

## RELIABILITY TESTS ▪ STANDARD



Reference JIS C 5101-1, JIS C 5101-4 and JIS 60068-2

| No. | Test                                 | Test Specification  | Test Standard   | Sample Quantity | Test Criteria   |
|-----|--------------------------------------|---|---|-----------------|---|
| 1   | Shelf life                           | Upper category temperature<br>Duration: 1000h   | JIS C 5101-4<br>No. 4.17<br><br>JIS C 5101-1<br>No. 4.25  | 10 pcs          | 1. $ \Delta C/C_R  \leq 20\%$ of initial value <sup>[1]</sup><br>2. $\tan\delta \leq 2$ times spec. limit <sup>[1]</sup><br>3. $I_{LEAK} \leq$ spec. limit<br>4. ESR $\leq$ spec. limit<br>5. No visible damage<br>6. Marking legible   |
| 2   | Temperature cycling                  | a. Lower category temperature: 30mins<br>b. Temperature change: 3mins<br>c. Upper category temperature: 30mins<br>d. Temperature change: 3mins<br>Step 1 to 4 as a cycle<br>Cycle: 10 cycles  | JIS C 5101-4<br>No. 4.7<br><br>JIS C 5101-1<br>No. 4.16   | 10 pcs          | 1. $ \Delta C/C_R  \leq 5\%$ of initial value<br>2. $\tan\delta \leq$ spec. limit<br>3. $I_{LEAK} \leq$ spec. limit<br>4. ESR $\leq$ spec. limit<br>5. No visible damage<br>6. Marking legible  |
| 3   | Unbiased humidity                    | Temperature: $60^\circ\text{C} \pm 2^\circ\text{C}$<br>Humidity: 90 ~ 95%RH<br>Duration: 1000h  | JIS C 5101-4<br>No. 4.12<br><br>JIS C 5101-1<br>No. 4.22  | 10 pcs          | 1. $ \Delta C/C_R  \leq 20\%$ of initial value<br>2. $\tan\delta \leq 1.5$ times of spec. limit<br>3. $I_{LEAK} \leq$ spec. limit<br>4. ESR $\leq$ spec. limit<br>5. No visible damage<br>6. Marking legible  |
| 4   | Endurance (load Life)                | Upper category temperature<br>$V_R$ applied<br>Duration: specified or see detail specification  | JIS C 5101-4<br>No. 4.13<br><br>JIS C 5101-1<br>No. 4.23  | 10 pcs          | 1. $ \Delta C/C_R  \leq 20\%$ of initial value <sup>[1]</sup><br>2. $\tan\delta \leq 1.5$ times spec. limit <sup>[1]</sup><br>3. $I_{LEAK} \leq$ spec. limit<br>4. ESR $\leq$ spec. limit<br>5. No visible damage<br>6. Marking legible   |
| 5   | Endurance (Load ripple current life) | Upper category temperature<br>$I_R$ and $V_R$ applied<br>$AC + DC \approx V_R$<br>Duration: specified or see detail specification   | JIS C 5101-4<br>No. 4.13<br><br>JIS C 5101-1<br>No. 4.23  | 10 pcs          | 1. $ \Delta C/C_R  \leq 20\%$ of initial value <sup>[1]</sup><br>2. $\tan\delta \leq 1.5$ times spec. limit <sup>[1]</sup><br>3. $I_{LEAK} \leq$ spec. limit<br>4. ESR $\leq$ spec. limit<br>5. No visible damage<br>6. Marking legible   |
| 6   | Solvent resistance of marking        | a. Solvent to be used: IPA<br>b. Solvent temperature: $23^\circ\text{C} \pm 5^\circ\text{C}$<br>c. Conditioning: Method 1 (with rubbing)<br>d. Rubbing material: Cotton wool<br>e. Recovery time: Not applicable, unless otherwise stated in the detail specification | JIS C 5101-1<br>No. 4.32<br><br>JIS C 60068-2-45<br>3.1.2 | 5 pcs           | See detail specification  |
| 7   | Vibration                            | a. Frequency: 10 ~ 55 Hz<br>b. Swing (single peak) and acceleration: 0.75mm or 98m/s <sup>2</sup><br>c. Test direction and duration: X, Y, Z each on for 2h   | JIS C 5101-4<br>No. 4.8<br><br>JIS C 5101-1<br>No. 4.17   | 10 pcs          | Taking from the vibration table static placed in the horizontal to test the box and carton appearance, test the electrical characteristics.<br>1. $ \Delta C/C_R  \leq 5\%$ of initial value<br>2. $\tan\delta \leq$ spec. limit<br>3. $I_{LEAK} \leq$ spec. limit<br>4. ESR $\leq$ spec. limit<br>5. No visible damage<br>6. Marking legible |

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Reference JIS C 5101-1, JIS C 5101-4 and JIS 60068-2

| No. | Test  | Test Specification  | Test Standard                                  | Sample Quantity | Test Criteria   |
|-----|---|---|--|-----------------|---|
| 8   | Resistance to solder heat                   | Max. temperature: 260°C (0 ~ +3°C)<br>Duration: 10s ± 1s  | JIS C 5101-4 No. 4.5<br>JIS C 5101-1 No. 4.14  | 10 pcs          | 1. $ \Delta C/C_R  \leq 5\%$ of initial value<br>2. $\tan\delta \leq \text{spec. limit}$<br>3. $I_{LEAK} \leq \text{spec. limit}$<br>4. $ESR \leq \text{spec. limit}$<br>5. No visible damage<br>6. Marking legible |
| 9   | Solderability                               | Max. temperature: 245°C ± 5°C<br>Duration: 2s ± 0.5s  | JIS C 5101-4 No. 4.6<br>JIS C 5101-1 No. 4.15  | 10 pcs          | The surface soldering attachment is greater than 95% soldering should brightness and equality, non-soldering needle hole, drop weld or concentrate at some points are not allowed                                   |
| 10  | Characteristics at high and low temperature | The capacitors shall be measured at each temperature step<br>Step 1: 20°C<br>Capacitance, Tangent of loss angle, Impedance (at the same frequency as step 2)<br>Step 2: Lower category temperature ▪ Impedance<br>Step 3: Upper category temperature ▪ Leakage current<br>See detail specification  | JIS C 5101-4 No. 4.19<br>JIS C 5101-1 No. 4.29 | 10 pcs          | See detail specification  |
| 11  | Substrate bending                           | The SMD capacitor shall be mounted on an epoxide woven glass printed board as described:<br>a. The capacitance of the SMD capacitor shall be measured as specified in 4.7 and in the relevant sectional specification.<br>b. The capacitor shall be subjected to JIS C 60068-2-21, test Ue, using the conditions as prescribed in the relevant specification for the deflection D and the number of bends.<br>c. The capacitance of the SMD capacitor shall be measured as specified in (a) with the board in the bent position | JIS C 5101-1 No. 4.35<br>JIS C 60068.2.21      | 5 pcs           | The change of capacitance shall not exceed the limits prescribed by the relevant specification  |
| 12  | Terminal strength                           | Test method: Following model picture means:<br>Put the samples solder on the glass epoxy resin board, profile added force is 17.7N (1.8kg), time within 60s ± 1s<br>See detail specification  | JIS C 5101-1 No. 4.13<br>JIS C 5104-1 No. 4.4  | 10 pcs          | See detail specification  |

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Reference JIS C 5101-1, JIS C 5101-4 and JIS 60068-2

| No. | Test                       | Test Specification   | Test Standard                                      | Sample Quantity | Test Criteria  |
|-----|----------------------------|--|--|-----------------|--|
| 13  | Surge voltage              | a. Test temp: 15°C ~ 35°C.<br>b. Add surge voltage to the connections:<br>1.25·V <sub>R</sub> when V <sub>R</sub> ≤ 100V<br>1.15·V <sub>R</sub> when V <sub>R</sub> > 100V<br>c. 6 min as a cycle (charge time 30s, discharge time 330s)<br>d. Cycles: 1000 cycles | JIS C 5101-4 No. 4.14<br><br>JIS C 5101-1 No. 4.26 | 10 pcs          | 1. $ \Delta C/C_R  \leq 10\%$ of initial value<br>2. $\tan\delta \leq \text{spec. limit}$<br>3. $I_{LEAK} \leq \text{spec. limit}$<br>4. $ESR \leq \text{spec. limit}$<br>5. No visible damage<br>6. Marking legible |
| 14  | Storage at low temperature | Duration: 16h or 4h after thermal stability has been reached<br>Temperature: -40°C   | JIS C 5101-4 No. 4.18<br><br>JIS C 5101-1 No. 4.25 | 10 pcs          | 1. $ \Delta C/C_R  \leq 10\%$ of initial value<br>2. $\tan\delta \leq \text{spec. limit}$<br>3. $I_{LEAK} \leq \text{spec. limit}$<br>4. $ESR \leq \text{spec. limit}$<br>5. No visible damage<br>6. Marking legible |

**Note:**

[1]  $\Delta C/C_R$  &  $\tan\delta$  criterion, please refer to CapXon datasheet.

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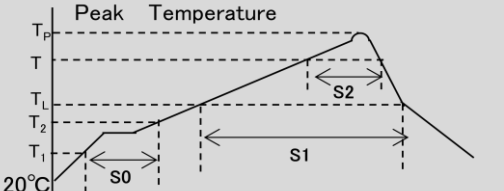
Reference MIL-STD-202, JESD22, J-STD-002 and AEC-Q200

| No.   | Test  | Test Specification   | Test Standard          | Sample Quantity | Test Criteria   |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |
|-------|---|--|------------------------|-----------------|---|---|----------------------------|--------------|---|--------------------|-------------|---|----------------------------|--------------|---|--------------------|-------------|----------------------|--------|---|
| 1     | High temperature exposure (Storage at upper category temperature) | Test temp: Upper category temperature<br>No voltage applied<br>Duration: 1000h<br>Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes<br>Measurement at 24h after test conclusion   | MIL-STD-202 Method 108 | 77 pcs          | 1. $ \Delta C/C_R  \leq 20\%$ of initial value <sup>[1]</sup><br>2. $\tan\delta \leq 2$ times spec. limit <sup>[1]</sup><br>3. $I_{LEAK} \leq$ spec. limit<br>4. $ESR \leq$ spec. limit<br>5. No visible damage |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |
| 2     | Temperature cycling   | <table><tr><th>Stage</th><th>Temperature</th><th>Time</th></tr><tr><td>1</td><td>Lower category temperature</td><td>Within 30min</td></tr><tr><td>2</td><td>Temperature change</td><td>Within 1min</td></tr><tr><td>3</td><td>Upper category temperature</td><td>Within 30min</td></tr><tr><td>4</td><td>Temperature change</td><td>Within 1min</td></tr></table><br>Stage 1 to 4 is one cycle<br>Test time: 1000 cycles<br>Measurement at 24h after test conclusion | Stage                  | Temperature     | Time  | 1 | Lower category temperature | Within 30min | 2 | Temperature change | Within 1min | 3 | Upper category temperature | Within 30min | 4 | Temperature change | Within 1min | JESD22 Method JA-104 | 77 pcs | 1. $ \Delta C/C_R  \leq 10\%$ of initial value<br>2. $\tan\delta \leq$ spec. limit<br>3. $I_{LEAK} \leq$ spec. limit<br>4. $ESR \leq$ spec. limit<br>5. No visible damage<br>6. Marking legible |
| Stage | Temperature   | Time   |                        |                 |   |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |
| 1     | Lower category temperature  | Within 30min   |                        |                 |   |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |
| 2     | Temperature change  | Within 1min  |                        |                 |   |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |
| 3     | Upper category temperature  | Within 30min   |                        |                 |   |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |
| 4     | Temperature change  | Within 1min  |                        |                 |   |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |
| 3     | Biased Humidity   | Temperature: 85°C<br>Humidity: 85%RH<br>Applied voltage: $V_R$<br>Duration: 1000h<br>Measurement at 24h after test conclusion  | MIL-STD-202 Method 103 | 77 pcs          | 1. $ \Delta C/C_R  \leq 20\%$ of initial value<br>2. $\tan\delta \leq 1.2$ times spec. limit<br>3. $I_{LEAK} \leq$ spec. limit<br>4. $ESR \leq$ spec. limit<br>5. No visible damage<br>6. Marking legible       |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |
| 4     | Operational life  | Test temp: Upper category temperature<br>$V_R$ applied (& $I_R$ applied if specified)<br>Duration: specified or see detail specification<br>Measurement at 24h after test conclusion   | MIL-STD-202 Method 108 | 77 pcs          | 1. $ \Delta C/C_R  \leq 20\%$ of initial value <sup>[1]</sup><br>2. $\tan\delta \leq 2$ times spec. limit <sup>[1]</sup><br>3. $I_{LEAK} \leq$ spec. limit<br>4. $ESR \leq$ spec. limit<br>5. No visible damage |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |
| 5     | Resistance to solvents  | a. Solvent to be used: IPA<br>b. Soak time: Using the brush according to mark place to brush with 10 times after 180s, repeat above step again with 2 times (namely is total 3 times)<br>c. After test place in air nature drying<br>d. Test temperature: 25°C ± 5°C   | MIL-STD-202 Method 215 | 5 pcs           | 1. No visible damage<br>2. Marking legible  |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |
| 6     | Mechanical shock  | a. Pulse shape: Half-sine waveform<br>b. Max. acceleration: 980m/s <sup>2</sup> (100g·s)<br>c. Pulse duration time: 6ms<br>d. Direction: X, Y, Z on 6 faces<br>e. Shock time: 3 times in one face, 18 times in total.  | MIL-STD-202 Method 213 | 30 pcs          | 1. $ \Delta C/C_R  \leq 5\%$ of initial value<br>2. $\tan\delta \leq$ spec. limit<br>3. $I_{LEAK} \leq$ spec. limit<br>4. $ESR \leq$ spec. limit<br>5. No visible damage  |   |                            |              |   |                    |             |   |                            |              |   |                    |             |                      |        |   |

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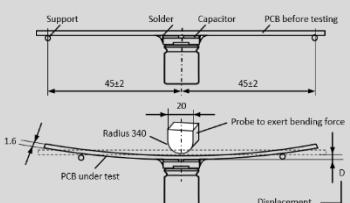
Reference MIL-STD-202, JESD22, J-STD-002 and AEC-Q200

| No. | Test  | Test Specification  | Test Standard          | Sample Quantity   | Test Criteria   |   |                |     |           |         |         |       |     |    |    |    |  |              |             |            |                        |        |  |
|-----|---|---|------------------------|---|---|---|----------------|-----|-----------|---------|---------|-------|-----|----|----|----|--|--------------|-------------|------------|------------------------|--------|--|
| 7   | Vibration   | <p>a. 10Hz ~ 2kHz ~ 10Hz (20min)</p> <p>b. Amplitude (Double peaks): 1.5mm @10 ~ 55Hz</p> <p>c. Acceleration: 49m/s<sup>2</sup> (5g/s) @55 ~ 2kHz</p> <p>d. X direction 4h<br/>Y direction 4h<br/>Z direction 4h<br/>Total: 12h</p>   | MIL-STD-202 Method 204 | 30 pcs  | <p>1. <math> \Delta C/C_R  \leq 5\%</math> of initial value</p> <p>2. <math>\tan\delta \leq</math> spec. limit</p> <p>3. <math>I_{LEAK} \leq</math> spec. limit</p> <p>4. <math>ESR \leq</math> spec. limit</p> <p>5. No visible damage</p> |   |                |     |           |         |         |       |     |    |    |    |  |              |             |            |                        |        |  |
| 8   | Resistance to solder heat                               | <p>a. Kind of solder: H60A or equal</p> <p>b. Below diagram shows the products which in soldering stove of the 3 times reflow soldering</p> <p>c. When finish the first time and the samples temperature col off and become stable then will proceed the 2<sup>nd</sup>time</p> <p>d. When finish the 2<sup>nd</sup> time and the samples temperature col off and become stable then will proceed the 3<sup>rd</sup>time</p> <div><p>Peak Temperature</p><table border="1" data-bbox="330 1225 868 1435"><thead><tr><th></th><th>T<sub>1</sub>-T<sub>2</sub><br/>(Preheat Temperature)</th><th>T<sub>L</sub></th><th>T</th><th>T<sub>P</sub></th></tr></thead><tbody><tr><td>4φ-</td><td>150-180°C</td><td>&gt; 217°C</td><td>&gt; 245°C</td><td rowspan="3">260°C</td></tr><tr><td>10φ</td><td>S0</td><td>S1</td><td>S2</td></tr><tr><td></td><td>120 secs Max</td><td>60~150 secs</td><td>25~35 secs</td></tr></tbody></table></div> <p>e. Temperature rises velocity: 1°C/s ~ 4°C/s<br/>(Temperature profile please refer to CapXon datasheet)</p> |                        | T <sub>1</sub> -T <sub>2</sub><br>(Preheat Temperature) | T <sub>L</sub>  | T | T <sub>P</sub> | 4φ- | 150-180°C | > 217°C | > 245°C | 260°C | 10φ | S0 | S1 | S2 |  | 120 secs Max | 60~150 secs | 25~35 secs | MIL-STD-202 Method 210 | 30 pcs | <p>1. <math> \Delta C/C_R  \leq 15\%</math> of initial value</p> <p>2. <math>\tan\delta \leq</math> spec. limit</p> <p>3. <math>I_{LEAK} \leq</math> spec. limit</p> <p>4. <math>ESR \leq</math> spec. limit</p> <p>5. No visible damage</p> <p>* Products expanding<br/>≤ Ø 6.3mm below 0.2mm<br/>≥ Ø 8mm below 0.3mm</p> |
|     | T <sub>1</sub> -T <sub>2</sub><br>(Preheat Temperature) | T <sub>L</sub>  | T                      | T <sub>P</sub>  |   |   |                |     |           |         |         |       |     |    |    |    |  |              |             |            |                        |        |  |
| 4φ- | 150-180°C   | > 217°C   | > 245°C                | 260°C   |   |   |                |     |           |         |         |       |     |    |    |    |  |              |             |            |                        |        |  |
| 10φ | S0  | S1  | S2                     |   |   |   |                |     |           |         |         |       |     |    |    |    |  |              |             |            |                        |        |  |
|     | 120 secs Max  | 60~150 secs   | 25~35 secs             |   |   |   |                |     |           |         |         |       |     |    |    |    |  |              |             |            |                        |        |  |
| 9   | Solderability   | <p>SMD Reflow solder method</p> <p>a. Kind of solder:<br/>Sn96.5%; Ag3%; Cu0.5%</p> <p>b. Pre-handle: 155°C, 4Hours+15min</p> <p>c. Solder stove temp.: 245°C ± 5°C</p> <p>d. Solder solvent: Resin alcohol solution (25 wts%) or resin IPA solution</p> <p>e. Immerse time: within 5 +0/-0.5 secs</p> <p>f. Immerse speed: 25±2.5mm/s</p>  | J-STD-002              | 15 pcs  | Up to immerse position, above 95% area of surroundings surface shall be cover by the new soldering  |   |                |     |           |         |         |       |     |    |    |    |  |              |             |            |                        |        |  |

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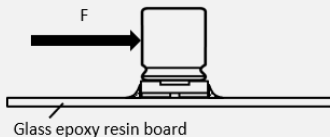
Reference MIL-STD-202, JESD22, J-STD-002 and AEC-Q200

| No. | Test                        | Test Specification  | Test Standard | Sample Quantity | Test Criteria      |                      |  |
|-----|-----------------------------|---|---------------|-----------------|--------------------|----------------------|--|
| 10  | Electrical characterization | a. In different environment to deposit the products                                     | User spec.    | 30 pcs          | stage 2<br>stage 3 | Impedance comparison | Products with lower category temperature -40°C |
|     |                             | Stage   |               |                 |                    |                      | Comparison of temp section                     |
|     |                             | Temp. (°C)  |               |                 |                    |                      | Magnification                                  |
|     |                             | 1 (initial value)   |               |                 |                    |                      | Z-25°C / Z+20°C                                |
|     |                             | 2   |               |                 |                    |                      | According to spec.                             |
|     |                             | 3   |               |                 |                    |                      | Z-40°C / Z+20°C                                |
|     |                             | 4   |               |                 |                    |                      | According to spec.                             |
|     |                             | 5   |               |                 |                    |                      | Products with lower category temperature -55°C |
|     |                             | 6   |               |                 |                    |                      | Comparison of temp section                     |
|     |                             |   |               |                 |                    |                      | Magnification                                  |
| 11  | Board flex (SMD)            | b. Test frequency: 120Hz  | AEC-Q200 -005 | 30 pcs          | stage 5            |                      | Z-25°C / Z+20°C                                |
|     |                             | c. Each stage of time: Reached time of hot balance (temperature stability)              |               |                 |                    |                      | According to spec.                             |
|     |                             |   |               |                 |                    |                      | Z-55°C / Z+20°C                                |
|     |                             |   |               |                 |                    |                      | According to spec.                             |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
| 11  | Board flex (SMD)            | a. Put the test sample solder on the PCB board, size of 100 mm (length) x 40 mm (width) | AEC-Q200 -005 | 30 pcs          |                    |                      | 1. $ \Delta C/C_R  \leq 30\%$ of initial value |
|     |                             | b. Curing test of the fixed method as follows:  |               |                 |                    |                      | 2. $\tan\delta \leq$ spec. limit               |
|     |                             |      |               |                 |                    |                      | 3. $I_{LEAK} \leq$ spec. limit                 |
|     |                             |   |               |                 |                    |                      | 4. $ESR \leq$ spec. limit                      |
|     |                             |   |               |                 |                    |                      | 5. No visible damage                           |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
| 11  | Board flex (SMD)            | c. Curve central point moves: Minimum 2mm   | AEC-Q200 -005 | 30 pcs          |                    |                      |  |
|     |                             | d. Duration time after curving: 60s ± 5s  |               |                 |                    |                      |  |
|     |                             | e. Curve times: 1 time  |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |
|     |                             |   |               |                 |                    |                      |  |

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Reference MIL-STD-202, JESD22, J-STD-002 and AEC-Q200

| No. | Test                    | Test Specification  | Test Standard         | Sample Quantity | Test Criteria   |
|-----|-------------------------|---|-----------------------|-----------------|---|
| 12  | Terminal strength (SMD) | <p>Test method: Following model picture means:<br/>Put the samples solder on the glass epoxy resin board, profile added force is 17.7N (1.8kg), time within 60s ± 1s</p>  <p>Pad size: See dedicated packaging information</p>             | AEC-Q200-006          | 30 pcs          | <ol style="list-style-type: none"> <li><math> \Delta C/C_R  \leq 5\%</math> of initial value</li> <li><math>\tan \delta \leq \text{spec. limit}</math></li> <li><math>I_{\text{LEAK}} \leq \text{spec. limit}</math></li> <li>No unusual or loose situation on terminals</li> </ol>                             |
| 13  | Surge voltage           | <ol style="list-style-type: none"> <li>Test temp: 15°C ~ 35°C.</li> <li>Add surge voltage to the connections:<br/>1.25·V<sub>R</sub> when V<sub>R</sub> ≤ 100V<br/>1.15·V<sub>R</sub> when V<sub>R</sub> &gt; 100V</li> <li>6 min as a cycle (charge time 30s, discharge time 330s)</li> <li>Cycles: 1000 cycles</li> </ol> | JIS C 5101-1 No. 4.26 | 30 pcs          | <ol style="list-style-type: none"> <li><math> \Delta C/C_R  \leq 15\%</math> of initial value</li> <li><math>\tan \delta \leq \text{spec. limit}</math></li> <li><math>I_{\text{LEAK}} \leq \text{spec. limit}</math></li> <li>ESR ≤ spec. limit</li> <li>No visible damage</li> <li>Marking legible</li> </ol> |

[1]  $\Delta C/C_R$  &  $\tan \delta$  criterion, please refer to CapXon datasheet.