions



No.	Name	NPO	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)

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Multilayer Ceramic Capacitors

Automotive Capacitors Series (MT)

multicompPRO

Storage and handling conditions

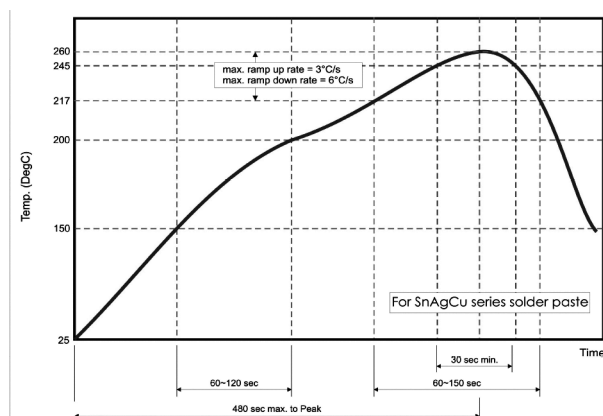
- (1) To store products at 5°C to 40°C ambient temperature and 20 to 70% related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

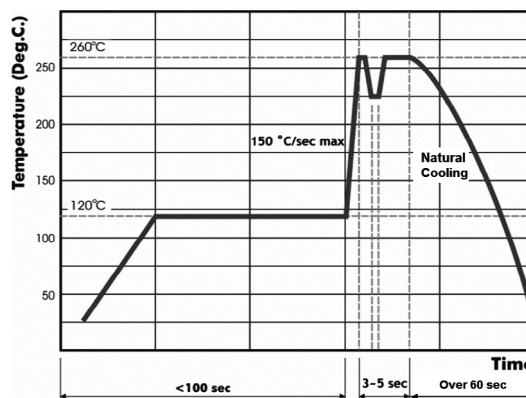
- a. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- b. In corrosive atmosphere, solderability might be degraded,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

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.



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



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

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