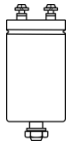
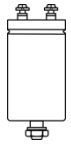


RELIABILITY TESTS ▪ STANDARD

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 Duration: 1000h	JIS C 5101-4 No. 4.17 JIS C 5101-1 No. 4.25	2 pcs	<ol style="list-style-type: none"> 1. $\Delta C/C_R \leq 10\%$ of initial value^[2] 2. $\tan\delta \leq 1.3$ times spec. limit^[2] 3. $I_{LEAK} \leq$ spec. limit 4. No visible damage 5. No leakage of electrolyte 6. Marking legible
2	Temperature cycling	<ol style="list-style-type: none"> 1. Lower category temperature: 30mins 2. Temperature change: 3mins 3. Upper category temperature: 30mins 4. Temperature change: 3mins Step 1 to 4 as a cycle Cycle: 10 cycles	JIS C 5101-4 No. 4.7 JIS C 5101-1 No. 4.16	1 pc	<ol style="list-style-type: none"> 1. $\Delta C/C_R \leq 5\%$ of initial value 2. $\tan\delta \leq$ spec. limit 3. $I_{LEAK} \leq$ spec. limit 4. No visible damage 5. No leakage of electrolyte 6. Marking legible
3	Unbiased humidity	Temperature: 40°C Humidity: 90 ~ 95%RH Duration: <ul style="list-style-type: none"> ▪ 250h for general purpose grade products^[1] ▪ 500h for long life grade products^[1] 	JIS C 5101-4 No. 4.12 JIS C 5101-1 No. 4.22	2 pcs	<ol style="list-style-type: none"> 1. $\Delta C/C_R \leq 20\%$ of initial value for general purpose grade products^[1] $\Delta C/C_R \leq \pm 10\%$ of initial value for long life grade products^[1] 2. $\tan\delta \leq 1.2$ times of spec. limit 3. $I_{LEAK} \leq$ spec. limit 4. No visible damage 5. No leakage of electrolyte 6. Marking legible
4	Endurance (load Life)	Upper category temperature V_R applied Duration: specified or see detail specification	JIS C 5101-4 No. 4.13 JIS C 5101-1 No. 4.23	2 pcs	<ol style="list-style-type: none"> 1. $\Delta C/C_R \leq 10\%$ of initial value^[2] 2. $\tan\delta \leq 1.3$ times spec. limit^[2] 3. $I_{LEAK} \leq$ spec. limit 4. No visible damage 5. No leakage of electrolyte 6. Marking legible
5	Endurance (Load ripple current life)	Upper category temperature I_R and V_R applied $AC + DC \approx V_R$ Duration: specified or see detail specification	JIS C 5101-4 No. 4.13 JIS C 5101-1 No. 4.23	2 pcs	<ol style="list-style-type: none"> 1. $\Delta C/C_R \leq 10\%$ of initial value^[2] 2. $\tan\delta \leq 1.3$ times spec. limit^[2] 3. $I_{LEAK} \leq$ spec. limit 4. No visible damage 5. No leakage of electrolyte 6. Marking legible
6	Solvent resistance of marking	<ol style="list-style-type: none"> a. Solvent to be used: IPA b. Solvent temperature: 23°C ± 5°C c. Conditioning: Method 1 (with rubbing) d. Rubbing material: Cotton wool e. Recovery time: Not applicable, unless otherwise stated in the detail specification 	JIS C 5101-1 No. 4.32 JIS C 60068-2-45 3.1.2	1pc	See detail specification
7	Vibration	<ol style="list-style-type: none"> a. Frequency: 10 ~ 55 Hz b. Swing (single peak) and acceleration: 0.75mm or 98m/s² c. Test direction and duration: X, Y, Z each one for 2h 	JIS C 5101-4 No. 4.8 JIS C 5101-1 No. 4.17	1 pc	Taking from the vibration table static placed in the horizontal to test the box and carton appearance, test the electrical characteristics. <ol style="list-style-type: none"> 1. $\Delta C/C_R \leq 5\%$ of initial value 2. $\tan\delta \leq$ spec. limit 3. $I_{LEAK} \leq$ spec. limit 4. No visible damage 5. No leakage of electrolyte 6. Marking legible

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
8	Characteristics at high and low temperature	The capacitors shall be measured at each temperature step Step 1: 20°C Capacitance tangent of loss angle Impedance (at the same frequency as step 2) Step 2: Lower category temperature ▪ Impedance Step 3: Upper category temperature ▪ Leakage current See detail specification	JIS C 5101-4 No. 4.19 JIS C 5101-1 No. 4.29	1pc	See detail specification
9	Surge voltage	a. Test temp.: Max. temp. for long life grade products ^[1] or Room temp. for general purpose grade products ^[1] b. Add surge voltage to the connections: 1.15·V _R when V _R ≤ 315V 1.10·V _R when V _R > 315V c. 6 mins as a cycle (charge time 30s, discharge time 330s) d. Cycle: 1000 cycles	JIS C 5101-4 No. 4.14 JIS C 5101-1 No. 4.26	1 pc	1. ΔC/C _R ≤ 15% of initial value 2. tanδ ≤ spec. limit 3. I _{LEAK} ≤ spec. limit 4. No visible damage 5. No leakage of electrolyte 6. Marking legible
10	Pressure relief	See detail specification	JIS C 5101-4 No. 4.16 JIS C 5101-1 No. 4.28	1 pc	Device shall open without danger of explosion or fire
11	Insulation resistance	Measured capacitor terminal, terminal anode and coat (insulation coat) insulation resistance (should charge and discharge before measurement) by 500V DC The insulation resistance shall be measured after the voltage has been applied for 60s ± 5s, unless otherwise prescribed in the detail specification	JIS C 5101-1 No. 4.5	1 pc	The insulation resistance shall be not less than 100MΩ
12	Voltage proof	1000V AC for 1min (V _R < 100V) 2000V AC for 1min (V _R ≥ 100V)	JIS C 5101-1 No. 4.6	1 pc	There shall be no breakdown or flashover during the test
13	Reverse voltage	a. 125h at upper category temperature with 1V DC in the reverse voltage direction. b. 125h at upper category temperature with direct voltage equal to the category voltage in the forward polarity direction.	JIS C 5101-4 No. 4.15	1 pc	1. ΔC/C _R ≤ 10% of initial value 2. tanδ ≤ spec. limit 3. I _{LEAK} ≤ spec. limit 4. No visible damage 5. No leakage of electrolyte Marking legible

Note:

 [1] General purpose grade: lifetime (V_R applied) ≤ 2000 hours.

 Long life grade: lifetime (V_R applied) > 2000 hours.

 [2] ΔC/C_R & tanδ criteria, please refer to CapXon datasheet.