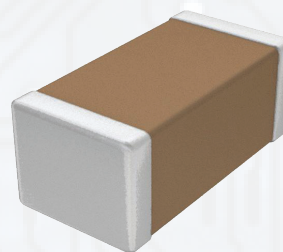


AUTOMOTIVE MULTILAYER CERAMIC CHIP CAPACITORS

- 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



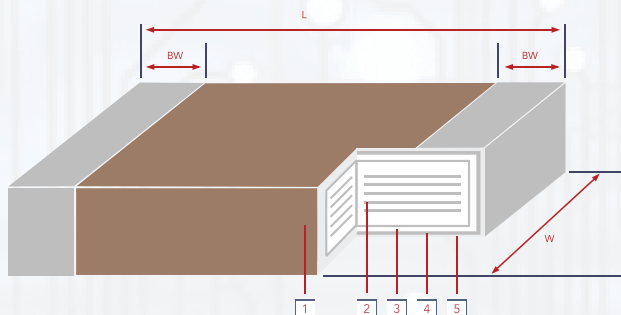
APPLICATIONS

- 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	Inner Layer	Cu	Cu
4	Middle Layer	Ni	Ni
5	Outer Layer	Sn	Sn

SIZE INCH (MM)	L (MM)	W (MM)	T (MM) / SYMBOL	MA (MM)
0201 (0603)	0.60±0.03	0.30±0.03	SEE FOLLOWING CHARTS	0.15+/-0.05
0402 (1005)	1.00±0.10	0.50±0.10		0.25+0.05/-0.10
0603 (1608)	1.60±0.15	0.80±0.15		0.40±0.15
0805 (2012)	2.00±0.20	1.25±0.20		0.50±0.20
1206 (3216)	3.20±0.20	1.60±0.20		0.60 ±0.2
	3.30 ± 0.30	1.60 +0.3 / -0.1		
1210 (3225)	3.20±0.30	2.50 ± 0.30		0.75±0.35
	3.30±0.40			

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 X7S - X7S X7T - X7T X5R - X5R	OR5: 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	NPO	X7R	X7S	X7T	X5R
SIZE	0201, 0402, 0603, 0805, 1206, 1210	0201, 0402, 0603, 0805, 1206, 1210	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 22µF	100pF to 100µF	100pF TO 100µF	220pF to 100µF
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%)	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		6.3v, 10v, 16v, 25v,35v 50v, 100v	6.3v, 10v, 16v, 25v,35v 50v, 100v	10V, 16V, 25V, 35V 50V
OPERATING TEMPERATURE			-55 TO +125°C		-55-85C
CAPACITANCE CHARACTERISTIC	±30ppm/°C	±15%	±22%	+22% / -33%	±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															
1,200	122																D2	D2	D2	D2											
1,500	152																D2	D2	D2	D2											
1,800	182																D2	D2	D2	D2											
2,200	222																B														
2,700	272																D2	D2	D2	D2											
3,300	332																B														
3,900	392																D2	D2	D2	D2											
4,700	472																B														
5,600	562																D2	D2	D2	D2											
6,800	682																B														
8,200	822																D2	D2	D2	D2											
0.010µF	103																B	B	B												
0.012	123																D2	D2	D2	D2											
0.015	153																B	B	B												
0.018	183																B														
0.022	223																B	B	B												
0.027	273																D2	D2	D2	D2											
0.033	333																B	B	B	B											
0.039	393																D2	D2	D2	D2											
0.047	473																B	B	B	B											
0.056	563																D2	D2	D2	D2											
0.068	683																D2	D2	D2	D2											
0.082	823																B	B	B	B											
0.10	104																B	B	B	B	B										
0.12	124																														
0.15	154																B	B													
0.18	183																														
0.22	224																C*	C*													
0.27	274																														
0.33	334																														
0.39	394																														
0.47	474																B	B	C*												
0.56	564																														
0.68	684																D2	D2	D2	D2	D2										
0.82	824																														
1.00	105																C*	C*	C*												
1.5	155																														
2.2	225																														
3.3	335																														
4.70	475																														
6.8	685																														
10	106																														
15	156																														
22	226																														
47	476																														
100	107																														

C* - L - 1.00-0.05/+0.20 | W - 0.50-0.05/+0.20

A2	B	C	D2	E	F2	G	H	I	L
0.50mm	0.55mm	0.70mm	0.90mm	0.95mm	1.25 mm	1.35mm	1.45mm	1.8 mm	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="2">≥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 rowspan="2">≥50V</td> <td>≤20%</td> <td>0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤6%</td> <td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td rowspan="2">35V</td> <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="2">25V</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 rowspan="2">16V</td> <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 rowspan="2">10V</td> <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="2">6.3V</td> <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>≤7.5%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> </tbody> </table> <p>* I.R.: ≥10GΩ or RxC≥500Ω·F whichever is smaller.</p>	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	≥50V	≤20%	0805 > 0.22μF; 1210 ≥ 3.3μF	≤6%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	35V	≤10%	0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤20%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805/X7R> 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V	≤5%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤10%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	16V	≤14%	0603 ≥ 0.33μF	≤15%	0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	10V	≤20%	0402 ≥ 0.33μF	≤10%	0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 120 ≥ 2.2μF; 1210 ≥ 4.7μF	6.3V	≤15%	0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤7.5%	0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	4V	≤20%	0201 ≥ 0.1μF; 0402 ≥ 1μF									
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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 rowspan="3">≤3%</td> <td>≤6% 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤7.5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤20% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="3">≥50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤20% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805(X7R) 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤5%</td> <td>≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤14% 0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 120 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤5%</td> <td>≤15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤7.5%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤15%</td> <td>≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>≤20% --- ---</td> </tr> </tbody> </table> <p>*1.R.: ≥10GΩ OR RxC≥500Ω-F whichever is smaller.</p>	RATED VOL.	D.F.≤	EXCEPTION OF D.F. ≤	≥100V	≤3%	≤6% 1206 ≥ 0.47μF	≤7.5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤20% 0805 > 0.22μF; 1210 ≥ 3.3μF	≥50V	≤3%	≤6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤20% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805(X7R) 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤5%	≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤14% 0603 ≥ 0.33μF	25V	≤5%	≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤20% 0402 ≥ 0.33μF	≤10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 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	≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF	10V	≤7.5%	≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	6.3V	≤15%	≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	≤20% --- ---
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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 rowspan="3">≤3%</td> <td>≤6% 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤7.5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤20% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="3">≥50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤20% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805(X7R) 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤5%</td> <td>≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤14% 0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 120 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤5%</td> <td>≤15% 0201 ≥ 0.022μF; 0402 ≥ 0.033μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤7.5%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤15%</td> <td>≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>≤20% --- ---</td> </tr> </tbody> </table> <p>*1.R.: ≥1GΩ OR RxC≥50Ω-F whichever is smaller.</p>	RATED VOL.	D.F.≤	EXCEPTION OF D.F. ≤	≥100V	≤3%	≤6% 1206 ≥ 0.47μF	≤7.5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤20% 0805 > 0.22μF; 1210 ≥ 3.3μF	≥50V	≤3%	≤6% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	≤10% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤20% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805(X7R) 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤5%	≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤14% 0603 ≥ 0.33μF	25V	≤5%	≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤20% 0402 ≥ 0.33μF	≤10% 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 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	≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF	10V	≤7.5%	≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	6.3V	≤15%	≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF	≤20% --- ---
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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																																							
7.	Operational Life MIL-STD-202 Method 108	<ul style="list-style-type: none"> - Test temp.: Maximum Operating Temperature $\pm 3^{\circ}\text{C}$ - To apply voltage: (1) $10\text{V} \leq \text{Ur} \leq 250\text{V}$: 200% of rated voltage. (2) 150% of rated voltage: a) 500V b) $\leq 6.3\text{V}$ or $\text{C} \geq 10\mu\text{F}$ c) $0603/\text{X7R}/50\text{V}/\text{Cap.} > 0.1\mu\text{F}$ $0603/\text{X7R}/\leq 25\text{V}/\text{Cap.} \geq 1.0\mu\text{F}$ d) $0805/\text{X7R}/50\text{V}/\text{Cap.} \geq 0.68\mu\text{F}$ e) $1206/\text{X7R}/100\text{V}/\text{Cap.} \geq 1.0\mu\text{F}$ f) $1210/\text{X7R}/50\text{V}\&100\text{V}/\text{Cap.} \geq 2.2\mu\text{F}$ (3) $630\text{V} \leq \text{Ur} \leq 1000\text{V}$: 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 ± 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 $\pm 3.0\%$ or $\pm 0.30\text{pF}$ whichever is larger X7R: within $\pm 12.5\%$ - Q/D.F. value: NPO: More than 30pF, $Q \geq 350$; $10\text{pF} \leq \text{C} \leq 30\text{pF}$, $Q \geq 275+2.5\text{C}$ less than 10pF $Q \geq 200+10\text{C}$ <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">$\geq 100\text{V}$</td> <td>$\leq 3\%$</td> <td>$\leq 6\%$ 1206 $\geq 0.47\mu\text{F}$ $\leq 7.5\%$ 0603 $\geq 0.068\mu\text{F}$; 0805 $\geq 0.1\mu\text{F}$; 1206 $\geq 1\mu\text{F}$; 1210 $\geq 2.2\mu\text{F}$ $\leq 20\%$ 0805 $> 0.22\mu\text{F}$; 1210 $\geq 3.3\mu\text{F}$</td> </tr> <tr> <td>$\leq 5\text{V}$</td> <td>$\leq 6\%$ 0201(50V); 0603 $\geq 0.047\mu\text{F}$; 0805 $\geq 0.18\mu\text{F}$; 1206 $\geq 0.47\mu\text{F}$ $\leq 10\%$ 0201 $\geq 0.01\mu\text{F}$; 1210 $\geq 3.3\mu\text{F}$ $\leq 20\%$ 0402 $\geq 0.012\mu\text{F}$; 0603 $> 0.1\mu\text{F}$; 0805/X7R $> 0.47\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$</td> </tr> <tr> <td>35V</td> <td>$\leq 20\%$ 0603 $\geq 1\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$ $\leq 10\%$ 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">25V</td> <td>$\leq 5\%$</td> <td>$\leq 14\%$ 0603 $\geq 0.33\mu\text{F}$ $\leq 15\%$ 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 0.056\mu\text{F}$; 0603 $\geq 0.47\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 22\mu\text{F}$ $\leq 20\%$ 0402 $\geq 0.33\mu\text{F}$</td> </tr> <tr> <td>16V</td> <td>$\leq 10\%$ 0603 $\geq 0.15\mu\text{F}$; 0805 $\geq 0.68\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 4.7\mu\text{F}$ $\leq 15\%$ 0201 $\geq 0.022\mu\text{F}$; 0402 $\geq 0.033\mu\text{F}$; 0603 $> 0.47\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 22\mu\text{F}$</td> </tr> <tr> <td rowspan="2">10V</td> <td>$\leq 7.5\%$</td> <td>$\leq 15\%$ 0201 $\geq 0.012\mu\text{F}$; 0402 $\geq 0.15\mu\text{F}$; 0603 $\geq 0.33\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 22\mu\text{F}$ $\leq 20\%$ 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 1\mu\text{F}$</td> </tr> <tr> <td>6.3V</td> <td>$\leq 15\%$ 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> <tr> <td>4V</td> <td>$\leq 20\%$ ---</td> <td>---</td> </tr> </tbody> </table> <p>I.R.: $\geq 1\text{G}\Omega$ OR $\text{RxC} \geq 50\Omega\text{-F}$ whichever is smaller CLASS II X7R:</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210 $\geq 3.3\mu\text{F}$</td> <td rowspan="10">$1\text{G}\Omega$ 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 colspan="2">---</td> </tr> <tr> <td colspan="2">---</td> </tr> <tr> <td colspan="2">---</td> </tr> </tbody> </table>	RATED VOL.	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8.	External Visual MIL-STD-883 Method 2009	- Visual inspection	- No remarkable defect.																																							
9.	Physical Dimension JESD22 Method JB-100	- By using calipers	- Within the specified dimensions																																							
10.	Resistance to Solvents MIL-STD-202 Method 215	<ul style="list-style-type: none"> - Temperature $25 \pm 5^{\circ}\text{C}$ - Time: $3+0.5/-0$ min - Solvent: Iso-propyl alcohol. 	<ul style="list-style-type: none"> - No remarkable damage. - Cap: within the specified tolerance. - Q/D.F. value: NPO: $\text{Cap} \geq 30\text{pF}$; $Q \geq 1000$; $\text{Cap} < 30\text{pF}$, $Q \geq 400+20\text{C}$. <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">$\geq 100\text{V}$</td> <td>$\leq 2.5\%$</td> <td>$\leq 3\%$ 1206 $\geq 0.47\mu\text{F}$ $\leq 5\%$ 0603 $\geq 0.068\mu\text{F}$; 0805 $\geq 0.1\mu\text{F}$; 1206 $\geq 1\mu\text{F}$; 1210 $\geq 2.2\mu\text{F}$ $\leq 10\%$ 0805 $> 0.22\mu\text{F}$; 1210 $\geq 3.3\mu\text{F}$</td> </tr> <tr> <td>$\geq 50\text{V}$</td> <td>$\leq 3\%$ 0201(50V); 0603 $\geq 0.047\mu\text{F}$; 0805 $\geq 0.18\mu\text{F}$; 1206 $\geq 0.47\mu\text{F}$ $\leq 5\%$ 0201 $\geq 0.01\mu\text{F}$; 1210 $\geq 3.3\mu\text{F}$ $\leq 10\%$ 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>35V</td> <td>$\leq 3.5\%$ $\leq 10\%$ 0603 $\geq 1\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$ $\leq 5\%$ 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">25V</td> <td>$\leq 3.5\%$</td> <td>$\leq 7\%$ 0603 $\geq 0.33\mu\text{F}$ $\leq 10\%$ 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 0.056\mu\text{F}$; 0603 $\geq 0.47\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 22\mu\text{F}$ $\leq 12.5\%$ 0402 $\geq 0.33\mu\text{F}$</td> </tr> <tr> <td>16V</td> <td>$\leq 3.5\%$ $\leq 5\%$ 0201 $\geq 0.01\mu\text{F}$; 0402 $\geq 0.033\mu\text{F}$; 0603 $\geq 0.15\mu\text{F}$; 0805 $\geq 0.68\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 4.7\mu\text{F}$ $\leq 10\%$ 0201 $\geq 0.022\mu\text{F}$; 0402 $\geq 0.15\mu\text{F}$; 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 rowspan="2">10V</td> <td>$\leq 5\%$</td> <td>$\leq 10\%$ 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 $\geq 22\mu\text{F}$ $\leq 15\%$ 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 1\mu\text{F}$</td> </tr> <tr> <td>6.3V</td> <td>$\leq 10\%$ $\leq 15\%$ 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 $\geq 100\mu\text{F}$ $\leq 20\%$ 0402 $\geq 2.2\mu\text{F}$</td> </tr> <tr> <td>4V</td> <td>$\leq 15\%$ ---</td> <td>---</td> </tr> </tbody> </table> <p>I.R.: $\geq 10\text{G}\Omega$ 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</td> <td rowspan="10">$10\text{G}\Omega$ or $\text{RxC} \geq 100\Omega\text{-F}$ 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: 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: 0402 $\geq 1\mu\text{F}$; 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 colspan="2">---</td> </tr> <tr> <td colspan="2">---</td> </tr> <tr> <td colspan="2">---</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																																																											
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 rowspan="3">≤2.5%</td> <td>≤3% 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤10% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤2.5%</td> <td>≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤5% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤10% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤7% 0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤12.5% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤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>≤10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤5%</td> <td>15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤10%</td> <td>15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <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="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="10">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 rowspan="3">≤2.5%</td> <td>≤3% 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤5% 0603≥0.068μF; 0805>0.1μF; 1206≥1μF; 1210≥2.2μF</td> </tr> <tr> <td>≤10% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤2.5%</td> <td>≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤5% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤10% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤7% 0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤12.5% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤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>≤10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤5%</td> <td>15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤10%</td> <td>15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>≤20% 0402 ≥ 2.2μF</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="10">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>≤2.5%</td> <td>≤3% 1206 ≥ 0.47μF ≤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">≤5%</td> <td>≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF ≤10% 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">50V</td> <td>≤2.5%</td> <td>≤7% 0603 ≥ 0.33μF ≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF ≤12.5% 0402 ≥ 0.33μF</td> </tr> <tr> <td rowspan="2">≤3.5%</td> <td>≤5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 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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>≤3%</td> <td>≤6% 1206 ≥ 0.47μF ≤7.5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF ≤20% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="2">≤5%</td> <td>≤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</td> </tr> <tr> <td>≤3.5%</td> <td>≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF ≤10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="2">50V</td> <td>≤3%</td> <td>≤14% 0603 ≥ 0.33μF ≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF ≤20% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤5%</td> <td>≤10% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF ≤15% 0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="2">35V</td> <td>≤5%</td> <td>≤15% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF ≤20% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF ≤20% ---</td> </tr> <tr> <td rowspan="2">25V</td> <td>≤5%</td> <td>---</td> </tr> <tr> <td>≤3.5%</td> <td>---</td> </tr> <tr> <td rowspan="2">16V</td> <td>≤5%</td> <td>---</td> </tr> <tr> <td>≤3.5%</td> <td>---</td> </tr> <tr> <td rowspan="2">10V</td> <td>≤5%</td> <td>---</td> </tr> <tr> <td>≤3.5%</td> <td>---</td> </tr> <tr> <td rowspan="2">6.3V</td> <td>≤15%</td> <td>---</td> </tr> <tr> <td>≤20%</td> <td>---</td> </tr> <tr> <td rowspan="2">4V</td> <td>≤15%</td> <td>---</td> </tr> <tr> <td>≤20%</td> <td>---</td> </tr> </tbody> </table> <p>*1.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	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	≤5%	≤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	≤3.5%	≤20% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF ≤10% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	50V	≤3%	≤14% 0603 ≥ 0.33μF ≤15% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF ≤20% 0402 ≥ 0.33μF	≤5%	≤10% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF ≤15% 0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	35V	≤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	≤3.5%	≤30% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF ≤20% ---	25V	≤5%	---	≤3.5%	---	16V	≤5%	---	≤3.5%	---	10V	≤5%	---	≤3.5%	---	6.3V	≤15%	---	≤20%	---	4V	≤15%	---	≤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 ≥ 2.2μF; 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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* "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																																																								
15.	ESD AEC-Q200-002	- Per AEC-Q200-002	<p>- No remarkable damage. - Cap change: within the specified tolerance. -Q/D.F. value: NPO: Cap\geq30pF, Q\geq1000; Cap$<$30pF, Q\geq400+20C</p> <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="2">\geq100V</td> <td rowspan="2">\leq2.5%</td> <td>\leq3% 1206 \geq 0.47μF</td> </tr> <tr> <td>\leq5% 0603 \geq 0.048μF; 0805 $>$ 0.1μF; 1206 \geq 1μF; 1210 \geq 2.2μF</td> </tr> <tr> <td rowspan="2">50V</td> <td rowspan="2">\leq2.5%</td> <td>\leq10% 0805 $>$ 0.22μF; 1210 \geq 3.3μF</td> </tr> <tr> <td>\leq3% 0201(50V); 0603 \geq 0.047μF; 0805 \geq 0.18μF; 1206 \geq 0.47μF</td> </tr> <tr> <td rowspan="2">35V</td> <td rowspan="2">\leq3.5%</td> <td>\leq5% 0201 \geq 0.01μF; 1210 \geq 3.3μF</td> </tr> <tr> <td>\leq10% 0402 \geq 0.012μF; 0603 $>$ 0.1μF; 0805 $>$ 0.47μF; 1206 \geq 2.2μF; 1210 \geq 10μF</td> </tr> <tr> <td rowspan="2">25V</td> <td rowspan="2">\leq3.5%</td> <td>\leq5% 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="2">16V</td> <td rowspan="2">\leq3.5%</td> <td>\leq7% 0603 \geq 0.33μF</td> </tr> <tr> <td>\leq10% 0201 \geq 0.1μF; 0402 \geq 0.056μF; 0603 \geq 0.47μF; 0805 \geq 2.2μF; 1206 \geq 4.7μF; 1210 \geq 22μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">\leq5%</td> <td>\leq12.5% 0402 \geq 0.33μF</td> </tr> <tr> <td>\leq5% 0201 \geq 0.01μF; 0402 \geq 0.033μF; 0603 \geq 0.15μF; 0805 \geq 0.68μF; 1206 \geq 2.2μF; 1210 \geq 4.7μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">\leq10%</td> <td>\leq10% 0201 \geq 0.022μF; 0402 \geq 0.15μF; 0603 $>$ 0.47μF; 0805 \geq 2.2μF; 1206 \geq 4.7μF; 1210 \geq 22μF</td> </tr> <tr> <td>\leq15% 0201 \geq 0.01μF; 0402 \geq 0.15μF; 0603 \geq 0.33μF; 0805 \geq 2.2μF; 1206 \geq 2.2μF; 1210 \geq 22μF</td> </tr> <tr> <td>4V</td> <td>\leq15%</td> <td>0201 \geq 0.1μF; 0402 \geq 1μF</td> </tr> </tbody> </table> <p>*I.R.: \geq10GΩ OR RxC\geq500Ω-F whichever is smaller.</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="6">10GΩ or RxC\geq100 Ω-F whichever is smaller</td> </tr> <tr> <td>50V: 0402 $>$ 0.01μF; 0603 \geq 1μF; 0805 \geq 1μF; 1206 \geq 4.7μF; 1210 \geq 4.7μF</td> </tr> <tr> <td>35V: 0805 \geq 2.2μF; 1206 \geq 2.2μF; 1210 \geq 10μF</td> </tr> <tr> <td>25V: 0402 \geq 1μF; 0603 \geq 2.2μF; 0805 \geq 2.2μF; 1206 \geq 10μF; 1210 \geq 10μF</td> </tr> <tr> <td>16V: 0201 \geq 0.1μF; 0402 \geq 0.22μF; 0603 \geq 1μF; 0805 \geq 2.2μF; 1206 \geq 10μF; 1210 \geq 47μF</td> </tr> <tr> <td>10V: 0201 \geq 47nF; 0402 \geq 0.47μF; 0603 \geq 0.47μF; 0805 \geq 2.2μF; 1206 \geq 4.7μF; 1210 \geq 47μF</td> </tr> <tr> <td>6.3V; 4V; Size \geq 1812</td> <td></td> </tr> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> <tr> <td>100V: 1210 \geq 3.3μF</td> <td rowspan="7">RxC\geq50 Ω-F</td> </tr> <tr> <td>50V: 0402 \geq 0.1μF; 0603 \geq 2.2μF; 0805 \geq 10μF; 1206 \geq 10μF</td> </tr> <tr> <td>35V: 0603 \geq 1μF;</td> </tr> <tr> <td>25V: 0201 \geq 0.1μF; 0402 \geq 2.2μF; 0603 \geq 10μF; 0805 \geq 10μF; 1206 \geq 22μF</td> </tr> <tr> <td>16V: 0603 \geq 10μF; 0402 \geq 1μF; 0201 \geq 0.22μF</td> </tr> <tr> <td>10V: 0201 $>$ 0.1μF; 0402 \geq 1μF; 0603 \geq 10μF; 0805 \geq 47μF</td> </tr> <tr> <td>6.3V; 0201 \geq 0.1μF; 0402 \geq 1μF; 0603 $>$ 4.7μF; 0805 \geq 47μF; 1206 \geq 10μF</td> </tr> <tr> <td>4V: 0603 \geq 22μF; 0805 \geq 47μF; 1206 \geq 100μF</td> </tr> </tbody> </table>	RATED VOL.	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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\pm0.5 sec in solder bath at 245\pm5°C.</p> <p>- Condition B Un-mounted chips steam 8 hrs then completely immersed for 10\pm1 sec in solder bath at 215+5/-0°C</p> <p>- Condition C Un-mounted chips steam 8 hrs then completely immersed for 10\pm1 sec in solder bath at 260+0/-5°C.</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.																																																								

* "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≤1000pF 1.0±0.2Vrms, 1MHz±10% Cap>1000pF 1.0±0.2Vrms, 1KHz±10% - Class II: (X7R) <ul style="list-style-type: none"> Cap ≤10μF, 1.0±0.2Vrms, 1KHz±10% Cap>10μF, 0.5±0.2Vrms, 120Hz±20% - Insulation Resistance - Test temp: Room Temperature. - Test voltage: <ul style="list-style-type: none"> ≤100V: To apply rated voltage for max. 120 sec. ≥200V: 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"> ≤100 ≥2.5 times VDC 200V~300V ≥2 times VDC 400V~450V ≥1.2 times VDC 500V~999V ≥1.5 times VDC 1000V~3000V ≥1.2 times VDC duration 1~5 sec, charge and discharge current less than 50mA. - Temperature Coefficient (with no electrical load) - Operation temperature: Min. operating temp. to Max. operating temp. at 25°C 	<ul style="list-style-type: none"> - Capacitance within the specified tolerance. - Q/D.F. value: <ul style="list-style-type: none"> 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 colspan="2">EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</td> <td>≤2.5%</td> <td>≤3%</td> <td>1206 ≥ 0.47μF</td> </tr> <tr> <td rowspan="2">≤5%</td> <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="2">≤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 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="2">≤3.5%</td> <td>≤10%</td> <td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤5%</td> <td>0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤7%</td> <td>0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="2">≤3.5%</td> <td>≤10%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤12.5%</td> <td>0402 ≥ 0.33μF</td> </tr> <tr> <td>≤5%</td> <td>0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="2">≤3.5%</td> <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>≤15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤5%</td> <td>≤15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤10%</td> <td>≤20%</td> <td>0402 ≥ 2.2μF</td> </tr> <tr> <td>≤15%</td> <td>---</td> </tr> <tr> <td>4V</td> <td>---</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 ≥ 10μF</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>---</td> </tr> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: 1210 ≥ 3.3μF</td> <td rowspan="10">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> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> </tbody> </table>	RATED VOL.	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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±1 sec. - Measurement to be made after keeping at room temp. for 24±2 hrs. 	<ul style="list-style-type: none"> - No remarkable damage. - Cap change: <ul style="list-style-type: none"> NPO: within ±5% or 0.5pF whichever is larger X7R: within ±12.5% <p>(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</p>																																																																																							

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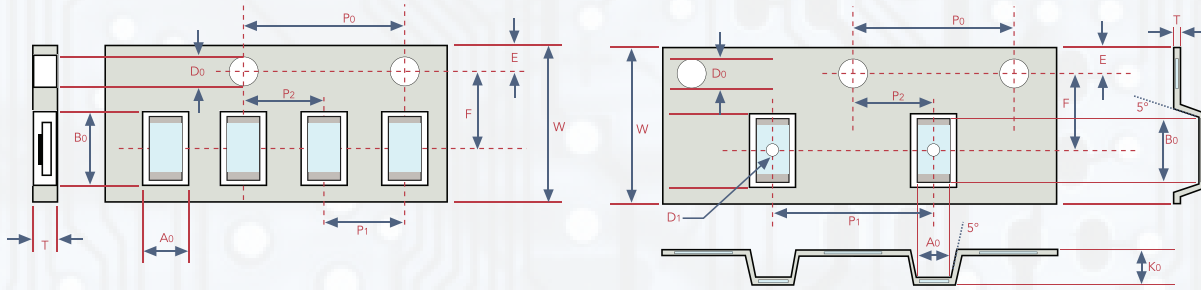


RELIABILITY TEST CONDITIONS AND DIMENSIONS

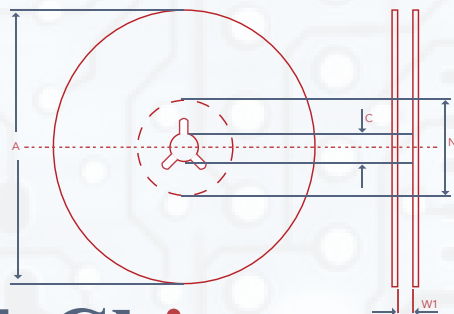
NO.	TEST ITEM	TEST CONDITION	REQUIREMENTS																																								
19.	Terminal Strength AEC-Q200-006	- Pressurizing force: 2N (0201 & 0402), 10N (0603), 10N(0603), 18N(≥0805). - Test time: 60±1 sec.	- No remarkable damage or removal of the terminations - Capacitance within the specified 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 rowspan="3">≤2.5%</td> <td>≤3% 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>≤10% 0805 > 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤2.5%</td> <td>≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 > 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>≤5% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td>≤10% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>≤7% 0603 ≥ 0.33μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤12.5% 0402 ≥ 0.33μF</td> </tr> <tr> <td>≤5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.48μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤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>≤10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="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>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td> </tr> <tr> <td>≤20% 0402 ≥ 2.2μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤10%</td> <td>≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 4.7μF; 1210 ≥ 100μF</td> </tr> <tr> <td>≤20% 0402 ≥ 2.2μF</td> </tr> <tr> <td rowspan="2">4V</td> <td rowspan="2">≤15%</td> <td>---</td> </tr> </tbody> </table>	RATED VOL.	D.F.≤	EXCEPTION OF D.F. ≤	≥100V	≤2.5%	≤3% 1206 ≥ 0.47μF	≤5% 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF	≤10% 0805 > 0.22μF; 1210 ≥ 3.3μF	50V	≤2.5%	≤3% 0201(50V); 0603 ≥ 0.047μF; 0805 > 0.18μF; 1206 ≥ 0.47μF	≤5% 0201 ≥ 0.01μF; 1210 ≥ 3.3μF	≤10% 0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	≤3.5%	≤10% 0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	≤5% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	≤7% 0603 ≥ 0.33μF	25V	≤3.5%	≤10% 0201 ≥ 0.1μF; 0402 ≥ 0.056μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤12.5% 0402 ≥ 0.33μF	≤5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.48μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	16V	≤3.5%	≤10% 0201 ≥ 0.022μF; 0402 ≥ 0.15μF; 0603 > 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	≤10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF	10V	≤5%	≤10% 0201 ≥ 0.012μF; 0402 ≥ 0.15μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	≤15% 0201 ≥ 0.1μF; 0402 ≥ 1μF	≤20% 0402 ≥ 2.2μF	6.3V	≤10%	≤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



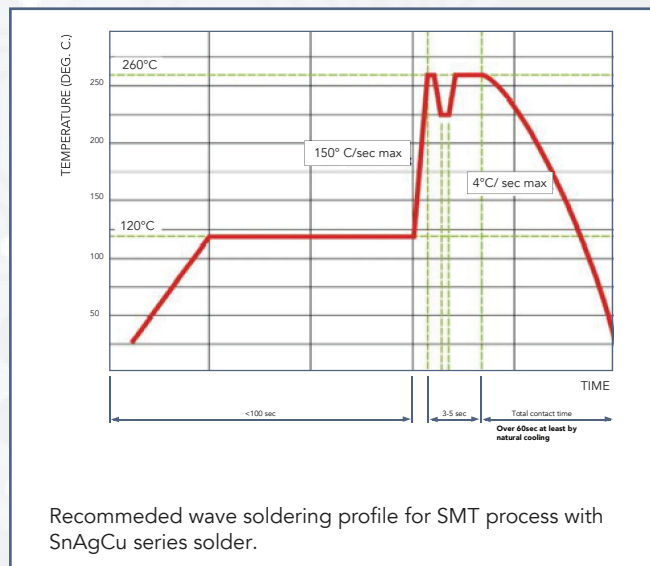
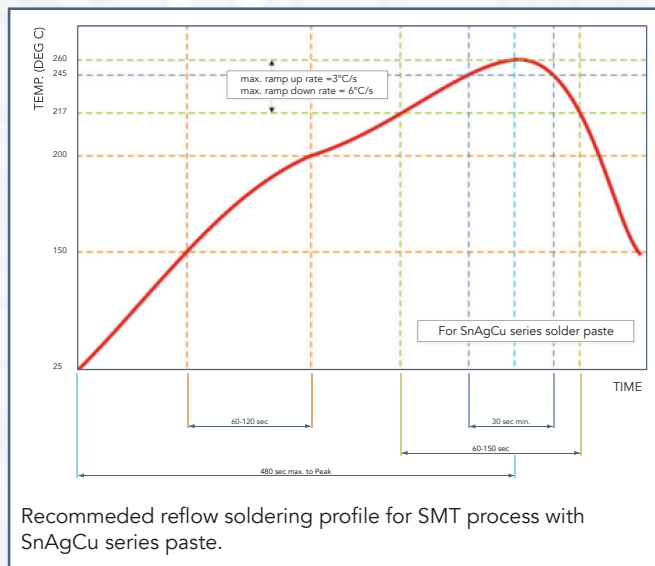
SIZE	0201		0402		0603		0805		1206			1210	
THICKNESS	L	N, E	S, H, X	A, H	B, T	D, I	B, T	C, J, D	G, P	T	C, D, G, K	M	
A ₀	0.40±0.10	0.70±0.20	1.05±0.30	1.50±0.20	1.50±0.20	< 1.80	1.90±0.50	< 2.00	<2.30	< 3.05	< 3.05	< 3.20	
B ₀	0.70±0.10	1.20±0.20	1.80±0.30	2.30±0.20	2.30±0.20	< 2.70	3.50±0.50	< 3.70	< 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±2.0	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, Inc., 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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