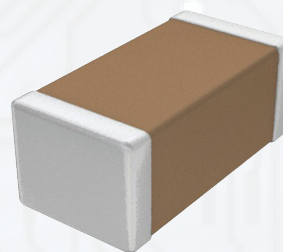


AUTOMOTIVE MULTILAYER CERAMIC CHIP CAPACITORS

- GMT SERIES -

SCOPE

- Consists of conducting material and electrodes - to achieve chip-type SMT and small size, high density and high efficiency ceramic condensers are used
- Provide product dielectrics provides product with high electrical precision, stability and reliability
- Assured quality performance in automotive applications qualified to AEC-Q200



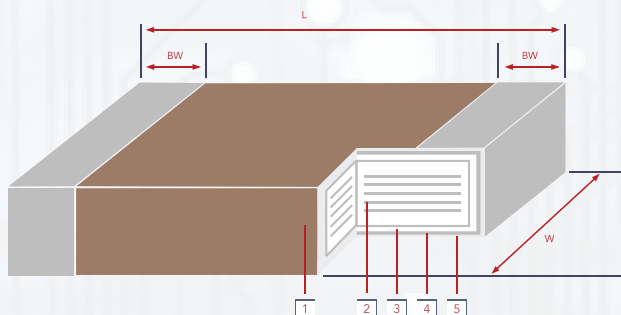
APPLICATIONS

- For navigation and information equipment
- For entertainment equipment
- For comfortable equipment
- For automotive electronic equipment

FEATURES

- Wide selection of sizes available
- High capacitance in given case size
- MLCC with lead free termination (pure Tin)
- Meets AEC-Q200 requirement

CONSTRUCTION AND DIMENSIONS



NO.	NAME	CLASS I DIELECTRIC	CLASS II DIELECTRIC
1	Ceramic Material	CaZrO3	BaTiO3
2	Inner Electrode	Ni	Ni
3	Termination	Inner Layer	Cu
4		Middle Layer	Ni
5		Outer Layer	Sn

PART NUMBER

GMT	04	CG	102	J	50	NT	4
PRODUCT TYPE	DIMENSIONS	DIELECTRIC	CAPACITANCE	TOLERANCE	RATED VOLTAGE	PACKAGING CODE	REEL SIZE
AECQ200 Qualified	02 - 0201 04 - 0402 10 - 0603 21 - 0805 31 - 1206 32 - 1210	CG - NPO / COG X8G - X8G X7R - X7R X5R - X5R	0R5: 0.5pF 5R0: 5pF 100: 10pF 101: 100pF 102: 1000pF 103: .01uF 104: 1uF 105: 1.0uF 106: 10uF	A: ± 0.05pF B: ± 0.1pF C: ± 0.25pF D: ± 0.5pF F: ± 1% G: ± 2% J: ± 5% K: ± 10% M: ± 20%	6R3: 6.3 VDC 10: 10 VDC 16: 16 VDC 25: 25 VDC 50: 50 VDC 100: 100 VDC 200: 200 VDC 250: 250 VDC 630: 630 VDC 1K0: 1000 VDC	NT: Tape & Reel	1: 1K reel 3: 3K reel 4: 4K reel 6: 6K reel 8: 8K reel 10: 10K reel 15: 15K reel **See packaging quantity on page 2 for more info

STANDARD ELECTRICAL SPECIFICATIONS

DIELECTRIC	NP0	X7R	X5R
SIZE	0201, 0402, 0603, 0805, 1206, 1210	0201, 0402, 0603, 0805, 1206, 1210	0402, 0603, 0805, 1206
CAPACITANCE RANGE*	0.1pF to 0.047µF	100PF to 10µF	100pF to 10µF
CAPACITANCE TOLERANCE**	Cap≤5pF: A (±0.5pF), B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: B (±0.1pF), C (±0.25pF), D (±0.25pF) Cap≥10pF: F (±1%), G (±2%), J (±5%)	J (±5%), K (±10%), M (±20%)	J (+/-5%), K (+/-10%), M (+/-20%)
RATED VOLTAGE (WVDC)	10, 16V, 25V, 35V, 50V, 100V, 250V, 500V, 630V, 1000V		10V, 16V, 25V, 35V 50V
OPERATING TEMPERATURE	-55 TO +125°C		-55-85C
CAPACITANCE CHARACTERISTIC	±30ppm/ °C	±15%	±15%
TERMINATION			



DIELECTRIC		X5R																																						
DIMENSION (MM)		GMT02 (0201)				GMT04 (0402)				GMT10 (0603)				GMT21 (0805)				GMT31 (1206)				GMT32 (1210)																		
LENGTH (L)		0.60 ± 0.03				1.00 ± 0.10				1.60 ± 0.15				2.00 ± 0.20				3.20 ± 0.20				3.20 ± 0.30																		
WIDTH (W)		0.30 ± 0.03				0.50 ± 0.10				0.80 ± 0.15				1.25 ± 0.20				1.60 ± 0.20				2.5 ± 0.30																		
BW		0.15 ± 0.05				0.25±0.05 -0.10				0.40 ± 0.15				0.50 ± 0.20				0.60 ± 0.20				0.75 ± 0.35																		
RATED VOLTAGE		10	16	25	50	10	16	25	35	50	6.3	10	16	25	35	50	10	16	25	35	50	16	25	35	50	10	16	25	35	50	100									
100	101																																							
120	121																																							
150	151																																							
180	181																																							
220	221															B																								
270	271																																							
330	331															B																								
390	391																																							
470	471															B																								
560	561																																							
680	681															B																								
820	821																																							
1,000	102															B													D2											
1,200	122																																							
1,500	152															B													D2											
1,800	182																																							
2,200	222															B													D2											
2,700	272																																							
3,300	332															B													D2											
3,900	392																																							
4,700	472															B													D2											
5,600	562																																							
6,800	682															B													D2											
8,200	822																																							
0.010µF	103															B	B	B											D2											
0.012	123																																							
0.015	153															B	B	B											D2											
0.018	183															B																								
0.022	223															B	B	B											D2											
0.027	273																																							
0.033	333															B	B	B	B										D2											
0.039	393																																							
0.047	473															B	B	B	B										D2											
0.056	563																																							
0.068	683																												D2											
0.082	823															B	B	B	B																					
0.10	104															B	B	B	B									D2	D2											
0.12	124																																							
0.15	154															B	B											D2	D2	D2	F2									
0.18	183																																							
0.22	224															B	B											D2	D2	D2	D2	F2								
0.27	274																																							
0.33	334																											D2	D2	D2	D2	F2								
0.39	394																																							
0.47	474															B	B	B										D2	D2	D2	D2	F2	F2	F2	H					
0.56	564																																							
0.68	684																											D2	D2	D2	D2	D2	F2	F2	F2	F2	H			
0.82	824																B																							
1.00	105															B	B	B										D2	D2	D2	D2	D2	F2	F2	F2	F2	H			
1.5	155																											D2	D2				F2	F2	F2	F2	F2	H	H	H
2.2	225																											D2	D2				F2	F2	F2	F2	F2	H	H	H
3.3	335																											D2	D2				F2	F2	F2	F2	F2	H	H	H
4.70	475																											D2				F2	F2	F2	F2	F2	H	H	H	H
6.8	685																															F2					H	H	H	H
10	106																															F2	H	H			H	H	H	I
15	156																																							
22	226																																							
47	476																																					L		
100	107																																				L			

CAP. RANGE

A	A2	B	C	C2	D	D2	E	E2	F	F2	G	H	H2	I	J	K	L
0.33mm	0.50mm	0.55mm	0.70mm	0.80mm	0.87mm	0.90mm	0.95mm	1.00mm	1.05mm	1.25 mm	1.35mm	1.45mm	1.60 mm	1.8 mm	1.9mm	2.2mm	2.8mm



RELIABILITY TEST CONDITIONS AND DIMENSIONS

NO.	TEST ITEM	TEST CONDITION	REQUIREMENTS																																																																				
1.	Pre-and Post-Stress Electrical Test	---																																																																					
2.	High Temperature Exposure (Storage) MIL-STD-202 Method 108	- Test temp.: 125±3°C - Un-powered - Test Time: 1000+24/-0 hrs - Measurement to be made after keeping at room temp. for 24±2 hrs.	- No remarkable damage. - Cap Change: NPO: within ±2.5% or ±0.25pF whichever is larger X7R: within ±10.00% -Q/D.F. value: NPO: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>RATED VOL.</th> <th>D.F.≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</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>≤6%</td> <td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤3%</td> <td>≤10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R> 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td>≤5%</td> <td>≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <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 rowspan="3">25V</td> <td>≤5%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td>≤10%</td> <td>0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 120 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤5%</td> <td>≤15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤7.5%</td> <td>≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="2">10V</td> <td>≤7.5%</td> <td>≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤15%</td> <td>≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>---</td> </tr> </tbody> </table> <p>* I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller.</p> <p>CLASS II X7R:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="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 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V, 4V, Size ≥ 1812</td> </tr> </tbody> </table>	RATED VOL.	D.F.≤	EXCEPTION OF D.F. ≤	≥100V	≤6%	1206 ≥ 0.47μF	≤7.5%	0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤20%	0805 > 0.22μF; 1210 ≥ 3.3μF	≥50V	≤6%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤3%	≤10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤20%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R> 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤5%	≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤10%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤14%	0603 ≥ 0.33μF	25V	≤5%	≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤20%	0402 ≥ 0.33μF	≤10%	0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 120 ≥ 2.2μF; 1210 ≥ 4.7μF	16V	≤5%	≤15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤7.5%	≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤20%	0201 ≥ 0.1μF; 0402 ≥ 1μF	10V	≤7.5%	≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤15%	≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	6.3V	≤15%	≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	4V	≤20%	---	RATED VOLTAGE	INSULATION RESISTANCE	100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.	50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF	6.3V, 4V, Size ≥ 1812									
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3.	Destructive Physical Analysis EIA-469	-Per EIA-469	-No defects or abnormalities																																																																				
4.	Temperature Cycling JESD22 Method JA-104	- Conduct 1000 cycles according to the temperatures and time. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th>STEP</th> <th>TEMP. (°C)</th> <th>TIME (MIN.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C ±0/-3</td> <td>5 ±1</td> </tr> <tr> <td>2</td> <td>+125°C ±3/-0</td> <td>5 ±1</td> </tr> </tbody> </table> - Before initial measurement (X7R only): Perform 150+0/-10° for 1 hr and then set for 24±2 hrs at room temp. - Measurement to be made after keeping at room temp for 24±2hrs.	STEP	TEMP. (°C)	TIME (MIN.)	1	-55°C ±0/-3	5 ±1	2	+125°C ±3/-0	5 ±1	- No remarkable damage. - Cap Change: NPO: within ±2.5% or ±0.25pF whichever is larger X7R: within ±10.0% -Q/D.F. value: NPO: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>RATED VOL.</th> <th>D.F.≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</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>≤6%</td> <td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤3%</td> <td>≤10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R> 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td>≤5%</td> <td>≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <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 rowspan="3">25V</td> <td>≤5%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td>≤10%</td> <td>0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 120 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤5%</td> <td>≤15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤7.5%</td> <td>≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="2">10V</td> <td>≤7.5%</td> <td>≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤15%</td> <td>≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>---</td> </tr> </tbody> </table> <p>* I.R.: ≥10GΩ or RxC≥500Ω-F whichever is smaller.</p> <p>CLASS II X7R:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="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 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V, 4V, Size ≥ 1812</td> </tr> </tbody> </table>	RATED VOL.	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RELIABILITY TEST CONDITIONS AND DIMENSIONS

NO.	TEST ITEM	TEST CONDITION	REQUIREMENTS																																																																								
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: NPO: within ±3.0% or ±0.30pF whichever is larger X7R: within ±12.5% -Q/D.F. value: NPO: More than 30pF, Q≥350; 10pF≤C≤30pF, Q≥275+2.5C Less than 10pF Q≥200+10C X7R: <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F.≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</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>≤6%</td> <td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R> 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td>≤20%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <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 rowspan="3">25V</td> <td>≤5%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤15%</td> <td>0201 ≥ 0.022μF; 0402 ≥ 0.033μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤10%</td> <td>0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 120 ≥ 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>≤20%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">10V</td> <td>≤7.5%</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>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 4.7μF; 1210 ≥ 100μF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>---</td> </tr> </tbody> </table> <p>*I.R.: ≥10GΩ OR RxC≥500Ω-F whichever is smaller.</p> <p>CLASS II X7R:</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="10">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 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> </tr> </tbody> </table>	RATED VOL.	D.F.≤	EXCEPTION OF D.F. ≤	≥100V	≤6%	1206 ≥ 0.47μF	≤7.5%	0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤20%	0805 > 0.22μF; 1210 ≥ 3.3μF	≥50V	≤6%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤10%	0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤20%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R> 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤20%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤10%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤14%	0603 ≥ 0.33μF	25V	≤5%	0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤15%	0201 ≥ 0.022μF; 0402 ≥ 0.033μF	≤20%	0402 ≥ 0.33μF	16V	≤10%	0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 120 ≥ 2.2μF; 1210 ≥ 4.7μF	≤15%	0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤20%	0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	10V	≤7.5%	0201 ≥ 0.1μF; 0402 ≥ 1μF	≤15%	0201 ≥ 0.1μF; 0402 ≥ 1μF	≤20%	0201 ≥ 0.1μF; 0402 ≥ 1μF	6.3V	≤15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 4.7μF; 1210 ≥ 100μF	4V	≤20%	---	RATED VOLTAGE	INSULATION RESISTANCE	100V: All X7R; 1210 ≥ 3.3μF	1GΩ or RxC ≥ 10 Ω-F whichever is smaller.	50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF	35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF	16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF	10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF	6.3V; 4V; Size ≥ 1812											
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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 (Max.500V) and 1.3~1.5Vdc (add 100k ohm resistor) - Before initial measurement (Class II only): To apply test voltage for 1hr at test temp. and then set 24±2 hrs at room temp. - Measurement to be made after keeping at room temp. for 24±2hrs.	- No remarkable damage. - Cap Change: NPO: within ±3.0% or ±0.30pF whichever is larger X7R: within ±12.5% -Q/D.F. value: NPO: C≥30pF, Q≥200; Cap<30pF, Q≥100+10/3C X7R: <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F.≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</td> <td>≤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>≤6%</td> <td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R> 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td>≤20%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <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 rowspan="3">25V</td> <td>≤5%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤15%</td> <td>0201 ≥ 0.022μF; 0402 ≥ 0.033μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤10%</td> <td>0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 120 ≥ 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>≤20%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">10V</td> <td>≤7.5%</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>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 4.7μF; 1210 ≥ 100μF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>---</td> </tr> </tbody> </table> <p>*I.R.: ≥1GΩ OR RxC≥50Ω-F whichever is smaller.</p> <p>Class II (X7R) for rated voltage test:</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="10">500MΩ or RxC ≥ 5 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> </tr> </tbody> </table> <p>Class II (X7R) for 1.3~1.5Vdc</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="10">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 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> </tr> </tbody> </table>	RATED VOL.	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* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.



NO.	TEST ITEM	TEST CONDITION	REQUIREMENTS																																																								
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) 0603/X7R/50V/Cap. $>0.1\mu\text{F}$ 0603/X7R/ $\leq 25\text{V}$ /Cap. $\geq 1.0\mu\text{F}$ d) 0805/X7R/50V/Cap. $\geq 0.68\mu\text{F}$ e) 1206/X7R/100V/Cap. $\geq 1.0\mu\text{F}$ f) 1210/X7R/50V&100V/Cap. $\geq 2.2\mu\text{F}$ (3) $630\text{V} \leq U_r \leq 1000\text{V}$: 120% of rated voltage. - 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.	- No remarkable damage. - Cap Change: NPO: within $\pm 3.0\%$ or $\pm 0.30\text{pF}$ whichever is larger X7R: within $\pm 12.5\%$ -Q/D.F. value: NPO: More than 30pF, $Q \geq 350$; 10pF $\leq C \leq 30\text{pF}$, $Q \geq 275+2.5\text{C}$ less than 10pF $Q \geq 200+10\text{C}$ X7R: <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. \leq</th> <th>EXCEPTION OF D.F. \leq</th> </tr> </thead> <tbody> <tr> <td rowspan="2">$\geq 100\text{V}$</td> <td>$\leq 6\%$</td> <td>1206 $\geq 0.47\mu\text{F}$</td> </tr> <tr> <td>$\leq 7.5\%$</td> <td>0603 $\geq 0.068\mu\text{F}$; 0805 $\geq 0.1\mu\text{F}$; 1206 $\geq 1\mu\text{F}$; 1210 $\geq 2.2\mu\text{F}$</td> </tr> <tr> <td rowspan="2">$\geq 50\text{V}$</td> <td>$\leq 20\%$</td> <td>0805 $> 0.22\mu\text{F}$; 1210 $\geq 3.3\mu\text{F}$</td> </tr> <tr> <td>$\leq 6\%$</td> <td>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 rowspan="2">35V</td> <td>$\leq 3\%$</td> <td>0201 $\geq 0.01\mu\text{F}$; 1210 $\geq 3.3\mu\text{F}$</td> </tr> <tr> <td>$\leq 20\%$</td> <td>0402 $\geq 0.012\mu\text{F}$; 0603 $> 0.1\mu\text{F}$; 0805/X7R $> 0.47\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$</td> </tr> <tr> <td rowspan="2">25V</td> <td>$\leq 10\%$</td> <td>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>$\leq 10\%$</td> <td>0201 $\geq 0.01\mu\text{F}$; 0805 $\geq 1\mu\text{F}$; 1210 $\geq 10\mu\text{F}$</td> </tr> <tr> <td rowspan="2">16V</td> <td>$\leq 5\%$</td> <td>0603 $\geq 0.33\mu\text{F}$</td> </tr> <tr> <td>$\leq 15\%$</td> <td>0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 0.056\mu\text{F}$; 0603 $\geq 0.47\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 22\mu\text{F}$</td> </tr> <tr> <td rowspan="2">10V</td> <td>$\leq 20\%$</td> <td>0402 $\geq 0.33\mu\text{F}$</td> </tr> <tr> <td>$\leq 10\%$</td> <td>0603 $\geq 0.15\mu\text{F}$; 0805 $\geq 0.68\mu\text{F}$; 120 $\geq 2.2\mu\text{F}$; 1210 $\geq 4.7\mu\text{F}$</td> </tr> <tr> <td rowspan="2">6.3V</td> <td>$\leq 7.5\%$</td> <td>0201 $\geq 0.022\mu\text{F}$; 0402 $\geq 0.033\mu\text{F}$; 0603 $> 0.47\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 22\mu\text{F}$</td> </tr> <tr> <td>$\leq 15\%$</td> <td>0201 $\geq 0.012\mu\text{F}$; 0402 $\geq 0.15\mu\text{F}$; 0603 $\geq 0.33\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 22\mu\text{F}$</td> </tr> <tr> <td rowspan="2">4V</td> <td>$\leq 30\%$</td> <td>0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 1\mu\text{F}$</td> </tr> <tr> <td>$\leq 20\%$</td> <td>0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 1\mu\text{F}$; 0603 $\geq 10\mu\text{F}$; 0805 $\geq 4.7\mu\text{F}$; 1206 $\geq 47\mu\text{F}$; 1210 $\geq 100\mu\text{F}$</td> </tr> </tbody> </table> <p>I.R.: $\geq 1\text{G}\Omega$ OR $\text{RxC} \geq 500\Omega\text{-F}$ whichever is smaller CLASS II X7R:</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 $\geq 3.3\mu\text{F}$</td> <td rowspan="10">1GΩ or $\text{RxC} \geq 10\Omega\text{-F}$ whichever is smaller.</td> </tr> <tr> <td>50V: 0402 $> 0.01\mu\text{F}$; 0603 $\geq 1\mu\text{F}$; 0805 $\geq 1\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 4.7\mu\text{F}$</td> </tr> <tr> <td>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> </tr> <tr> <td></td> </tr> <tr> <td></td> </tr> <tr> <td></td> </tr> </tbody> </table>	RATED VOL.	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9.	Physical Dimension JESD22 Method JB-100	- By using calipers	- Within the specified dimensions																																																								
10.	Resistance to Solvents MIL-STD-202 Method 215	- Temperature $25 \pm 5^{\circ}\text{C}$ - Time: 3+0.5/-0 min - Solvent: Iso-propyl alcohol.	- No remarkable damage. - Cap: within the specified tolerance. -Q/D.F. value: NPO: Cap $\geq 30\text{pF}$; $Q \geq 1000$; Cap $< 30\text{pF}$, $Q \geq 400+20\text{C}$. 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* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.



RELIABILITY TEST CONDITIONS AND DIMENSIONS

NO.	TEST ITEM	TEST CONDITION	REQUIREMENTS																																																																		
11.	Mechanical Shock MIL-STD-202 Method 213	- Peak value: 1500g's - Wave: 1/2 sine. - Velocity: 15.4ft/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: Cap30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F.≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</td> <td>≤2.5%</td> <td>≤3% 1206 ≥ 0.47μF ≤5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤5%</td> <td>≤10% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤10%</td> <td>≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td rowspan="3">50V</td> <td>≤2.5%</td> <td>≤5% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤5%</td> <td>≤10% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤10%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td>≤3.5%</td> <td>≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤5%</td> <td>≤7% 0603 ≥ 0.33μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">25V</td> <td>≤3.5%</td> <td>≤12.5% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤5%</td> <td>0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤3.5%</td> <td>≤10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤5%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤10%</td> <td>15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td>≤10%</td> <td>≤20% 0402 ≥ 2.2μF</td> </tr> <tr> <td>≤15%</td> <td>---</td> </tr> <tr> <td>4V</td> <td>≤15%</td> <td>---</td> </tr> </tbody> </table> <p>*I.R.: ≥10GΩ OR RxC≥500Ω-F whichever is smaller.</p> <p>CLASS II X7R:</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R</td> <td rowspan="10">10GΩ or RxC ≥ 100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V: 4V; Size ≥ 1812</td> </tr> <tr> <td>RATED VOLTAGE</td> <td rowspan="8">RxC ≥ 50 Ω-F</td> </tr> <tr> <td>100V: 1210 ≥ 3.3μF</td> </tr> <tr> <td>50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF</td> </tr> <tr> <td>16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF</td> </tr> <tr> <td>10V: 0201 > 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> </tbody> </table>	RATED VOL.	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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 Change: within the specified tolerance -Q/D.F. value: NPO: C≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F.≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</td> <td>≤2.5%</td> <td>≤3% 1206 ≥ 0.47μF ≤5% 0603≥0.068μF; 0805>0.1μF; 1206≥1μF; 1210≥2.2μF</td> </tr> <tr> <td>≤5%</td> <td>≤10% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤10%</td> <td>≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td rowspan="3">50V</td> <td>≤2.5%</td> <td>≤5% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤5%</td> <td>≤10% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤10%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td>≤3.5%</td> <td>≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤5%</td> <td>≤7% 0603 ≥ 0.33μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">25V</td> <td>≤3.5%</td> <td>≤12.5% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤5%</td> <td>0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤3.5%</td> <td>≤10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤5%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤10%</td> <td>15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 47μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td>≤10%</td> <td>≤20% 0402 ≥ 2.2μF</td> </tr> <tr> <td>≤15%</td> <td>---</td> </tr> <tr> <td>4V</td> <td>≤15%</td> <td>---</td> </tr> </tbody> </table> <p>*I.R.: ≥1GΩ OR RxC≥50Ω-F whichever is smaller.</p> <p>Class II (X7R) for rated voltage test:</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R</td> <td rowspan="10">10GΩ or RxC ≥ 100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> </tr> <tr> <td>RATED VOLTAGE</td> <td rowspan="8">RxC ≥ 50 Ω-F</td> </tr> <tr> <td>100V: 1210 ≥ 3.3μF</td> </tr> <tr> <td>50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF</td> </tr> <tr> <td>16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF</td> </tr> <tr> <td>10V: 0201 > 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> </tbody> </table>	RATED VOL.	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* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.



RELIABILITY TEST CONDITIONS AND DIMENSIONS

NO.	TEST ITEM	TEST CONDITION	REQUIREMENTS																																																																										
13.	Resistance to Soldering Heat MIL-STD-202 Method 210	<ul style="list-style-type: none"> - Solder temperature: 260±5°C - Dipping time: 10±1 sec - Before initial measurement (X7R only): perform 150+0/-10°C for 1 hr and then set 24±2 hrs at room temp. - Measurement to be made after keeping at room temp. for 24±2 hrs. 	<ul style="list-style-type: none"> - No remarkable damage. - Cap change: 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 <p>X7R:</p> <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F.≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</td> <td>≤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>≤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 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td>≤3.5%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤5%</td> <td>0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤7%</td> <td>0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td>≤3.5%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤10%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td>≤12.5%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤3.5%</td> <td>0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">10V</td> <td>≤5%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td>≤10%</td> <td>0402 ≥ 2.2μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 2.2μF</td> </tr> <tr> <td>4V</td> <td>≤15%</td> <td>---</td> </tr> </tbody> </table> <p>*I.R.: ≥10GΩ OR RxC≥500Ω-F whichever is smaller.</p> <p>CLASS II X7R:</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R</td> <td rowspan="7">10GΩ or RxC ≥ 100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> </tr> <tr> <td>RATED VOLTAGE</td> <td>INSULATION RESISTANCE</td> </tr> <tr> <td>100V: 1210 ≥ 3.3μF</td> <td rowspan="7">RxC ≥ 50 Ω-F</td> </tr> <tr> <td>50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF</td> </tr> <tr> <td>16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF</td> </tr> <tr> <td>10V: 0201 > 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> </tbody> </table>	RATED VOL.	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14.	Thermal Shock MIL-STD-202 Method 107	<ul style="list-style-type: none"> - Conduct 300 cycles according to the temperatures and time. <table border="1"> <thead> <tr> <th>STEP</th> <th>TEMP. (°C)</th> <th>TIME (MIN.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C ±0/-3</td> <td>5 ± 3</td> </tr> <tr> <td>2</td> <td>+125°C ± 3/-0</td> <td>5 ± 3</td> </tr> </tbody> </table> <ul style="list-style-type: none"> - Max. transfer time: 20 sec. - Before initial measurement (X7R only): perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp. - Measurement to be made after keeping at room temp for 24±2 hrs. 	STEP	TEMP. (°C)	TIME (MIN.)	1	-55°C ±0/-3	5 ± 3	2	+125°C ± 3/-0	5 ± 3	<ul style="list-style-type: none"> - 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 <p>X7R:</p> <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F.≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</td> <td>≤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>≤6%</td> <td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 /X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td>≤5%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <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 rowspan="3">25V</td> <td>≤5%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤5%</td> <td>0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 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>≤20%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="2">10V</td> <td>≤7.5%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤30%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td>≤15%</td> <td>0402 ≥ 2.2μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 2.2μF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>---</td> </tr> </tbody> </table> <p>*I.R.: ≥1GΩ OR RxC≥50Ω-F whichever is smaller.</p> <p>Class II (X7R) for rated voltage test</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 ≥ 3.3μF</td> <td rowspan="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 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V; 4V; Size ≥ 1812</td> </tr> </tbody> </table>	RATED VOL.	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RELIABILITY TEST CONDITIONS AND DIMENSIONS

NO.	TEST ITEM	TEST CONDITION	REQUIREMENTS																																																													
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ESD AEC-Q200-002	- Per AEC-Q200-002	<p>- No remarkable damage.</p> <p>- Cap change: within the specified tolerance.</p> <p>- Q/D.F. value: NPO: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C</p> <p>X7R:</p> <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F.≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="2">≥100V</td> <td>≤3%</td> <td>1206 ≥ 0.47μF</td> </tr> <tr> <td>≤2.5%</td> <td>≤5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF ≤10% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="2">50V</td> <td>≤3%</td> <td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤2.5%</td> <td>≤5% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="2">35V</td> <td>≤10%</td> <td>0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF ≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="2">25V</td> <td>≤7%</td> <td>0603 ≥ 0.33μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF ≤12.5% 0402 ≥ 0.33μF</td> </tr> <tr> <td rowspan="2">16V</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>≤3.5%</td> <td>≤10% 0201 ≥ 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>≤10%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤5%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td>≤15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>≤10%</td> <td>≤20% 0402 ≥ 2.2μF</td> </tr> <tr> <td>4V</td> <td>≤15%</td> <td>---</td> </tr> </tbody> </table> <p>*I.R.: ≥10GΩ OR RxC≥500Ω·F whichever is smaller.</p> <p>Class II (X7R)</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R</td> <td rowspan="7">10GΩ or RxC≥100 Ω·F whichever is smaller</td> </tr> <tr> <td>50V: 0402 > 0.01μF; 0603 ≥ 1μF; 0805 ≥ 1μF; 1206 ≥ 4.7μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>35V: 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>25V: 0402 ≥ 1μF; 0603 ≥ 2.2μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 10μF</td> </tr> <tr> <td>16V: 0201 ≥ 0.1μF; 0402 ≥ 0.22μF; 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 10μF; 1210 ≥ 47μF</td> </tr> <tr> <td>10V: 0201 ≥ 47nF; 0402 ≥ 0.47μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 47μF</td> </tr> <tr> <td>6.3V, 4V, Size ≥ 1812</td> </tr> <tr> <td>RATED VOLTAGE</td> <td rowspan="7">RxC≥50 Ω·F.</td> </tr> <tr> <td>100V: 1210 ≥ 3.3μF</td> </tr> <tr> <td>50V: 0402 ≥ 0.1μF; 0603 ≥ 2.2μF; 0805 ≥ 10μF; 1206 ≥ 10μF</td> </tr> <tr> <td>35V: 0603 ≥ 1μF;</td> </tr> <tr> <td>25V: 0201 ≥ 0.1μF; 0402 ≥ 2.2μF; 0603 ≥ 10μF; 0805 ≥ 10μF; 1206 ≥ 22μF</td> </tr> <tr> <td>16V: 0603 ≥ 10μF; 0402 ≥ 1μF; 0201 ≥ 0.22μF</td> </tr> <tr> <td>10V: 0201 > 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> </tbody> </table>	RATED VOL.	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6.3V	≤15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF																																																														
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16.	Solderability J-STD-002 JESD22-B102E	<p>- Condition A Un-mounted chips 4hrs / 155°C Dry then completely immersed for 5±0.5 sec in solder bath at 245±5°C.</p> <p>- Condition B Un-mounted chips steam 8 hrs then completely immersed for 10±1 sec in solder bath at 215+5/-0°C</p> <p>- Condition C Un-mounted chips steam 8 hrs then completely immersed for 10±1 sec in solder bath at 260+0/-5°C.</p>	<p>- 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.</p>																																																													

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



RELIABILITY TEST CONDITIONS AND DIMENSIONS

NO.	TEST ITEM	TEST CONDITION	REQUIREMENTS																																																																		
17.	Electrical Characterization	<ul style="list-style-type: none"> - Capacitance - Q/ D.F. (Dissipation Factor) - Test temp: Room Temperature. - Class I: (NPO) <ul style="list-style-type: none"> Cap\leq1000pF 1.0\pm0.2Vrms, 1MHz\pm10% Cap$>$1000pF 1.0\pm0.2Vrms, 1KHz\pm10% - Class II: (X7R) <ul style="list-style-type: none"> Cap \leq10μF, 1.0\pm0.2Vrms, 1KHz\pm10% Cap$>$10μF, 0.5\pm0.2Vrms, 120Hz\pm20% - Insulation Resistance - Test temp: Room Temperature. - Test voltage: <ul style="list-style-type: none"> \leq100V: To apply rated voltage for max. 120 sec. \geq200V: To apply rated voltage (Max.500V) for 60 sec. - Dielectric Strength <ul style="list-style-type: none"> To apply voltage: <ul style="list-style-type: none"> \leq100 \geq2.5 times VDC 200V~300V \geq2 times VDC 400V~450V \geq1.2 times VDC 500V~999V \geq1.5 times VDC 1000V~3000V \geq1.2 times VDC duration 1~5 sec, charge and discharge current less than 50mA. - Temperature Coefficient (with no electrical load) - Operation temperature: Min. operating temp. to Max. operating temp. at 25°C 	<ul style="list-style-type: none"> - Capacitance within the specified tolerance. - Q/D.F. value: <ul style="list-style-type: none"> NPO: Cap\geq30pF, Q\geq1000; Cap$<$30pF, Q\geq400+20C <p>X7R:</p> <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F.\leq</th> <th>EXCEPTION OF D.F. \leq</th> </tr> </thead> <tbody> <tr> <td rowspan="3">\geq100V</td> <td rowspan="3">\leq2.5%</td> <td>\leq3% 1206 \geq 0.47μF</td> </tr> <tr> <td>\leq5% 0603 \geq 0.068μF; 0805 $>$ 0.1μF; 1206 \geq 1μF; 1210 \geq 2.2μF</td> </tr> <tr> <td>\leq10% 0805 $>$ 0.22μF; 1210 \geq 3.3μF</td> </tr> <tr> <td rowspan="2">50V</td> <td rowspan="2">\leq2.5%</td> <td>\leq3% 0201(50V); 0603 \geq 0.047μF; 0805 \geq 0.18μF; 1206 \geq 0.47μF</td> </tr> <tr> <td>\leq5% 0201 \geq 0.01μF; 1210 \geq 3.3μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">\leq3.5%</td> <td>\leq10% 0402 \geq 0.012μF; 0603 $>$ 0.1μF; 0805 $>$ 0.47μF; 1206 \geq 2.2μF; 1210 \geq 10μF</td> </tr> <tr> <td>\leq10% 0603 \geq 1μF; 0805 \geq 2.2μF; 1206 \geq 2.2μF; 1210 \geq 10μF</td> </tr> <tr> <td>\leq5% 0201 \geq 0.01μF; 0805 \geq 1μF; 1210 \geq 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">\leq3.5%</td> <td>\leq7% 0603 \geq 0.33μF</td> </tr> <tr> <td>\leq10% 0201 \geq 0.1μF; 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18.	Board Flex AEC-Q200-005	<ul style="list-style-type: none"> - 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\pm1 sec. - Measurement to be made after keeping at room temp. for 24\pm2 hrs. 	<ul style="list-style-type: none"> - No remarkable damage. - Cap change: <ul style="list-style-type: none"> NPO: within \pm5% or 0.5pF whichever is larger X7R: within \pm12.5% (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.) 																																																																		

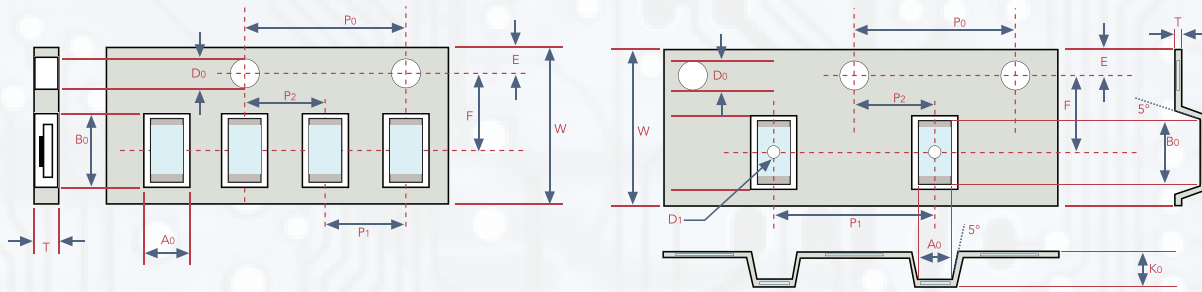
* "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

RELIABILITY TEST CONDITIONS AND DIMENSIONS

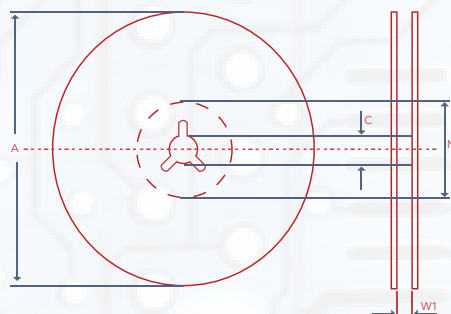
NO.	TEST ITEM	TEST CONDITION	REQUIREMENTS																																															
19.	Terminal Strength AEC-Q200-006	- Pressurizing force: 2N (0201 & 0402), 10N (0603), 10N(0603), 18N(≥0805). - Test time: 60±1 sec.	- No remarkable damage or removal of the terminations - Capacitance within the 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>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</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="2">50V</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 rowspan="2">35V</td> <td>≤3.5%</td> <td>0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤10%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td>≤5%</td> <td>0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤7%</td> <td>0603 ≥ 0.33μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤12.5%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td>≤5%</td> <td>0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="2">10V</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>≤15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 4.7μF; 1210 ≥ 100μF</td> </tr> <tr> <td>≤20%</td> <td>0402 ≥ 2.2μF</td> </tr> <tr> <td>4V</td> <td>≤15%</td> <td>---</td> </tr> </tbody> </table>	RATED VOL.	D.F.≤	EXCEPTION OF D.F. ≤	≥100V	≤3%	1206 ≥ 0.47μF	≤5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤10%	0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤5%	0201 ≥ 0.01μF; 1210 ≥ 3.3μF	35V	≤3.5%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤7%	0603 ≥ 0.33μF	≤10%	0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	16V	≤12.5%	0402 ≥ 0.33μF	≤5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	≤10%	0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	10V	≤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	≤15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 4.7μF; 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.

TAPE & REEL DIMENSIONS



SIZE	0201		0402		0603		0805		1206		1210	
THICKNESS	L	N, E	S, H, X	A, H	B, T	D, I	B, T	C, J, D	G, P	T	C, D, G, K	M
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	< 3.20
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	< 4.00
T	≤0.55	≤0.80	≤1.20	≤1.15	≤1.20	0.23±0.1	≤1.20	0.23±0.1	0.23±0.1	0.23±0.1	0.23±0.1	0.23±0.1
K ₀	-	-	-	-	-	< 2.50	-	< 2.50	< 2.50	< 1.50	< 2.50	< 3.20
W	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30
P 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
10 X P 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
P ₁	2.00±0.05	2.00±0.05	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
P 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
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
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
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05

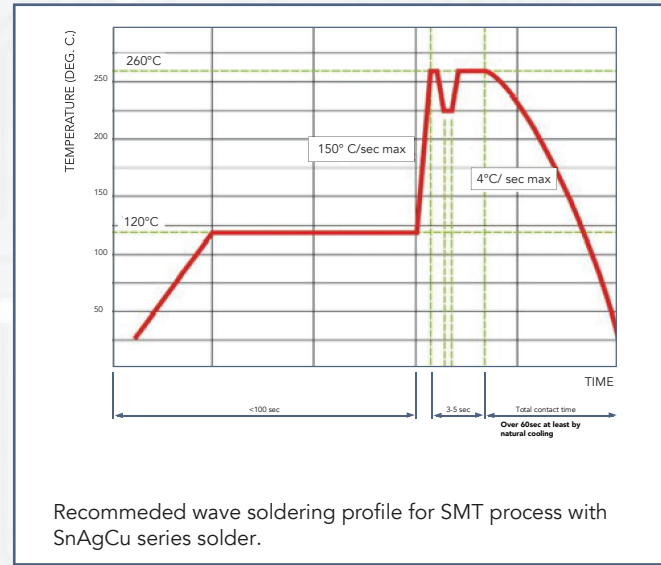
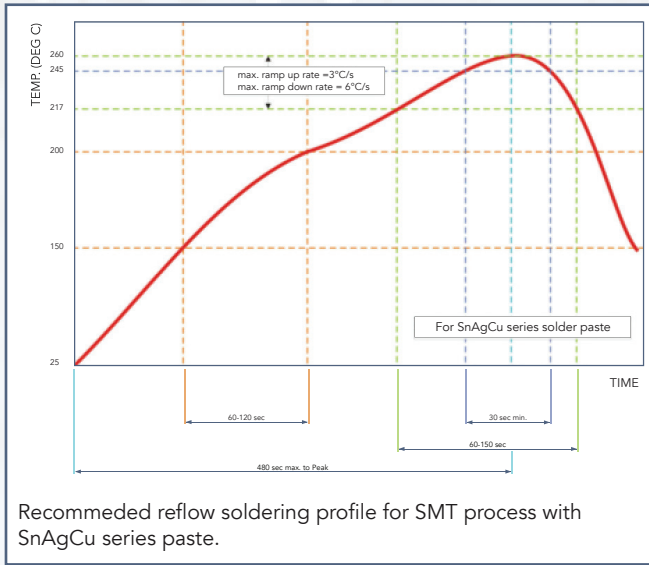


SIZE	0201, 0402, 0603, 0805, 1206, 1210		
REEL SIZE	7"	10"	13"
C	13.0±0.5	13.0±0.5	13.0±0.5
W ₁	10.0±1.5	10.0±1.5	10.0±1.5
A	178.0±0.20	250.0±2.0	330.0±2.0
N	60.0+1.0/-0	50 min	50 min



RECOMMENDED SOLDERING CONDITIONS

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



WARRANTY: All passive components supplied by CalChip Electronics, 59 Steamwhistle Drive, Ivyland, PA 18974, are under warranty for a period of 2 years from the date of manufacture. Product will meet or exceed all reliability and test specifications expressed by CalChip for the above mentioned time period provided storage conditions (stated below) are met.

PRODUCT STORAGE INSTRUCTIONS:

- 1) Product must be kept away from direct sunlight.
- 2) Product must be stored in the following conditions
 Temperature; 5 to 35°C / 30 to 90°F
 Humidity; 45 to 85%
- 3) Product to be kept free of moisture, dirt and debris.

*****WHEN THESE CONDITIONS ARE NOT MET, PRODUCT LIFE COULD BE SHORTENED*****

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