

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
- NPO/X7R dielectrics provides product with high electrical precision, stability and reliability
- Assured quality performance in automotive applications qualified to AEC-Q200

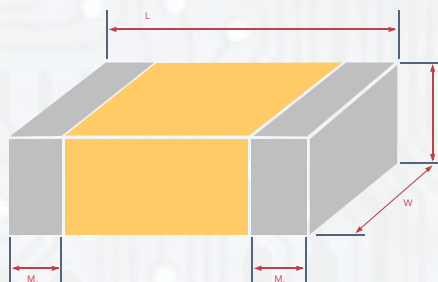
FEATURES

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

APPLICATIONS

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

CONSTRUCTION AND DIMENSIONS



| SIZE INCH (MM) | L (MM) | W (MM) | T (MM) / SYMBOL | REMARK | M _A (MM) |
|----------------|-----------------|-----------------|-----------------|--------|---------------------|
| 0402 (1005) | 1.00±0.05 | 0.50±0.05 | 0.50±0.05 | # | 0.25±0.05/-0.10 |
| 0603 (1608) | 1.60±0.10 | 0.80±0.10 | 0.80±0.07 | | 0.45±0.15 |
| | 1.60±0.15/-0.10 | 0.80±0.15/-0.10 | 0.80±0.15/-0.10 | | |
| 0805 (2012) | 2.00±0.15 | 1.25±0.10 | 0.60±0.10 | | 0.50±0.20 |
| | | | 0.80±0.10 | | |
| | | | 1.25±0.10 | # | |
| | | | 0.80±0.10 | | |
| 1206 (3216) | 3.20±0.15 | 1.60±0.15 | 0.95±0.10 | | 0.60±0.20 |
| | | | 1.25±0.10 | # | |
| | | | 1.15±0.15 | # | |
| | | | 1.60±0.20 | # | |
| | | | 3.20±0.20 | | |
| | 3.20±0.3/-0.10 | 1.60±0.3/-0.1 | 1.60±0.20 | # | |

#Reflow soldering only is recommended

PACKAGING STYLE AND QUANTITY

| SIZE | THICKNESS (mm)/SYMBOL | PAPER TAPE | | PLASTIC TAPE | |
|-------------|-----------------------|------------|----------|--------------|----------|
| | | 7" REEL | 13" REEL | 7" REEL | 13" REEL |
| 0402 (1005) | 0.50±0.05 | 10k | 50K | - | - |
| 0603 (1608) | 0.80±0.07 | 4k | 15k | - | - |
| | 0.80±0.15/-0.10 | 4k | 15k | - | - |
| 0805 (2012) | 0.60±0.10 | 4k | 15k | - | - |
| | 0.80±0.10 | 4k | 15k | - | - |
| | 1.25±0.10 | - | - | 3k | 10k |
| | 1.25±0.20 | - | - | 3k | 10k |
| 1206 (3216) | 0.80±0.10 | 4k | 15k | - | - |
| | 0.95±0.10 | - | - | 3k | 10k |
| | 1.15±0.15 | - | - | 3k | 10k |
| | 1.25±0.10 | - | - | 3k | 10k |
| | 1.60±0.20 | - | - | 3k | 10k |
| | 1.60±0.30/-0.10 | - | - | 3k | 10k |

ORDERING INFORMATION

| GMT | 04 | CG | 102 | J | 50 | NT | 4 |
|-------------------|--|-----------------------------|--|--|--|----------------------------------|--|
| PRODUCT TYPE | DIMENSIONS | DIELECTRIC | CAPACITANCE | TOLERANCE | RATED VOLTAGE | PACKAGING CODE | REEL SIZE |
| AECQ200 Qualified | 04 - 0402 10 - 0603 21 - 0805 31 - 1206 | CG - NPO / C0G X7R - X7R | 0R5: 0.5pF 5R0: 5pF 100: 10pF 101: 10pF 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 | NT: Tape & Reel XT: Soft Term | 3: 3K reel 4: 4K reel 10: 10K reel 15: 15K reel |

**See packaging quantity on page 1 for more info



STANDARD ELECTRICAL SPECIFICATIONS

| DIELECTRIC | NPO | X7R |
|-----------------------------|--|-----------------------------|
| SIZE | 0402, 0603, 0805, 1206 | 0402, 0603, 0805, 1206 |
| CAPACITANCE RANGE* | 0.5pF to 0.01μF | 100PF to 1μF |
| CAPACITANCE TOLERANCE** | Caps≤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%) |
| RATED VOLTAGE (WVDC) | 10V, 16V, 25V, 50V, 100V, 200V | 10V, 16V, 25V, 50V, 100V |
| TAN δ* | Cap <30pF: Q≥400+200C Cap ≥30pF: Q≥1000 | Note 1 |
| INSULATION RESISTANCE AT UR | ≥10GΩ or RxC≥500ΩxF whichever is less | |
| OPERATING TEMPERATURE | -55 TO +125°C | |
| CAPACITANCE CHARACTERISTIC | ±30ppm/°C | ±15% |
| TERMINATION | Ni/Sn (lead-free termination) | |

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

NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% for Caps≤1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25°C at ambient temperature Measured at 1.0±0.2Vrms, 1.0kHz±10% for C≤10uF; 0.5±0.2 Vrms, 120Hz±20% for C>10uF, 30~70% related humidity, 25°C ambient for temperature X7R

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

NOTE 1: X7R

| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | |
|------------|--------|--|------------|
| | | ≤3% | ≤5% |
| ≥50V | ≤2.5% | 0603≥0.047uF; 0805≥0.18uF; 1206≥0.47uF | 1210≥4.7uF |
| | | 0603≥1uF; 0805≥1uF; 1206≥0.47uF; 1210≥10uF | |
| | | 0805≥2.2uF; 1210≥10uF | |
| 35V | ≤3.5% | 0805≥1uF; 1210≥10uF | |
| | | 0603≥0.33uF; 1206≥0.47uF | |
| | | 0402≥0.10uF; 0603≥0.47uF 0805≥2.2uF; 1206≥6.8uF; 1210≥22uF | |
| 25V | ≤3.5% | 0402≥0.033uF; 0603≥0.15uF; 0805≥0.68uF; 1206≥2.2uF; 1210≥4.7uF | |
| | | 0402≥0.47uF; 0603≥0.68uF 0805≥2.2uF; 1206≥4.7uF; 1210≥22uF | |
| | | 0402≥0.033uF; 0603≥0.33uF; 0805≥2.2uF; 1206≥2.2uF; 1210≥22uF | |
| 16V | ≤3.5% | 0402≥1uF | |
| | | 0402≥1uF; 0603≥10uF; 0905≥2.2uF; 1206≥47uF; 1210≥100uF | |
| | | 0402≥2.2uF | |
| 10V | ≤5% | --- | --- |
| | | --- | --- |
| | | --- | --- |
| 6.3V | ≤10% | --- | --- |
| | | --- | --- |
| | | --- | --- |
| 4V | ≤15% | --- | --- |
| | | --- | --- |
| | | --- | --- |





NPO / COG

| DIMENSION (MM) | | GMT04 (0402) | | | | GMT10 (0603) | | | | | | GMT21 (0805) | | | | | GMT31 (1206) | | | | |
|----------------|-----|--------------|----|----|----|--------------|----|----|----|-----|-----|--------------|----|----|----|-----|--------------|----|----|----|-----|
| Rated Voltage | | 10 | 16 | 25 | 50 | 10 | 16 | 25 | 50 | 100 | 200 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| Cap. Range | | | | | | | | | | | | | | | | | | | | | |
| 0.5pF | 0R5 | | | | | | | | | | | | | | | | | | | | |
| 0.6 | 0R6 | | | | | | | | | | | | | | | | | | | | |
| 0.7 | 0R7 | | | | | | | | | | | | | | | | | | | | |
| 0.8 | 0R8 | | | | | | | | | | | | | | | | | | | | |
| 0.9 | 0R9 | | | | | | | | | | | | | | | | | | | | |
| 1 | 1R0 | | | | | | | | | | | | | | | | | | | | |
| 1.2 | 1R2 | | | | | | | | | | | | | | | | | | | | |
| 1.5 | 1R5 | | | | | | | | | | | | | | | | | | | | |
| 1.8 | 1R8 | | | | | | | | | | | | | | | | | | | | |
| 2.2 | 2R2 | | | | | | | | | | | | | | | | | | | | |
| 2.7 | 2R7 | | | | | | | | | | | | | | | | | | | | |
| 3.3 | 3R3 | | | | | | | | | | | | | | | | | | | | |
| 3.9 | 3R9 | | | | | | | | | | | | | | | | | | | | |
| 4.7 | 4R7 | | | | | | | | | | | | | | | | | | | | |
| 5.6 | 5R6 | | | | | | | | | | | | | | | | | | | | |
| 6.8 | 6R8 | | | | | | | | | | | | | | | | | | | | |
| 8.2 | 8R2 | | | | | | | | | | | | | | | | | | | | |
| 10 | 100 | | | | | | | | | | | | | | | | | | | | |
| 12 | 120 | | | | | | | | | | | | | | | | | | | | |
| 15 | 150 | | | | | | | | | | | | | | | | | | | | |
| 18 | 180 | | | | | | | | | | | | | | | | | | | | |
| 22 | 220 | | | | | | | | | | | | | | | | | | | | |
| 27 | 270 | | | | | | | | | | | | | | | | | | | | |
| 33 | 330 | | | | | | | | | | | | | | | | | | | | |
| 39 | 390 | | | | | | | | | | | | | | | | | | | | |
| 47 | 470 | | | | | | | | | | | | | | | | | | | | |
| 56 | 560 | | | | | | | | | | | | | | | | | | | | |
| 68 | 680 | | | | | | | | | | | | | | | | | | | | |
| 82 | 820 | | | | | | | | | | | | | | | | | | | | |
| 100 | 101 | | | | | | | | | | | | | | | | | | | | |
| 120 | 121 | | | | | | | | | | | | | | | | | | | | |
| 150 | 151 | | | | | | | | | | | | | | | | | | | | |
| 180 | 181 | | | | | | | | | | | | | | | | | | | | |
| 220 | 221 | | | | | | | | | | | | | | | | | | | | |
| 270 | 271 | | | | | | | | | | | | | | | | | | | | |
| 330 | 331 | | | | | | | | | | | | | | | | | | | | |
| 390 | 391 | | | | | | | | | | | | | | | | | | | | |
| 470 | 471 | | | | | | | | | | | | | | | | | | | | |
| 560 | 561 | | | | | | | | | | | | | | | | | | | | |
| 680 | 681 | | | | | | | | | | | | | | | | | | | | |
| 820 | 821 | | | | | | | | | | | | | | | | | | | | |
| 1000 | 102 | | | | | | | | | | | | | | | | | | | | |
| 1200 | 122 | | | | | | | | | | | | | | | | | | | | |
| 1500 | 152 | | | | | | | | | | | | | | | | | | | | |
| 180 | 182 | | | | | | | | | | | | | | | | | | | | |
| 2200 | 222 | | | | | | | | | | | | | | | | | | | | |
| 2700 | 272 | | | | | | | | | | | | | | | | | | | | |
| 3300 | 332 | | | | | | | | | | | | | | | | | | | | |
| 3900 | 392 | | | | | | | | | | | | | | | | | | | | |
| 4700 | 472 | | | | | | | | | | | | | | | | | | | | |
| 5600 | 562 | | | | | | | | | | | | | | | | | | | | |
| 6800 | 682 | | | | | | | | | | | | | | | | | | | | |
| 8200 | 822 | | | | | | | | | | | | | | | | | | | | |
| 0.010 uF | 103 | | | | | | | | | | | | | | | | | | | | |

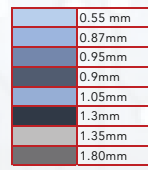
| |
|--------|
| 0.55mm |
| 0.7mm |
| 0.87mm |
| 0.9mm |
| 1.05mm |
| 1.35mm |





X7R

| DIMENSION (MM) | | GMT04 (0402) | | | | GMT10 (0603) | | | | GMT21 (0805) | | | | GMT31 (1206) | | | | |
|----------------|-----|--------------|----|----|----|--------------|----|----|----|--------------|----|----|----|--------------|----|----|----|-----|
| Rated Voltage | | 10 | 16 | 25 | 50 | 10 | 16 | 25 | 50 | 10 | 16 | 25 | 50 | 10 | 16 | 25 | 50 | 100 |
| Cap. Range | | | | | | | | | | | | | | | | | | |
| 100 pF | 101 | | | | | | | | | | | | | | | | | |
| 120 | 121 | | | | | | | | | | | | | | | | | |
| 150 | 151 | | | | | | | | | | | | | | | | | |
| 180 | 181 | | | | | | | | | | | | | | | | | |
| 220 | 221 | | | | | | | | | | | | | | | | | |
| 270 | 271 | | | | | | | | | | | | | | | | | |
| 330 | 331 | | | | | | | | | | | | | | | | | |
| 390 | 391 | | | | | | | | | | | | | | | | | |
| 470 | 471 | | | | | | | | | | | | | | | | | |
| 560 | 561 | | | | | | | | | | | | | | | | | |
| 680 | 681 | | | | | | | | | | | | | | | | | |
| 820 | 821 | | | | | | | | | | | | | | | | | |
| 1000 | 102 | | | | | | | | | | | | | | | | | |
| 1200 | 122 | | | | | | | | | | | | | | | | | |
| 1500 | 152 | | | | | | | | | | | | | | | | | |
| 1800 | 182 | | | | | | | | | | | | | | | | | |
| 2200 | 222 | | | | | | | | | | | | | | | | | |
| 2700 | 272 | | | | | | | | | | | | | | | | | |
| 3300 | 332 | | | | | | | | | | | | | | | | | |
| 3900 | 392 | | | | | | | | | | | | | | | | | |
| 4700 | 472 | | | | | | | | | | | | | | | | | |
| 5600 | 562 | | | | | | | | | | | | | | | | | |
| 6800 | 682 | | | | | | | | | | | | | | | | | |
| 8200 | 822 | | | | | | | | | | | | | | | | | |
| 0.010uF | 103 | | | | | | | | | | | | | | | | | |
| 0.012 | 123 | | | | | | | | | | | | | | | | | |
| 0.015 | 153 | | | | | | | | | | | | | | | | | |
| 0.018 | 183 | | | | | | | | | | | | | | | | | |
| 0.022 | 223 | | | | | | | | | | | | | | | | | |
| 0.027 | 273 | | | | | | | | | | | | | | | | | |
| 0.033 | 333 | | | | | | | | | | | | | | | | | |
| 0.039 | 393 | | | | | | | | | | | | | | | | | |
| 0.047 | 473 | | | | | | | | | | | | | | | | | |
| 0.056 | 563 | | | | | | | | | | | | | | | | | |
| 0.068 | 683 | | | | | | | | | | | | | | | | | |
| 0.082 | 823 | | | | | | | | | | | | | | | | | |
| 0.10 | 104 | | | | | | | | | | | | | | | | | |
| 0.12 | 124 | | | | | | | | | | | | | | | | | |
| 0.15 | 154 | | | | | | | | | | | | | | | | | |
| 0.18 | 184 | | | | | | | | | | | | | | | | | |
| 0.22 | 224 | | | | | | | | | | | | | | | | | |
| 0.27 | 274 | | | | | | | | | | | | | | | | | |
| 0.33 | 334 | | | | | | | | | | | | | | | | | |
| 0.39 | 394 | | | | | | | | | | | | | | | | | |
| 0.47 | 474 | | | | | | | | | | | | | | | | | |
| 0.56 | 564 | | | | | | | | | | | | | | | | | |
| 0.68 | 684 | | | | | | | | | | | | | | | | | |
| 1.00 | 105 | | | | | | | | | | | | | | | | | |
| 2.20 | 225 | | | | | | | | | | | | | | | | | |



RELIABILITY TEST CONDITIONS AND DIMENSIONS

| NO. | AEC-Q200 TEST ITEM | AEC-Q200 TEST CONDITION | REQUIREMENTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|---|------------|-------------|---------------------|-------------|-----|--|------------------|---|--|------------|----------------------------|--------------------------|------------------------------|-----|--|--|--|---|-----|----------------------------|---|---|---------------|-----|--|---|---|---------------|------|---|---|--|----------|-------|---|---------------|---------------|------|---------------|---|--|---|---|----------------------------|---|--|--|---------------|-----------------------|-----------|---|---|----------------------------|---|--|--|------------|-----|-----|-----|
| 1. | Pre-and Post-Stress Electrical Test | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. | High Temperature Exposure (Storage) MIL-STD-202 Method 108 | - Test temp.: 150±3°C - Unpowered - Test TIme: 1000+24/-0 hrs - Measurement to be made after keeping at room temp. for 24±2 hrs. | - No remarkable damage. - Cap Change: 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; font-size: 8px;"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0603≥0.047µF; 0805≥0.18µF; 1206≥0.47µF</td> </tr> <tr> <td>≤10% 1206≥0.47µF</td> </tr> <tr> <td>≤20% 0603≥1µF; 0805≥1µF; 1206≥0.47µF, 1210≥10µF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤5%</td> <td>≤20% 0805≥2.2µF; 1210≥10µF</td> </tr> <tr> <td>≤10% 0805≥1µF; 1210≥10µF</td> </tr> <tr> <td>≤14% 0603≥0.33µF; 1206≥4.7µF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤15% 0402≥0.10µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥6.8µF; 1210≥22µF</td> </tr> <tr> <td>≤10% 0603≥1.5µF; 0805≥0.68µF; 1206≥2.2µF, 1210≥4.7µF</td> </tr> <tr> <td>≤15% 0402≥0.033µF; 0603≥0.68µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥22µF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤5%</td> <td>≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF</td> </tr> <tr> <td>≤10% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF</td> </tr> <tr> <td>≤20% 0402≥1µF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤7.5%</td> <td>≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF</td> </tr> <tr> <td>≤10% 0402≥1µF</td> </tr> <tr> <td>≤20% 0402≥1µF</td> </tr> <tr> <td rowspan="3">6.3V</td> <td rowspan="3">≤15%</td> <td>≤30% 0402≥1µF; 0603≥10µF; 0805≥4.7µF; 1206≥47µF; 1210≥100µF</td> </tr> <tr> <td>≤10% 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF</td> </tr> <tr> <td>≤20% ---</td> </tr> <tr> <td rowspan="3">4V</td> <td rowspan="3">≤20%</td> <td>---</td> </tr> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> </tbody> </table> Class II (X7R) <table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="10" style="text-align: center; vertical-align: middle;">1GΩ or RxC≥10 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1µF; 0805≥1µF; 1206≥4.7µF; 1210≥4.7µF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22µF; 0603≥1µF; 0805≥2.2µF; 1206≥10µF; 1210≥47µF</td> </tr> <tr> <td>10V: 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF</td> </tr> <tr> <td>6.3V; 4.3;</td> </tr> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> </tbody> </table> | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | 50V | ≤3% | ≤6% 0603≥0.047µF; 0805≥0.18µF; 1206≥0.47µF | ≤10% 1206≥0.47µF | ≤20% 0603≥1µF; 0805≥1µF; 1206≥0.47µF, 1210≥10µF | 35V | ≤5% | ≤20% 0805≥2.2µF; 1210≥10µF | ≤10% 0805≥1µF; 1210≥10µF | ≤14% 0603≥0.33µF; 1206≥4.7µF | 25V | ≤5% | ≤15% 0402≥0.10µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥6.8µF; 1210≥22µF | ≤10% 0603≥1.5µF; 0805≥0.68µF; 1206≥2.2µF, 1210≥4.7µF | ≤15% 0402≥0.033µF; 0603≥0.68µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥22µF | 16V | ≤5% | ≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | ≤10% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | ≤20% 0402≥1µF | 10V | ≤7.5% | ≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | ≤10% 0402≥1µF | ≤20% 0402≥1µF | 6.3V | ≤15% | ≤30% 0402≥1µF; 0603≥10µF; 0805≥4.7µF; 1206≥47µF; 1210≥100µF | ≤10% 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF | ≤20% --- | 4V | ≤20% | --- | --- | --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 1GΩ or RxC≥10 Ω·F whichever is smaller. | 50V: 0603≥1µF; 0805≥1µF; 1206≥4.7µF; 1210≥4.7µF | 35V: 0805≥2.2µF; 1210≥10µF | 25V: 0402≥1µF; 0603≥2.2µF; 0805≥2.2µF; 1206≥10µF; 1210≥10µF | 16V: 0402≥0.22µF; 0603≥1µF; 0805≥2.2µF; 1206≥10µF; 1210≥47µF | 10V: 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF | 6.3V; 4.3; | --- | --- | --- | | | | | | | | | |
| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V | ≤3% | ≤6% 0603≥0.047µF; 0805≥0.18µF; 1206≥0.47µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 1206≥0.47µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 35V | ≤5% | ≤20% 0805≥2.2µF; 1210≥10µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 16V | ≤5% | ≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | ≤20% 0402≥1µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V | ≤7.5% | ≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | ≤20% 0402≥1µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V | ≤15% | ≤30% 0402≥1µF; 0603≥10µF; 0805≥4.7µF; 1206≥47µF; 1210≥100µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | ≤20% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 1GΩ or RxC≥10 Ω·F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603≥1µF; 0805≥1µF; 1206≥4.7µF; 1210≥4.7µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805≥2.2µF; 1210≥10µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402≥1µF; 0603≥2.2µF; 0805≥2.2µF; 1206≥10µF; 1210≥10µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V: 0402≥0.22µF; 0603≥1µF; 0805≥2.2µF; 1206≥10µF; 1210≥47µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V: 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V; 4.3; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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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; font-size: 8px; margin: 5px 0;"> <thead> <tr> <th>STEP</th> <th>TEMP. (°C)</th> <th>TIME (MIN.)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">-55°C +0/-3</td> <td style="text-align: center;">5±1</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">+125°C+3/-0</td> <td style="text-align: center;">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 ±10.8 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; font-size: 8px;"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0603≥0.047µF; 0805≥0.18µF; 1206≥0.47µF</td> </tr> <tr> <td>≤10% 1210≥4.7µF</td> </tr> <tr> <td>≤20% 0603≥1µF; 0805≥1µF; 1206≥4.7µF, 1210≥10µF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤5%</td> <td>≤20% 0805≥2.2µF; 1210≥10µF</td> </tr> <tr> <td>≤10% 0805≥1µF; 1210≥10µF</td> </tr> <tr> <td>≤14% 0603≥0.33µF; 1206≥4.7µF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤15% 0402≥0.10µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥6.8µF; 1210≥22µF</td> </tr> <tr> <td>≤10% 0603≥1.5µF; 0805≥0.68µF; 1206≥2.2µF, 1210≥4.7µF</td> </tr> <tr> <td>≤15% 0402≥0.033µF; 0603≥0.68µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥22µF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤5%</td> <td>≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF</td> </tr> <tr> <td>≤10% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF</td> </tr> <tr> <td>≤20% 0402≥1µF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤7.5%</td> <td>≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF</td> </tr> <tr> <td>≤10% 0402≥1µF</td> </tr> <tr> <td>≤20% 0402≥1µF</td> </tr> <tr> <td rowspan="3">6.3V</td> <td rowspan="3">≤15%</td> <td>≤30% 0402≥1µF; 0603≥10µF; 0805≥4.7µF; 1206≥47µF; 1210≥100µF</td> </tr> <tr> <td>≤10% 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF</td> </tr> <tr> <td>≤20% ---</td> </tr> <tr> <td rowspan="3">4V</td> <td rowspan="3">≤20%</td> <td>---</td> </tr> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> </tbody> </table> Class II (X7R) <table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="10" style="text-align: center; vertical-align: middle;">1GΩ or RxC≥10 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1µF; 0805≥1µF; 1206≥4.7µF; 1210≥4.7µF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22µF; 0603≥1µF; 0805≥2.2µF; 1206≥10µF; 1210≥47µF</td> </tr> <tr> <td>10V: 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF</td> </tr> <tr> <td>6.3V; 4.3;</td> </tr> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> <tr> <td>---</td> </tr> </tbody> </table> | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | 50V | ≤3% | ≤6% 0603≥0.047µF; 0805≥0.18µF; 1206≥0.47µF | ≤10% 1210≥4.7µF | ≤20% 0603≥1µF; 0805≥1µF; 1206≥4.7µF, 1210≥10µF | 35V | ≤5% | ≤20% 0805≥2.2µF; 1210≥10µF | ≤10% 0805≥1µF; 1210≥10µF | ≤14% 0603≥0.33µF; 1206≥4.7µF | 25V | ≤5% | ≤15% 0402≥0.10µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥6.8µF; 1210≥22µF | ≤10% 0603≥1.5µF; 0805≥0.68µF; 1206≥2.2µF, 1210≥4.7µF | ≤15% 0402≥0.033µF; 0603≥0.68µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥22µF | 16V | ≤5% | ≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | ≤10% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | ≤20% 0402≥1µF | 10V | ≤7.5% | ≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | ≤10% 0402≥1µF | ≤20% 0402≥1µF | 6.3V | ≤15% | ≤30% 0402≥1µF; 0603≥10µF; 0805≥4.7µF; 1206≥47µF; 1210≥100µF | ≤10% 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF | ≤20% --- | 4V | ≤20% | --- | --- | --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 1GΩ or RxC≥10 Ω·F whichever is smaller. | 50V: 0603≥1µF; 0805≥1µF; 1206≥4.7µF; 1210≥4.7µF | 35V: 0805≥2.2µF; 1210≥10µF | 25V: 0402≥1µF; 0603≥2.2µF; 0805≥2.2µF; 1206≥10µF; 1210≥10µF | 16V: 0402≥0.22µF; 0603≥1µF; 0805≥2.2µF; 1206≥10µF; 1210≥47µF | 10V: 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF | 6.3V; 4.3; | --- | --- | --- |
| STEP | TEMP. (°C) | TIME (MIN.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | -55°C +0/-3 | 5±1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | +125°C+3/-0 | 5±1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V | ≤3% | ≤6% 0603≥0.047µF; 0805≥0.18µF; 1206≥0.47µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 1210≥4.7µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% 0603≥1µF; 0805≥1µF; 1206≥4.7µF, 1210≥10µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V | ≤5% | ≤20% 0805≥2.2µF; 1210≥10µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0805≥1µF; 1210≥10µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤14% 0603≥0.33µF; 1206≥4.7µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V | ≤5% | ≤15% 0402≥0.10µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥6.8µF; 1210≥22µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0603≥1.5µF; 0805≥0.68µF; 1206≥2.2µF, 1210≥4.7µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤15% 0402≥0.033µF; 0603≥0.68µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥22µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V | ≤5% | ≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% 0402≥1µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V | ≤7.5% | ≤15% 0402≥0.33µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥2.2µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0402≥1µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% 0402≥1µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V | ≤15% | ≤30% 0402≥1µF; 0603≥10µF; 0805≥4.7µF; 1206≥47µF; 1210≥100µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | ≤20% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 1GΩ or RxC≥10 Ω·F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603≥1µF; 0805≥1µF; 1206≥4.7µF; 1210≥4.7µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805≥2.2µF; 1210≥10µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402≥1µF; 0603≥2.2µF; 0805≥2.2µF; 1206≥10µF; 1210≥10µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V: 0402≥0.22µF; 0603≥1µF; 0805≥2.2µF; 1206≥10µF; 1210≥47µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V: 0402≥0.47µF; 0603≥0.47µF; 0805≥2.2µF; 1206≥4.7µF; 1210≥47µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V; 4.3; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| NO. | AEC-Q200 TEST ITEM | AEC-Q200 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" data-bbox="982 378 1526 672"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤10% 1210≥4.7μF</td> </tr> <tr> <td>≤20% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF</td> </tr> <tr> <td rowspan="2">35V</td> <td rowspan="2">≤5%</td> <td>≤20% 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>≤10% 0805≥1μF; 1210≥10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤14% 0603≥0.33μF; 1206≥4.7μF</td> </tr> <tr> <td>≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF</td> </tr> <tr> <td>≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤5%</td> <td>≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td>≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤7.5%</td> <td>≤15% 0402≥1μF</td> </tr> <tr> <td>≤20% 0402≥1μF</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30% 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> <table border="1" data-bbox="950 714 1526 871"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="8">1GΩ or RxC≥10 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V; 4V</td> </tr> </tbody> </table> | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | 50V | ≤3% | ≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF | ≤10% 1210≥4.7μF | ≤20% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF | 35V | ≤5% | ≤20% 0805≥2.2μF; 1210≥10μF | ≤10% 0805≥1μF; 1210≥10μF | 25V | ≤5% | ≤14% 0603≥0.33μF; 1206≥4.7μF | ≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | ≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | 16V | ≤5% | ≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | 10V | ≤7.5% | ≤15% 0402≥1μF | ≤20% 0402≥1μF | 6.3V | ≤15% | ≤30% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | 4V | ≤20% | --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 1GΩ or RxC≥10 Ω·F whichever is smaller. | 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | 35V: 0805≥2.2μF; 1210≥10μF | 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | 6.3V; 4V | | | | | | | | | | |
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| 25V | ≤5% | ≤14% 0603≥0.33μF; 1206≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 16V | ≤5% | ≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 10V | ≤7.5% | ≤15% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 4V | ≤20% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 1GΩ or RxC≥10 Ω·F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 6.3V; 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. | | Biased Humidity MIL-STD-202 Method 103 | - Test Temp.: 85±3°C - Humidity: 85%RH - Test Time: 1000+24/-0 hrs - To apply voltage: rated voltage and 1.3~1.5Vdc (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" data-bbox="982 1081 1526 1375"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤10% 1210≥4.7μF</td> </tr> <tr> <td>≤20% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF</td> </tr> <tr> <td rowspan="2">35V</td> <td rowspan="2">≤5%</td> <td>≤20% 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>≤10% 0805≥1μF; 1210≥10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤14% 0603≥0.33μF; 1206≥4.7μF</td> </tr> <tr> <td>≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF</td> </tr> <tr> <td>≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤5%</td> <td>≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td>≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤7.5%</td> <td>≤15% 0402≥1μF</td> </tr> <tr> <td>≤20% 0402≥1μF</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30% 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.: ≥1GΩ OR RxC≥50Ω·F whichever is smaller.</p> <table border="1" data-bbox="950 1417 1526 1575"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="8">500MΩ or RxC≥5 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V; 4V</td> </tr> </tbody> </table> <table border="1" data-bbox="950 1606 1526 1774"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="8">1GΩ or RxC≥10 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V; 4V</td> </tr> </tbody> </table> | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | 50V | ≤3% | ≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF | ≤10% 1210≥4.7μF | ≤20% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF | 35V | ≤5% | ≤20% 0805≥2.2μF; 1210≥10μF | ≤10% 0805≥1μF; 1210≥10μF | 25V | ≤5% | ≤14% 0603≥0.33μF; 1206≥4.7μF | ≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | ≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | 16V | ≤5% | ≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | 10V | ≤7.5% | ≤15% 0402≥1μF | ≤20% 0402≥1μF | 6.3V | ≤15% | ≤30% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | 4V | ≤20% | --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 500MΩ or RxC≥5 Ω·F whichever is smaller. | 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | 35V: 0805≥2.2μF; 1210≥10μF | 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | 6.3V; 4V | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 1GΩ or RxC≥10 Ω·F whichever is smaller. | 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | 35V: 0805≥2.2μF; 1210≥10μF | 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF |
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| | | ≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 10V | ≤7.5% | ≤15% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V | ≤15% | ≤30% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | ≤20% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 500MΩ or RxC≥5 Ω·F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V; 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 1GΩ or RxC≥10 Ω·F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V; 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| NO. | AEC-Q200 TEST ITEM | AEC-Q200 TEST CONDITION | REQUIREMENTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|---|------------|--------|---------------------|-----|-------|--|-----------------|--|-----|-------|----------------------------|--------------------------|------------------------------|-----|-------|--|--|---|-----|-------|--|--|---------------|-----|-------|--|--|---|------|------|---|--------------|------|-----------------|---------|---------------|-----------------------|---------------|--|---|---|---|--|--|--|--|----------|
| 7. | Operational Life MIL-STD-202 Method 108 | - Test temp.: 125±3°C - To apply voltage: full rated voltage - Test time: 1000+24/-0 - Before initial measurement (X7R only): Apply rated voltage for 1 hr at 125°C. Remove and let set for 24+2hrs at room temp. - 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" data-bbox="885 378 1429 682"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤10% 1206≥4.7μF</td> </tr> <tr> <td>≤20% 0603≥1μF; 0805≥1μF; 1206≥4.7μF, 1210≥10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤5%</td> <td>≤20% 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>≤10% 0805≥1μF; 1210≥10μF</td> </tr> <tr> <td>≤14% 0603≥0.33μF; 1206≥4.7μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF</td> </tr> <tr> <td>≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF, 1210≥4.7μF</td> </tr> <tr> <td>≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤5%</td> <td>≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤20% 0402≥1μF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤7.5%</td> <td>≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤20% 0402≥1μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤15%</td> <td>≤30% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF</td> </tr> <tr> <td>≤20% --- ---</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>--- ---</td> </tr> </tbody> </table> -I.R.: ≥1GΩ OR RxC≥50Q-F whichever is smaller Class II (X7R) <table border="1" data-bbox="885 735 1429 882"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="7">10GΩ or RxC≥10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V; 4V</td> </tr> </tbody> </table> | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | 50V | ≤3% | ≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF | ≤10% 1206≥4.7μF | ≤20% 0603≥1μF; 0805≥1μF; 1206≥4.7μF, 1210≥10μF | 35V | ≤5% | ≤20% 0805≥2.2μF; 1210≥10μF | ≤10% 0805≥1μF; 1210≥10μF | ≤14% 0603≥0.33μF; 1206≥4.7μF | 25V | ≤5% | ≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | ≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF, 1210≥4.7μF | ≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | 16V | ≤5% | ≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤20% 0402≥1μF | 10V | ≤7.5% | ≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤20% 0402≥1μF | 6.3V | ≤15% | ≤30% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | ≤20% --- --- | 4V | ≤20% | --- --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 10GΩ or RxC≥10 Ω-F whichever is smaller. | 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | 35V: 0805≥2.2μF; 1210≥10μF | 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | 6.3V; 4V | | |
| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V | ≤3% | ≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 1206≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% 0603≥1μF; 0805≥1μF; 1206≥4.7μF, 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V | ≤5% | ≤20% 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0805≥1μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤14% 0603≥0.33μF; 1206≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V | ≤5% | ≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF, 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V | ≤5% | ≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V | ≤7.5% | ≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V | ≤15% | ≤30% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% --- --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | ≤20% | --- --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 10GΩ or RxC≥10 Ω-F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 6.3V; 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8. | External Visual MIL-STD-202 Method 2009 | - Visual inspection | - No remarkable defect. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. | Physical Dimension JESD22 Method JB-100 | - Using by calipers | - Within the specified dimencions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. | Resistance to Solvents MIL-STD-202 Method 215 | - Temperature 25±5°C - Time: 3+0.5/-0 min - Solvent: Iso-propyl alcohol. | - No remarkable damage. - Cap Change: within the specified tolerance. -Q/D.F. value: NPO: Cap≥30pf; Q≥1000; Cap<30pF, Q≥400+20C. X7R: <table border="1" data-bbox="885 1228 1429 1554"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">50V</td> <td rowspan="3">≤2.5%</td> <td>≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤5% 1206≥4.7μF</td> </tr> <tr> <td>≤10% 0603≥1μF; 0805≥1μF; 1206≥4.7μF, 1210≥10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>≤5% 0805≥1μF; 1210≥10μF</td> </tr> <tr> <td>≤7% 0603≥0.33μF; 1206≥4.7μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF</td> </tr> <tr> <td>≤5% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤10% 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤15% 0402≥1μF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤5%</td> <td>≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤15% 0402≥1μF</td> </tr> <tr> <td>≤20% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF</td> </tr> <tr> <td>6.3V</td> <td>≤10%</td> <td>≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF</td> </tr> <tr> <td>4V</td> <td>≤15%</td> <td>≤20% 0402≥2.2μF</td> </tr> <tr> <td></td> <td></td> <td>--- ---</td> </tr> </tbody> </table> -I.R.: ≥10GΩ OR RxC≥500Q-F whichever is smaller Class II (X7R) <table border="1" data-bbox="885 1617 1429 1764"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="7">10GΩ or RxC≥100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V; 4V</td> </tr> </tbody> </table> | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | 50V | ≤2.5% | ≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF | ≤5% 1206≥4.7μF | ≤10% 0603≥1μF; 0805≥1μF; 1206≥4.7μF, 1210≥10μF | 35V | ≤3.5% | ≤10% 0805≥2.2μF; 1210≥10μF | ≤5% 0805≥1μF; 1210≥10μF | ≤7% 0603≥0.33μF; 1206≥4.7μF | 25V | ≤3.5% | ≤10% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | ≤5% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | ≤10% 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | 16V | ≤3.5% | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤15% 0402≥1μF | 10V | ≤5% | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤15% 0402≥1μF | ≤20% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | 6.3V | ≤10% | ≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | 4V | ≤15% | ≤20% 0402≥2.2μF | | | --- --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 10GΩ or RxC≥100 Ω-F whichever is smaller. | 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | 35V: 0805≥2.2μF; 1210≥10μF | 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | 6.3V; 4V |
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| | | ≤15% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V | ≤5% | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 6.3V | ≤10% | ≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | ≤15% | ≤20% 0402≥2.2μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | --- --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 10GΩ or RxC≥100 Ω-F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V; 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| NO. | AEC-Q200 TEST ITEM | AEC-Q200 TEST CONDITION | REQUIREMENTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|--|---|------------|-------------|--------------------------|------------|-------------|---|-----------------------------------|-----|-------------|--|---|-----|-------------|---|---|-----|-------------|---|---|-----|-----------|---|----------------------------------|------|------------|--|------------------------------------|----|------------|-----|---------------|-----------------------|-----------|--|---|--|--|---|---|----------|----------|
| 11. | Mechanical Shock MIL-STD-202 Method 213 | - Peak value: 1500g's - Wave: 1/2 sine. - Veolicy: 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: Cap \geq 30pF, Q \geq 1000; Cap $<$ 30pF, Q \geq 400+20C X7R: <table border="1" data-bbox="982 331 1528 674"> <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">50V</td> <td rowspan="2">\leq2.5%</td> <td>\leq3% 0603\geq0.047μF; 0805\geq0.18μF; 1206\geq0.47μF</td> </tr> <tr> <td>\leq5% 1206\geq4.7μF</td> </tr> <tr> <td rowspan="2">35V</td> <td rowspan="2">\leq3.5%</td> <td>\leq10% 0603\geq1μF; 0805\geq1μF; 1206\geq4.7μF; 1210\geq10μF</td> </tr> <tr> <td>\leq5% 0805\geq2.2μF; 1210\geq10μF</td> </tr> <tr> <td rowspan="2">25V</td> <td rowspan="2">\leq3.5%</td> <td>\leq7% 0603\geq0.33μF; 1206\geq4.7μF</td> </tr> <tr> <td>\leq10% 0402\geq0.10μF; 0603\geq0.47μF; 0805\geq2.2μF; 1206\geq6.8μF; 1210\geq22μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">\leq3.5%</td> <td>\leq5% 0402\geq0.033μF; 0603\geq0.15μF; 0805\geq0.68μF; 1206\geq2.2μF; 1210\geq4.7μF</td> </tr> <tr> <td>\leq10% 0402\geq0.22μF; 0603\geq0.68μF; 0805\geq2.2μF; 1206\geq4.7μF; 1210\geq22μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">\leq5%</td> <td>\leq10% 0402\geq0.33μF; 0603\geq0.33μF; 0805\geq2.2μF; 1206\geq2.2μF; 1210\geq22μF</td> </tr> <tr> <td>\leq15% 0402\geq1μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">\leq10%</td> <td>\leq15% 0402\geq1μF; 0603\geq10μF; 0805\geq4.7μF; 1206\geq47μF; 1210\geq100μF</td> </tr> <tr> <td>\leq20% 0402\geq2.2μF</td> </tr> <tr> <td>4V</td> <td>\leq15%</td> <td>---</td> </tr> </tbody> </table> <p data-bbox="982 688 1279 709">*I.R.: \geq10GΩ OR RxC\geq5000Ω-F whichever is smaller.</p> <p data-bbox="954 716 1031 737">Class II (X7R)</p> <table border="1" data-bbox="982 737 1528 877"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="8">10GΩ or RxC\geq100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0603\geq1μF; 0805\geq1μF; 1206\geq4.7μF; 1210\geq4.7μF</td> </tr> <tr> <td>35V: 0805\geq2.2μF; 1210\geq10μF</td> </tr> <tr> <td>25V: 0402\geq1μF; 0603\geq2.2μF; 0805\geq2.2μF; 1206\geq10μF; 1210\geq10μF</td> </tr> <tr> <td>16V: 0402\geq0.22μF; 0603\geq1μF; 0805\geq2.2μF; 1206\geq10μF; 1210\geq47μF</td> </tr> <tr> <td>10V: 0402\geq0.47μF; 0603\geq0.47μF; 0805\geq2.2μF; 1206\geq4.7μF; 1210\geq47μF</td> </tr> <tr> <td>6.3V: 4V</td> </tr> <tr> <td>6.3V: 4V</td> </tr> </tbody> </table> | RATED VOL. | D.F. \leq | EXCEPTION OF D.F. \leq | 50V | \leq 2.5% | \leq 3% 0603 \geq 0.047 μ F; 0805 \geq 0.18 μ F; 1206 \geq 0.47 μ F | \leq 5% 1206 \geq 4.7 μ F | 35V | \leq 3.5% | \leq 10% 0603 \geq 1 μ F; 0805 \geq 1 μ F; 1206 \geq 4.7 μ F; 1210 \geq 10 μ F | \leq 5% 0805 \geq 2.2 μ F; 1210 \geq 10 μ F | 25V | \leq 3.5% | \leq 7% 0603 \geq 0.33 μ F; 1206 \geq 4.7 μ F | \leq 10% 0402 \geq 0.10 μ F; 0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F; 1206 \geq 6.8 μ F; 1210 \geq 22 μ F | 16V | \leq 3.5% | \leq 5% 0402 \geq 0.033 μ F; 0603 \geq 0.15 μ F; 0805 \geq 0.68 μ F; 1206 \geq 2.2 μ F; 1210 \geq 4.7 μ F | \leq 10% 0402 \geq 0.22 μ F; 0603 \geq 0.68 μ F; 0805 \geq 2.2 μ F; 1206 \geq 4.7 μ F; 1210 \geq 22 μ F | 10V | \leq 5% | \leq 10% 0402 \geq 0.33 μ F; 0603 \geq 0.33 μ F; 0805 \geq 2.2 μ F; 1206 \geq 2.2 μ F; 1210 \geq 22 μ F | \leq 15% 0402 \geq 1 μ F | 6.3V | \leq 10% | \leq 15% 0402 \geq 1 μ F; 0603 \geq 10 μ F; 0805 \geq 4.7 μ F; 1206 \geq 47 μ F; 1210 \geq 100 μ F | \leq 20% 0402 \geq 2.2 μ F | 4V | \leq 15% | --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 10G Ω or RxC \geq 100 Ω -F whichever is smaller. | 50V: 0603 \geq 1 μ F; 0805 \geq 1 μ F; 1206 \geq 4.7 μ F; 1210 \geq 4.7 μ F | 35V: 0805 \geq 2.2 μ F; 1210 \geq 10 μ F | 25V: 0402 \geq 1 μ F; 0603 \geq 2.2 μ F; 0805 \geq 2.2 μ F; 1206 \geq 10 μ F; 1210 \geq 10 μ F | 16V: 0402 \geq 0.22 μ F; 0603 \geq 1 μ F; 0805 \geq 2.2 μ F; 1206 \geq 10 μ F; 1210 \geq 47 μ F | 10V: 0402 \geq 0.47 μ F; 0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F; 1206 \geq 4.7 μ F; 1210 \geq 47 μ F | 6.3V: 4V | 6.3V: 4V |
| RATED VOL. | D.F. \leq | EXCEPTION OF D.F. \leq | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | \leq 5% 1206 \geq 4.7 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V | \leq 3.5% | \leq 10% 0603 \geq 1 μ F; 0805 \geq 1 μ F; 1206 \geq 4.7 μ F; 1210 \geq 10 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | \leq 5% 0805 \geq 2.2 μ F; 1210 \geq 10 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V | \leq 3.5% | \leq 7% 0603 \geq 0.33 μ F; 1206 \geq 4.7 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | \leq 10% 0402 \geq 0.10 μ F; 0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F; 1206 \geq 6.8 μ F; 1210 \geq 22 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V | \leq 3.5% | \leq 5% 0402 \geq 0.033 μ F; 0603 \geq 0.15 μ F; 0805 \geq 0.68 μ F; 1206 \geq 2.2 μ F; 1210 \geq 4.7 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | \leq 15% 0402 \geq 1 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | \leq 20% 0402 \geq 2.2 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | \leq 15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 10G Ω or RxC \geq 100 Ω -F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603 \geq 1 μ F; 0805 \geq 1 μ F; 1206 \geq 4.7 μ F; 1210 \geq 4.7 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805 \geq 2.2 μ F; 1210 \geq 10 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402 \geq 1 μ F; 0603 \geq 2.2 μ F; 0805 \geq 2.2 μ F; 1206 \geq 10 μ F; 1210 \geq 10 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V: 0402 \geq 0.22 μ F; 0603 \geq 1 μ F; 0805 \geq 2.2 μ F; 1206 \geq 10 μ F; 1210 \geq 47 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V: 0402 \geq 0.47 μ F; 0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F; 1206 \geq 4.7 μ F; 1210 \geq 47 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V: 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V: 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 \geq 30pF, Q \geq 1000; Cap $<$ 30pF, Q \geq 400+20C X7R: <table border="1" data-bbox="982 1024 1528 1367"> <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">\geq50V</td> <td rowspan="2">\leq2.5%</td> <td>\leq3% 0603\geq0.047μF; 0805\geq0.18μF; 1206\geq0.47μF</td> </tr> <tr> <td>\leq5% 1206\geq4.7μF</td> </tr> <tr> <td rowspan="2">35V</td> <td rowspan="2">\leq3.5%</td> <td>\leq10% 0603\geq1μF; 0805\geq1μF; 1206\geq4.7μF; 1210\geq10μF</td> </tr> <tr> <td>\leq5% 0805\geq2.2μF; 1210\geq10μF</td> </tr> <tr> <td rowspan="2">25V</td> <td rowspan="2">\leq3.5%</td> <td>\leq7% 0603\geq0.33μF; 1206\geq4.7μF</td> </tr> <tr> <td>\leq10% 0402\geq0.10μF; 0603\geq0.47μF; 0805\geq2.2μF; 1206\geq6.8μF; 1210\geq22μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">\leq3.5%</td> <td>\leq5% 0402\geq0.033μF; 0603\geq0.15μF; 0805\geq0.68μF; 1206\geq2.2μF; 1210\geq4.7μF</td> </tr> <tr> <td>\leq10% 0402\geq0.22μF; 0603\geq0.68μF; 0805\geq2.2μF; 1206\geq4.7μF; 1210\geq22μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">\leq5%</td> <td>\leq10% 0402\geq0.33μF; 0603\geq0.33μF; 0805\geq2.2μF; 1206\geq2.2μF; 1210\geq22μF</td> </tr> <tr> <td>\leq15% 0402\geq1μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">\leq10%</td> <td>\leq15% 0402\geq1μF; 0603\geq10μF; 0805\geq4.7μF; 1206\geq47μF; 1210\geq100μF</td> </tr> <tr> <td>\leq20% 0402\geq2.2μF</td> </tr> <tr> <td>4V</td> <td>\leq15%</td> <td>---</td> </tr> </tbody> </table> <p data-bbox="982 1373 1279 1394">*I.R.: \geq1GΩ OR RxC\geq50Ω-F whichever is smaller.</p> <p data-bbox="954 1400 1154 1421">Class II (X7R) for rated voltage test</p> <table border="1" data-bbox="982 1421 1528 1562"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="8">10MΩ or RxC\geq100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0603\geq1μF; 0805\geq1μF; 1206\geq4.7μF; 1210\geq4.7μF</td> </tr> <tr> <td>35V: 0805\geq2.2μF; 1210\geq10μF</td> </tr> <tr> <td>25V: 0402\geq1μF; 0603\geq2.2μF; 0805\geq2.2μF; 1206\geq10μF; 1210\geq10μF</td> </tr> <tr> <td>16V: 0402\geq0.22μF; 0603\geq1μF; 0805\geq2.2μF; 1206\geq10μF; 1210\geq47μF</td> </tr> <tr> <td>10V: 0402\geq0.47μF; 0603\geq0.47μF; 0805\geq2.2μF; 1206\geq4.7μF; 1210\geq47μF</td> </tr> <tr> <td>6.3V: 4V</td> </tr> <tr> <td>6.3V: 4V</td> </tr> </tbody> </table> | RATED VOL. | D.F. \leq | EXCEPTION OF D.F. \leq | \geq 50V | \leq 2.5% | \leq 3% 0603 \geq 0.047 μ F; 0805 \geq 0.18 μ F; 1206 \geq 0.47 μ F | \leq 5% 1206 \geq 4.7 μ F | 35V | \leq 3.5% | \leq 10% 0603 \geq 1 μ F; 0805 \geq 1 μ F; 1206 \geq 4.7 μ F; 1210 \geq 10 μ F | \leq 5% 0805 \geq 2.2 μ F; 1210 \geq 10 μ F | 25V | \leq 3.5% | \leq 7% 0603 \geq 0.33 μ F; 1206 \geq 4.7 μ F | \leq 10% 0402 \geq 0.10 μ F; 0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F; 1206 \geq 6.8 μ F; 1210 \geq 22 μ F | 16V | \leq 3.5% | \leq 5% 0402 \geq 0.033 μ F; 0603 \geq 0.15 μ F; 0805 \geq 0.68 μ F; 1206 \geq 2.2 μ F; 1210 \geq 4.7 μ F | \leq 10% 0402 \geq 0.22 μ F; 0603 \geq 0.68 μ F; 0805 \geq 2.2 μ F; 1206 \geq 4.7 μ F; 1210 \geq 22 μ F | 10V | \leq 5% | \leq 10% 0402 \geq 0.33 μ F; 0603 \geq 0.33 μ F; 0805 \geq 2.2 μ F; 1206 \geq 2.2 μ F; 1210 \geq 22 μ F | \leq 15% 0402 \geq 1 μ F | 6.3V | \leq 10% | \leq 15% 0402 \geq 1 μ F; 0603 \geq 10 μ F; 0805 \geq 4.7 μ F; 1206 \geq 47 μ F; 1210 \geq 100 μ F | \leq 20% 0402 \geq 2.2 μ F | 4V | \leq 15% | --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 10M Ω or RxC \geq 100 Ω -F whichever is smaller. | 50V: 0603 \geq 1 μ F; 0805 \geq 1 μ F; 1206 \geq 4.7 μ F; 1210 \geq 4.7 μ F | 35V: 0805 \geq 2.2 μ F; 1210 \geq 10 μ F | 25V: 0402 \geq 1 μ F; 0603 \geq 2.2 μ F; 0805 \geq 2.2 μ F; 1206 \geq 10 μ F; 1210 \geq 10 μ F | 16V: 0402 \geq 0.22 μ F; 0603 \geq 1 μ F; 0805 \geq 2.2 μ F; 1206 \geq 10 μ F; 1210 \geq 47 μ F | 10V: 0402 \geq 0.47 μ F; 0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F; 1206 \geq 4.7 μ F; 1210 \geq 47 μ F | 6.3V: 4V | 6.3V: 4V |
| RATED VOL. | D.F. \leq | EXCEPTION OF D.F. \leq | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| \geq 50V | \leq 2.5% | \leq 3% 0603 \geq 0.047 μ F; 0805 \geq 0.18 μ F; 1206 \geq 0.47 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | \leq 5% 1206 \geq 4.7 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V | \leq 3.5% | \leq 10% 0603 \geq 1 μ F; 0805 \geq 1 μ F; 1206 \geq 4.7 μ F; 1210 \geq 10 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | \leq 5% 0805 \geq 2.2 μ F; 1210 \geq 10 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V | \leq 3.5% | \leq 7% 0603 \geq 0.33 μ F; 1206 \geq 4.7 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | \leq 10% 0402 \geq 0.10 μ F; 0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F; 1206 \geq 6.8 μ F; 1210 \geq 22 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V | \leq 3.5% | \leq 5% 0402 \geq 0.033 μ F; 0603 \geq 0.15 μ F; 0805 \geq 0.68 μ F; 1206 \geq 2.2 μ F; 1210 \geq 4.7 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | \leq 15% 0402 \geq 1 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V | \leq 10% | \leq 15% 0402 \geq 1 μ F; 0603 \geq 10 μ F; 0805 \geq 4.7 μ F; 1206 \geq 47 μ F; 1210 \geq 100 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | \leq 20% 0402 \geq 2.2 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | \leq 15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 10M Ω or RxC \geq 100 Ω -F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 35V: 0805 \geq 2.2 μ F; 1210 \geq 10 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402 \geq 1 μ F; 0603 \geq 2.2 μ F; 0805 \geq 2.2 μ F; 1206 \geq 10 μ F; 1210 \geq 10 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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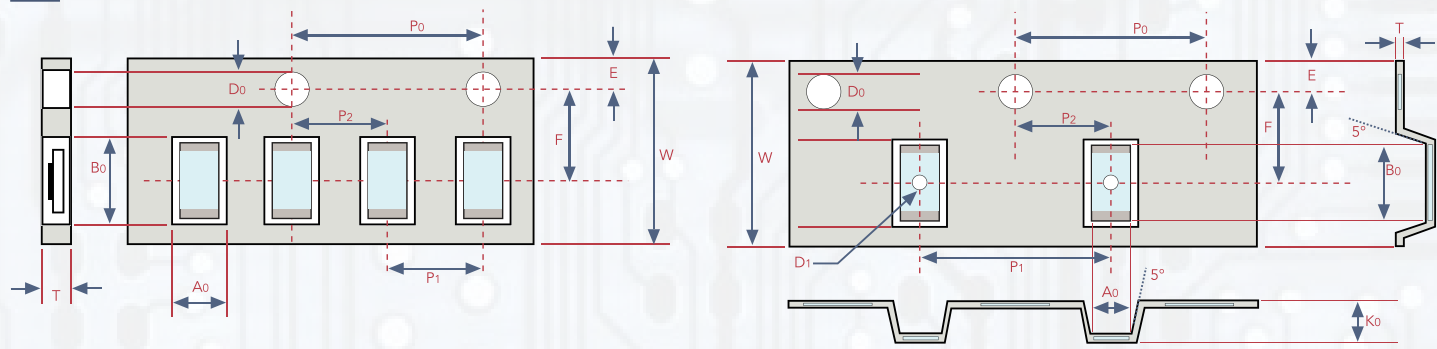
| NO. | AEC-Q200 TEST ITEM | AEC-Q200 TEST CONDITION | REQUIREMENTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|------------|------------|---------------------|------|-------------|--|----------------|--|------|--|----------------------------|-------------------------|-----------------------------|------|-------|---|---|--|-----|-------|--|--------------------------|------------------------------|-----|-----|--|---|---|------|------|--|---------------|------|-----|---------------|---|-----------------|---|---|----------------------------|---|--|--|----------|---------------|-----------------------|-----------|--|---|----------------------------|---|--|--|----------|
| 13. | Resistance to Soldering Heat MIL-STD-202 Method 210 | - Solder temperature: 270±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. | - No remarkable damage. - Cap change: NPO: within ±2.5% or 0.25pF whichever is larger X7R: within 7.5% -Q/D.F. value: NPO: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: <table border="1" data-bbox="885 346 1429 682"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥50V</td> <td rowspan="3">≤2.5%</td> <td>≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤5% 1210≥4.7uF</td> </tr> <tr> <td>≤10% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>≤5% 0805≥1μF; 1210≥10μF</td> </tr> <tr> <td>≤7% 0603≥0.33μF; 1206≥4.7μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤3.5%</td> <td>≤5% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF</td> </tr> <tr> <td>≤10% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤10% 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤3.5%</td> <td>≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤5% 0402≥1μF</td> </tr> <tr> <td>≤15% 0402≥1μF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤5%</td> <td>≤10% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF</td> </tr> <tr> <td>≤20% 0402≥2.2μF</td> </tr> <tr> <td>---</td> </tr> <tr> <td>6.3V</td> <td>≤10%</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> <table border="1" data-bbox="885 714 1429 871"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="10">10GΩ or RxC≥100 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V; 4V</td> </tr> </tbody> </table> | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | ≥50V | ≤2.5% | ≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF | ≤5% 1210≥4.7uF | ≤10% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF | 35V | ≤3.5% | ≤10% 0805≥2.2μF; 1210≥10μF | ≤5% 0805≥1μF; 1210≥10μF | ≤7% 0603≥0.33μF; 1206≥4.7μF | 25V | ≤3.5% | ≤5% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | ≤10% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | ≤10% 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | 16V | ≤3.5% | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤5% 0402≥1μF | ≤15% 0402≥1μF | 10V | ≤5% | ≤10% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | ≤20% 0402≥2.2μF | --- | 6.3V | ≤10% | --- | 4V | ≤15% | --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 10GΩ or RxC≥100 Ω-F whichever is smaller. | 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | 35V: 0805≥2.2μF; 1210≥10μF | 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | 6.3V; 4V | | | | | | | | | | |
| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 35V | ≤3.5% | ≤10% 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | ≤7% 0603≥0.33μF; 1206≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V | ≤3.5% | ≤5% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V | ≤3.5% | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤5% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤15% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V | ≤5% | ≤10% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% 0402≥2.2μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V | ≤10% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | ≤15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 10GΩ or RxC≥100 Ω-F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V; 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14. | | Thermal Shock MIL-STD-202 Method 107 | - Conduct 300 cycles according to the temperatures and time. <table border="1" data-bbox="300 945 560 997"> <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>15±3</td> </tr> <tr> <td>2</td> <td>+125°C +3/-0</td> <td>15±3</td> </tr> </tbody> </table> - 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 | 15±3 | 2 | +125°C +3/-0 | 15±3 | - No remarkable damage. - Cap change: NPO: within ±2.5% or 0.25pF whichever is larger X7R: within 10.0% -Q/D.F. value: NPO: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: <table border="1" data-bbox="885 1029 1429 1333"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤10% 1210≥4.7uF</td> </tr> <tr> <td>≤20% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤5%</td> <td>≤20% 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>≤10% 0805≥1μF; 1210≥10μF</td> </tr> <tr> <td>≤14% 0603≥0.33μF; 1206≥4.7μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤5%</td> <td>≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF</td> </tr> <tr> <td>≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td rowspan="3">16V</td> <td rowspan="3">≤5%</td> <td>≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤20% 0402≥1μF</td> </tr> <tr> <td>---</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤7.5%</td> <td>≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF</td> </tr> <tr> <td>≤30% 0402≥2.2μF</td> </tr> <tr> <td>---</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>---</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> <table border="1" data-bbox="885 1407 1429 1564"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="10">10GΩ or RxC≥10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V; 4V</td> </tr> </tbody> </table> | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | ≥50V | ≤3% | ≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF | ≤10% 1210≥4.7uF | ≤20% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF | 35V | ≤5% | ≤20% 0805≥2.2μF; 1210≥10μF | ≤10% 0805≥1μF; 1210≥10μF | ≤14% 0603≥0.33μF; 1206≥4.7μF | 25V | ≤5% | ≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | ≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | ≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | 16V | ≤5% | ≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤20% 0402≥1μF | --- | 10V | ≤7.5% | ≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | ≤30% 0402≥2.2μF | --- | 6.3V | ≤15% | --- | 4V | ≤20% | --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 10GΩ or RxC≥10 Ω-F whichever is smaller. | 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | 35V: 0805≥2.2μF; 1210≥10μF | 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | 6.3V; 4V |
| STEP | | TEMP. (°C) | TIME (MIN.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | -55°C +0/-3 | 15±3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | +125°C +3/-0 | 15±3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ≥50V | ≤3% | ≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 1210≥4.7uF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V | ≤5% | ≤20% 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0805≥1μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤14% 0603≥0.33μF; 1206≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V | ≤5% | ≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤15% 0402≥0.033μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V | ≤5% | ≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤20% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V | ≤7.5% | ≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤30% 0402≥2.2μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V | ≤15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | ≤20% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 10GΩ or RxC≥10 Ω-F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V; 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| NO. | AEC-Q200 TEST ITEM | AEC-Q200 TEST CONDITION | REQUIREMENTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|---|------------|--------|---------------------|------|-------|--|-------|--|-----|-------|--|-------|--|-----|-------|--|-------|--|-----|-------|--|-------|---------------|-----|-----|--|------|-----|------|------|-----|----|------|-----|---------------|-----------------------|-----------|---|---|----------------------------|---|--|--|----------|
| 15. | ESD AEC-Q200-002 | Per AEC-Q200-002 | <ul style="list-style-type: none"> - No remarkable damage. - Cap change: within the specified tolerance. - Q/D.F. value: NPO: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: <table border="1" data-bbox="974 315 1526 661"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="2">≥50V</td> <td>≤2.5%</td> <td>≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF ≤5% 1210≥4.7μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤10% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF ≤10% 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td rowspan="2">35V</td> <td>≤3.5%</td> <td>≤5% 0805≥1μF; 1210≥10μF ≤7% 0603≥0.33μF; 1206≥4.7μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤10% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">25V</td> <td>≤3.5%</td> <td>≤5% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤10% 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">16V</td> <td>≤3.5%</td> <td>≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤15% 0402≥1μF</td> </tr> <tr> <td rowspan="2">10V</td> <td>≤5%</td> <td>≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF ≤20% 0402≥2.2μF</td> </tr> <tr> <td>≤10%</td> <td>---</td> </tr> <tr> <td>6.3V</td> <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" data-bbox="974 693 1526 850"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="7">10GΩ or RxC≥100 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V; 4V</td> </tr> </tbody> </table> | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | ≥50V | ≤2.5% | ≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF ≤5% 1210≥4.7μF | ≤3.5% | ≤10% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF ≤10% 0805≥2.2μF; 1210≥10μF | 35V | ≤3.5% | ≤5% 0805≥1μF; 1210≥10μF ≤7% 0603≥0.33μF; 1206≥4.7μF | ≤3.5% | ≤10% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | 25V | ≤3.5% | ≤5% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | ≤3.5% | ≤10% 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | 16V | ≤3.5% | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤3.5% | ≤15% 0402≥1μF | 10V | ≤5% | ≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF ≤20% 0402≥2.2μF | ≤10% | --- | 6.3V | ≤15% | --- | 4V | ≤15% | --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 10GΩ or RxC≥100 Ω·F whichever is smaller. | 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | 35V: 0805≥2.2μF; 1210≥10μF | 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | 6.3V; 4V |
| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 25V | ≤3.5% | ≤5% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 16V | ≤3.5% | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤3.5% | ≤15% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V | ≤5% | ≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF ≤20% 0402≥2.2μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤10% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V | ≤15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | ≤15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100V: X7R | 10GΩ or RxC≥100 Ω·F whichever is smaller. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V: 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 6.3V; 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16. | Solderability J-STD-002 JESD22-B102E | <ul style="list-style-type: none"> - Condition A Un-mounted chips 4hrs / 155°C Dry then completely immersed for 5±0.5 sec in solder bath at 245±5°C. - Condition B Un-mounted chips steam 8 hrs then completely immersed for 10±1 sec in solder bath at 220+5/-0°C - Condition C Un-mounted chips steam 8 hrs then completely immersed for 10±1 sec in solder bath at 260+0/-5°C. | - All terminations shall exhibit a continuous solder coating free from defects from a minimum of 95% of the critical surface area of any individual termination. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17. | Electrical Characterization | <ul style="list-style-type: none"> - Capacitance - Q/D.F. (Dissipation Factor) Cap≤1000pF 1.0±0.2Vrms, 1MHz±10% Cap>1000pF 1.0±0.2Vrms, 1KHz±10% | <ul style="list-style-type: none"> - Capacitance within the specified tolerance. - Q/D.F. value: NPO: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: <table border="1" data-bbox="974 1239 1526 1585"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="2">≥50V</td> <td>≤2.5%</td> <td>≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF ≤5% 1210≥4.7μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤10% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF ≤10% 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td rowspan="2">35V</td> <td>≤3.5%</td> <td>≤5% 0805≥1μF; 1210≥10μF ≤7% 0603≥0.33μF; 1206≥4.7μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤10% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">25V</td> <td>≤3.5%</td> <td>≤5% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤10% 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">16V</td> <td>≤3.5%</td> <td>≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤3.5%</td> <td>≤15% 0402≥1μF</td> </tr> <tr> <td rowspan="2">10V</td> <td>≤5%</td> <td>≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF ≤20% 0402≥2.2μF</td> </tr> <tr> <td>≤10%</td> <td>---</td> </tr> <tr> <td>6.3V</td> <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" data-bbox="974 1617 1526 1774"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="7">10GΩ or RxC≥100 Ω·F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥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: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V; 4V</td> </tr> </tbody> </table> <ul style="list-style-type: none"> - Dielectric strength - No evidence of damage or flash over during test. - Temperature Coefficient - Capacitance Change: NPO: Within ±30ppm/°C X7R: Within ±15% | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | ≥50V | ≤2.5% | ≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF ≤5% 1210≥4.7μF | ≤3.5% | ≤10% 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF ≤10% 0805≥2.2μF; 1210≥10μF | 35V | ≤3.5% | ≤5% 0805≥1μF; 1210≥10μF ≤7% 0603≥0.33μF; 1206≥4.7μF | ≤3.5% | ≤10% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | 25V | ≤3.5% | ≤5% 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | ≤3.5% | ≤10% 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | 16V | ≤3.5% | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤3.5% | ≤15% 0402≥1μF | 10V | ≤5% | ≤15% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF ≤20% 0402≥2.2μF | ≤10% | --- | 6.3V | ≤15% | --- | 4V | ≤15% | --- | RATED VOLTAGE | INSULATION RESISTANCE | 100V: X7R | 10GΩ or RxC≥100 Ω·F whichever is smaller. | 50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF | 35V: 0805≥2.2μF; 1210≥10μF | 25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF | 16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF | 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | 6.3V; 4V |
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| | ≤3.5% | ≤15% 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 6.3V | ≤15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | ≤15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RATED VOLTAGE | INSULATION RESISTANCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 35V: 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V; 4V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

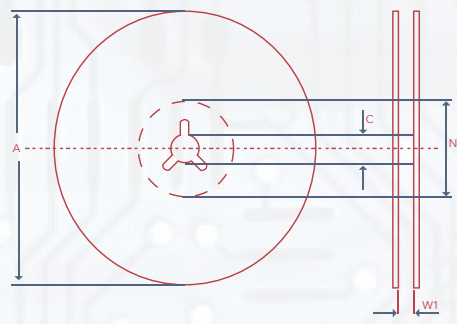


| NO. | AEC-Q200 TEST ITEM | AEC-Q200 TEST CONDITION | REQUIREMENTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------|-----------------------------------|--|---|------------|--------|---------------------|------|-------|--|-----|------------|------|---|-----|-------|----------------------------|-----|---------------------|-----|-------------------------|-----|-------|--|-----|--|------|---|-----|-------|--|-----|---|------|----------|-----|-----|---|------|------------|------|-----|------|------|-----|------|-----|-----|-----|----|------|-----|-----|-----|-----|-----|
| 18. | Board Flex AEC-Q200-005 | - The middle part of substrate shall be pressurized by means of pressurizing rod at a rate of about 1mm per second until the deflection becomes 3mm (2mm for X7R) and then the pressure shall be maintained for 5±1 sec. - Measurement to be made after keeping at room temp. for 24±2 hrs. | - No remarkable damage. - Cap change: NPO: within ±5% or 0.5pF whichever is larger X7R: within ±12.5% (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19. | Terminal Strength AEC-Q200-006 | - Pressurizing force: 2N (0402), 10N (0603), 18N (0805) - Test time: 60±1 sec. | - No remarkable damage or removal of the terminations - Capacitance within the specified tolerance. - Q/D.F. value: NPO: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥50V</td> <td>≤2.5%</td> <td>≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤5%</td> <td>1210≥4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td>≤3.5%</td> <td>≤10% 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>≤5%</td> <td>0805≥1μF; 1210≥10μF</td> </tr> <tr> <td>≤7%</td> <td>0603≥0.33μF; 1206≥4.7μF</td> </tr> <tr> <td rowspan="3">25V</td> <td>≤3.5%</td> <td>≤10% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF</td> </tr> <tr> <td>≤5%</td> <td>0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td rowspan="3">16V</td> <td>≤3.5%</td> <td>≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤5%</td> <td>0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤15%</td> <td>0402≥1μF</td> </tr> <tr> <td rowspan="3">10V</td> <td>≤5%</td> <td>≤10% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF</td> </tr> <tr> <td>≤10%</td> <td>0402≥2.2μF</td> </tr> <tr> <td>≤15%</td> <td>---</td> </tr> <tr> <td rowspan="3">6.3V</td> <td>≤10%</td> <td>---</td> </tr> <tr> <td>≤15%</td> <td>---</td> </tr> <tr> <td>---</td> <td>---</td> </tr> <tr> <td rowspan="3">4V</td> <td>≤15%</td> <td>---</td> </tr> <tr> <td>---</td> <td>---</td> </tr> <tr> <td>---</td> <td>---</td> </tr> </tbody> </table> | RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | ≥50V | ≤2.5% | ≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF | ≤5% | 1210≥4.7μF | ≤10% | 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF | 35V | ≤3.5% | ≤10% 0805≥2.2μF; 1210≥10μF | ≤5% | 0805≥1μF; 1210≥10μF | ≤7% | 0603≥0.33μF; 1206≥4.7μF | 25V | ≤3.5% | ≤10% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | ≤5% | 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF | ≤10% | 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | 16V | ≤3.5% | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤5% | 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | ≤15% | 0402≥1μF | 10V | ≤5% | ≤10% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | ≤10% | 0402≥2.2μF | ≤15% | --- | 6.3V | ≤10% | --- | ≤15% | --- | --- | --- | 4V | ≤15% | --- | --- | --- | --- | --- |
| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ≥50V | ≤2.5% | ≤3% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤5% | 1210≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤10% | 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35V | ≤3.5% | ≤10% 0805≥2.2μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤5% | 0805≥1μF; 1210≥10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤7% | 0603≥0.33μF; 1206≥4.7μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25V | ≤3.5% | ≤10% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | ≤10% | 0402≥0.22μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16V | ≤3.5% | ≤10% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤5% | 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤15% | 0402≥1μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10V | ≤5% | ≤10% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤10% | 0402≥2.2μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3V | ≤10% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | --- | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4V | ≤15% | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | --- | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | --- | --- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

TAPE & REEL DIMENSIONS



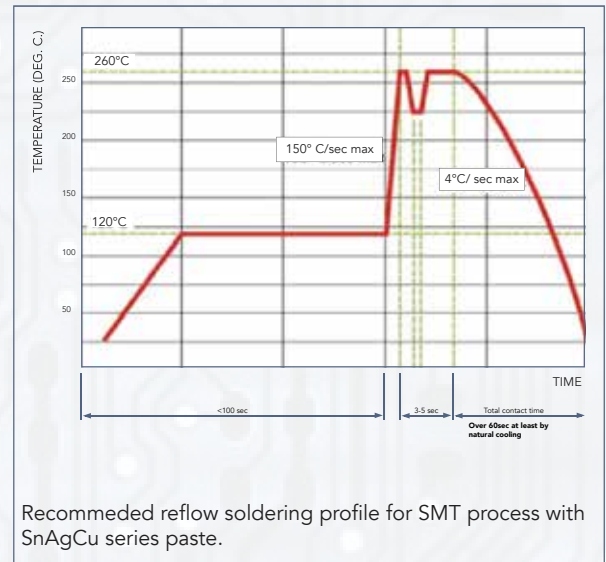
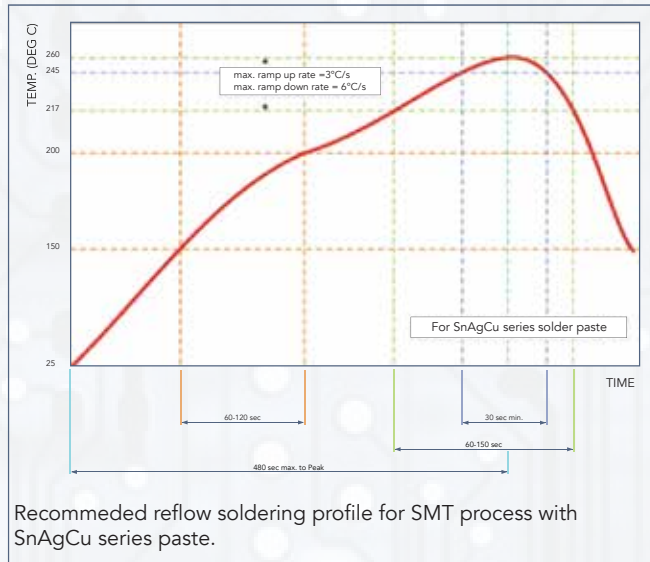
| SIZE | 0402 | 0603 | 0805 | | | 1206 | | |
|-----------|------------|------------|------------|------------|------------|------------|------------|------------|
| THICKNESS | N | S, B | A | X | M, C, I | X | M, J, C | E |
| Ao | 0.62±0.05 | 1.02±0.05 | 1.05±0.10 | 1.05±0.10 | <1.57 | 2.00±0.10 | <1.85 | <1.95 |
| Bo | 1.20±0.05 | 0.95±0.05 | 2.30±0.10 | 2.30±0.10 | <2.40 | 3.50±0.10 | <3.46 | <3.67 |
| T | 0.60±0.05 | 0.95±0.05 | 0.75±0.05 | 0.95±0.05 | 0.23±0.05 | 0.95±0.05 | 0.23±0.05 | 0.23±0.05 |
| Ko | - | - | - | - | <2.50 | - | <2.50 | <2.50 |
| W | 8.00±0.10 | 8.00±0.10 | 8.00±0.10 | 8.00±0.10 | 8.00±0.10 | 8.00±0.10 | 8.00±0.10 | 8.00±0.10 |
| Po | 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 Po | 40.00±0.10 | 40.00±0.10 | 40.00±0.10 | 40.00±0.10 | 40.00±0.10 | 40.00±0.10 | 40.00±0.10 | 40.00±0.10 |
| P1 | 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 |
| P2 | 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 |
| D0 | 1.55±0.05 | 1.55±0.05 | 1.55±0.05 | 1.55±0.05 | 1.55±0.05 | 1.55±0.05 | 1.50±0.05 | 1.50±0.05 |
| D1 | - | - | - | - | 1.00±0.10 | - | 1.00±0.10 | 1.00±0.10 |
| E | 1.75±0.05 | 1.75±0.05 | 1.75±0.05 | 1.75±0.05 | 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 |



| SIZE | 0402, 0603, 0805, 1206 | |
|-----------|------------------------|---------------|
| REEL SIZE | 7" | 10" |
| C | 13.0+0.5/-0.2 | 13.0+0.5/-0.2 |
| W1 | 8.4+1.5/-0 | 8.4+1.5/-0 |
| A | 178.0±0.10 | 330.0±1.0 |
| N | 60.0+1.0/-0 | 100+1.0 |

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*****

NOTICE: Specifications are subject to change without notice. Contact your nearest CalChip Sales Office for the latest specifications. All statements, information and data given herein are believed to be accurate and reliable, but are presented without guarantee, warranty, or responsibility of any kind, expressed or implied. Statements or suggestions concerning possible use of our products are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe any patent. The user should not assume that all safety measures are indicated or that other measures may not be required. Specifications are typical and may not apply to all applications.

