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Customer：瑞康

Date : 2019/12/09

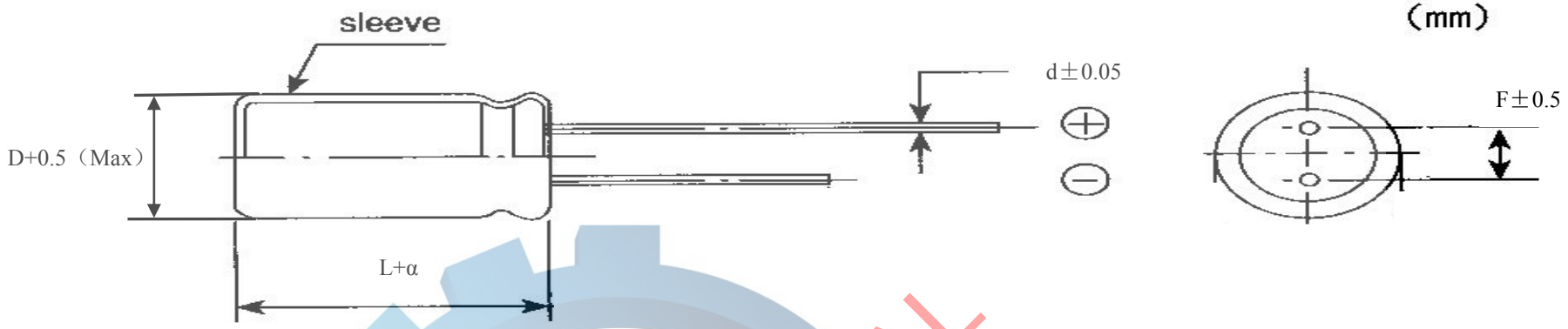
# SPECIFICATION

Product: Aluminum Electrolytic Capacitors

Sery: CD11-E

| APPROVED BY |
| --- |
| Please Return One Copy with Your Approval |

| PREPARED BY | CHECKED BY | APPROVED BY |
| --- | --- | --- |
| 张建州 | 林洲明 | 李民 |




| No. | Customer Part No. | Capacitance (uF) | Working Voltage (Vdc) | Surge voltage (v) | Tolerance on rated Capacitance (%) | Operating Temp. Range (℃) | Tanδ (120Hz) (Max) (%) | Leakage Current (uA)(2min.) | Max Ripple Current (mA) @105℃100KHz | Endurance @ 105℃(Hours) | 尺寸 (mm) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | DΦ | L | α | d | F |
| 1 | CD11-E | 4.7 | 400 | 450 | ±20 | -40+105 | 10 % | 175 | 98 | 6000 | 8 | 13.5 | -1~+2 | 0.6 | 3.5 |

The above marked ripple current is the value while product under regular service and also is the maximum promised value under rated lifetime 105℃
6000H,please do not exceed this value during your own design(the above ripple frequency correction factor under 120HZ is for your information)

## 1. SCOPE

This specification covers “CD11-Eseries” miniature single-ended aluminum electrolytic capacitors.

## 2. APPLICABLE SPECIFICATION

This approval sheet consulted the institute of JIS-C-5101-1 and JIS-C-5101-4.

## 3. OPERATING TEMPERATURE RANGE

Operating temperature range is the range of ambient temperature at which the capacitor can be operated continuously at rated voltage.

-40~+105℃

## 4. CHARACTERISTICS

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows.

Ambient temperature ： 15 to 35℃
Relative humidity ： 45 to 75%
Air pressure ： 86kpa to 106kpa

If there may be doubt on the results, measurements shall be made within the following limits.

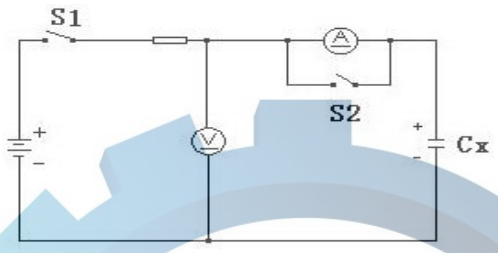
Ambient temperature ： 24±1℃
Relative humidity ： 60 to 67%
Air pressure ： 86kpa to 106kpa

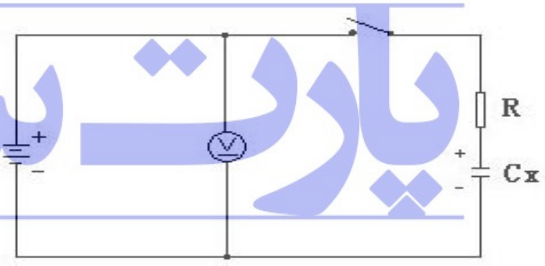
# 5. PRODUCT CHARACTERISTICS

## 5.1 ELECTRICAL CHARACTERISTICS

| NO. | Item | Test method | Performance |
|---|---|---|---|
| 5.1.1 | Rated voltage | | 160V~450V.DC |
| 5.1.2 | Capacitance | Measuring frequency: 120Hz±20%<br>Measuring circuit: Series equivalent circuit<br>Measuring voltage:<br>0.5Vrms or less +1.5 to 2.0 VDC | Capacitance tolerance:<br><br>CAP:±20% |

| NO. | Item | Test method | Performance |
|---|---|---|---|
| 5.1.3 | Dissipation Factor | Testing condition are the same as 5.1.2 for capacitance | CD11-E:<br>160V~250V:Tgδ=0.20<br>400V~450V:Tgδ=0.24 |

| | | | |
|---|---|---|---|
| 5.1.4 | Leakage current | The rated voltage shall be applied across the capacitor and its protective resistor which shall be 1000±100Ω. The leakage current shall then be measured after an electrification period of 2min..<br>Measurement circuit<br>  <br><br>Rs: Protective resistor(1000±100Ω)<br>DC ammeter<br>DC voltmeter<br>$S_1$:Switch<br>$S_2$:Protective switch for an ammeter | ·After 2 min.<br>I ≤0.04CV+100(μA)<br>I : Leakage current (μA）<br>C : Capacitance (μF）<br>V : Rated voltage (V) |

<table>
<tr><th>NO.</th><th>Item</th><th>Test method</th><th>Performance</th></tr>
<tr><td>5.1.5</td><td>Temperature Characteristic</td><td>
<table>
<tr><th>Step</th><th>Temperature</th><th>Time</th></tr>
<tr><td>1</td><td>20±2℃</td><td>--</td></tr>
<tr><td>2</td><td>-25，$-40^{+0}_{-3}$℃</td><td>2h</td></tr>
<tr><td>3</td><td>20±2℃</td><td>0.25h</td></tr>
<tr><td>4</td><td>$105^{+3}_{-0}$℃</td><td>2h</td></tr>
</table>
Step 1: Capacitance and impedance shall be measured.（|z| 20℃ 120Hz±20%）<br>
Step 2: After the capacitor being stored for 2 hours, impedance shall be made at thermal stability. （|z|-25，-40℃ 120Hz±20%）<br>
Step 4: After the capacitor being stored for 105℃ 2 hours, capacitance shall be measured. The measurement shall be made at thermal stability</td><td>Step 2:<br>Impedance ratio<br><br>Ratio to the value at step 1 , shall be not more than the value given table-1<br><br>Step4:<br>Variation of capacitance<br><br>Within±20% of the value at Step 1.</td></tr>
<tr><td>5.1.6</td><td>Surge Test</td><td>Voltage application:<br><br>1000 times of charging for 30±5 sec., with a period of 5.5±0.5 min..<br><br>Test temperature: 15℃-35℃<br><br>And the capacitor shall be stored under standard atmospheric conditions to obtain thermal stability, after which measurements shall be made.</td><td>Capacitance:<br>Not less than 80% of the value before test.<br>Dissipation factor:<br>Not more 200% of the specified value.<br>Leakage current:<br>To satisfy No.5.1.4</td></tr>
<tr><td></td><td></td><td>Test circuit<br> 

<br>Note :This requirement is applicable only to instantaneous over voltage which may be applied to terminals of capacitor, therefore, not applicable to such over voltages as often applied.</td><td></td></tr>
</table>

## 5.2 MECHANICAL PERFORMANCE

<table>
<tr><th>NO.</th><th>Item</th><th>Test method</th><th>Performance</th></tr>
<tr><td>5.2.1</td><td>Terminal Strength</td><td>Tensile strength of termination:<br>A static load of *1N shall be applied to the terminal in the axial direction and acting in a direction away from the body for 10 sec..
<table>
<tr><td>Lead wire Φ</td><td>0.5</td><td>0.6</td><td>0.8</td><td>1.0</td></tr>
<tr><td>Pull (N)</td><td>5.0</td><td colspan="2">10</td><td>20</td></tr>
</table>
Bending strength of termination:<br>Hang the specified dead weight of *2N,then bent the body through 90°, return to the original position.<br>Next bent it in opposite direction through 90°with the same speed, again return to the original position.<br>Carry out this operation in about 5 sec.
<table>
<tr><td>Lead wire Φ</td><td>0.5</td><td>0.6</td><td>0.8</td><td>1.0</td></tr>
<tr><td>Pull (N)</td><td>2.5</td><td colspan="2">5</td><td>10</td></tr>
</table></td><td>When the capacitance is measured, there shall be no intermittent contacts, or open or short-circuiting. There shall be no such mechanical damage.</td></tr>
<tr><td>5.2.2</td><td>Resistance to Vibration</td><td>To comply with JIS C 5101-1 4.17.<br>Direction and duration of vibration:<br>3 orthogonal directions mutually each for 2h , Total 6h.</td><td>When the capacitance is measured there shall be no intermittent contacts, or open or short circuiting There shall be no such mechanical damage.</td></tr>
<tr><td>5.2.3</td><td>Solder ability</td><td>Temperature or solder: 235±5℃<br>Dipping time: 2±0.5sec.</td><td>At least 90%of circumferential surface of the dipping portion of termination shall be covered with new solder.</td></tr>
</table>

## 5.3 ENDURANCE PERFORMANCE

| NO. | Item | Test method | Performance |
|---|---|---|---|
| 5.3.1 | Resistance to soldering heat | Solder bath method<br>Solder temperature : 260±5℃<br>Immersion time : 10±1sec.<br>Printed wiring board: 1.6mm | Variation of capacitance:<br>Within ±10% of the value before test.<br>Dissipation factor:<br>To satisfy the specified value.<br>Leakage current:<br>To satisfy No.5.1.4<br>Appearance :<br>No remarkable abnormality. |
| 5.3.2 | Resistance to damp heat (steady state) | To comply with JIS C 5101-1 4.22<br>Test temperature : 40±5℃<br>Test time : 240±8h<br>Relative humidity: 90~95%<br>After completion of test, the capacitor shall be subjected to standard atmospheric conditions for 1 to 2 hours, after which measurements shall be made. | Variation of capacitance:<br>Within ±10% of the value before test.<br>Dissipation factor:<br>To satisfy the specified value.<br>Leakage current:<br>To satisfy No.5.1.4<br>Appearance :<br>No remarkable abnormality. |
| 5.3.3 | Load Life Test | Application of the rated voltage and the rated ripple current.<br><br>Test temperature: 105±5℃<br>Test time:6000 h | Variation of capacitance:<br>Within ±20% of the value before test.<br>Dissipation factor:<br>Not more than 200% of the specified value.<br>Leakage current:<br>To satisfy No.5.1.4<br>Appearance :<br>No remarkable abnormality. |

| NO. | Item | Test method | Performance |
|---|---|---|---|
| 5.3.4 | Shelf Life Test | The capacitors are then stored with no voltage applied at a temperature of 105±5℃for 1000 h | Variation of capacitance:<br>Within ±20% of the value before test.<br>Dissipation factor:<br>Not more than 200% of the specified value.<br>Leakage current:<br>Not more than 200% of the specified value in 5.1.4<br>Appearance :<br>No remarkable abnormality. |
| 5.3.5 | Explosion proof test | The following experiment is only applicable to the aluminum shell diameter larger than Phi 6.3 products;<br>Applying reverse operating voltage to the capacitor 70-100V; | The valve is opened without glue drum, no spray and no obvious explosion;. |

TABLE 1

| | | | | | | |
|---|---|---|---|---|---|---|
| Impedence Ratio (max) | Rated Voltage(v) | 160 | 200 | 250 | 400 | 450 |
| | \|z\|-25℃/\|z\|20℃ | 3 | | | 6 | |

## 6. MARKING

6.1 The following items shall be marked indelibly on the capacitor.

（1）Manufacture’s name or trade mark. yunxing

（2）Rated voltage -v

（3）Type and specification CD11-E

（4）Polarity of the terminals 

（5）Rated temperature - 40℃~+105℃

6.2 Marking color

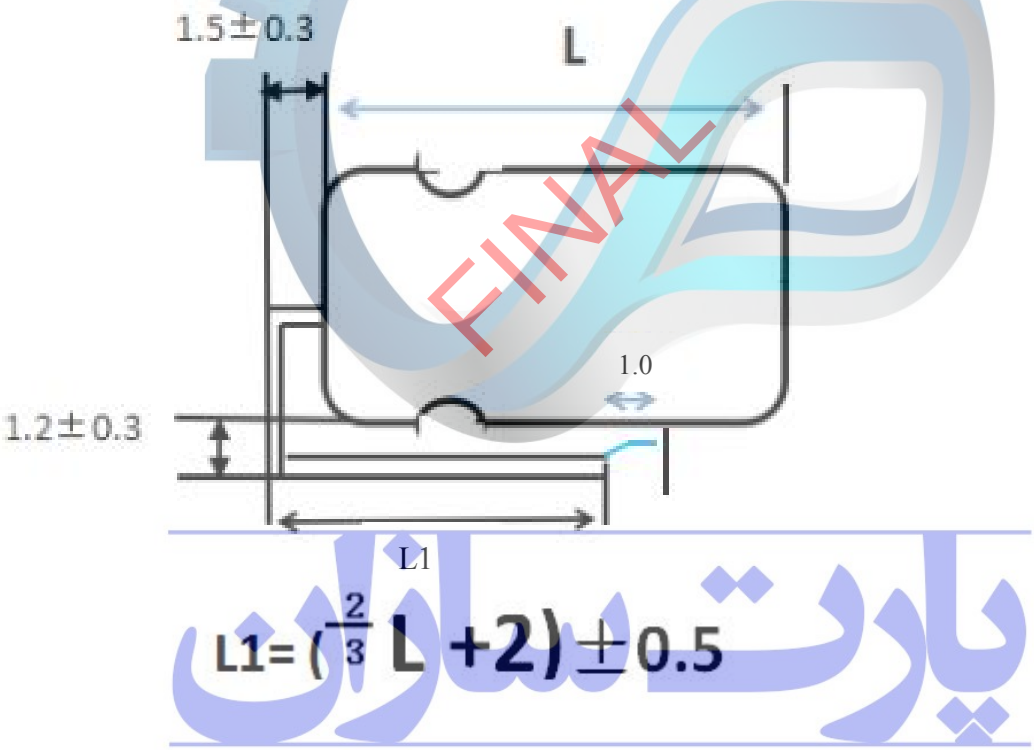
Sleeve color : transparent

Marking color: black

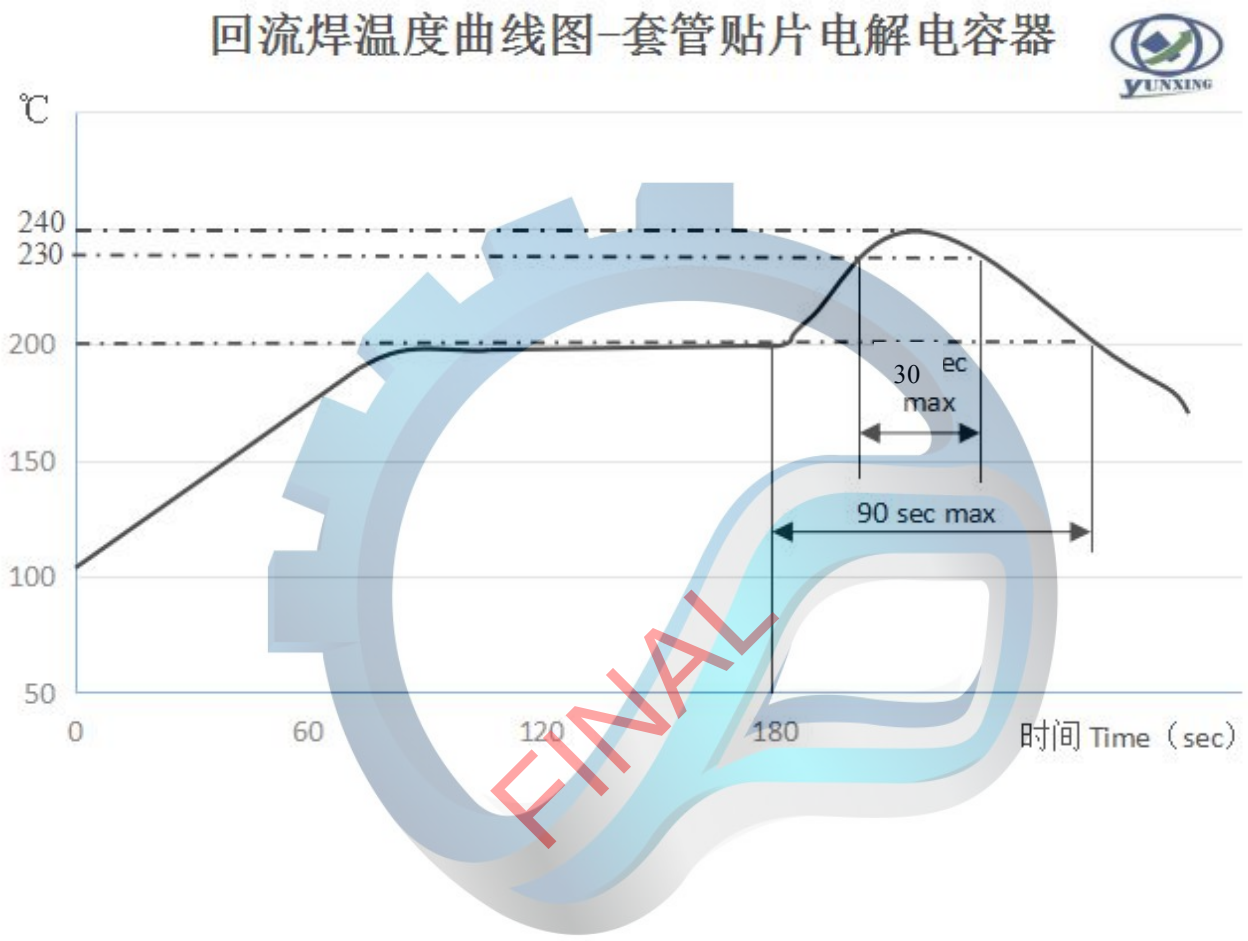
6.3.1 High voltage product rated ripple current factor

| frequency (Hz) / voltage (V) | 120 | 1K | 10K | 100K |
|---|---|---|---|---|
| 160 to 500 | 0.5 | 0.7 | 0.8 | 1 |

7.2 Forming mode:double L horizontal type(Fig. B).



7.3 reflow soldering temperature curve



# 8. OTHERS

## 8.1 IMPORTANT INFORMATION ON THE APPLICATION OF ALUMINUM ELECTROLYTIC CAPACITORS

(1).DC electrolytic capacitors are polarized

When reverse voltage is applied on DC electrolytic capacitor, the capacitor will becomes short-circuited please use no polarized capacitors in the circuit be damage due to abnormal current flows through the capacitors since the circuit where the positive voltage may be applied to the cathode terminal.

(2).Use capacitor within rated voltage

When capacitor is used at higher voltage than the rated voltage, leakage current increases, characteristics drastically deteriorate and damage in a short period may occur as a result. Please take extra caution that the peak voltage should not exceed the rated voltage.

(3).Charge and discharge application.

When aluminum electrolytic capacitors for general purpose are employed in rapid charge and discharge application, its life expectancy may be shortened by capacitance decrease, heat rise, etc.

(4).Store the capacitor.

I creased leakage current is common in aluminum capacitors which have been stored for long period of time. The Higher the storage temperature, the higher the leakage current increase, therefore please take precautions concerning the storage location. The leakage current decreases gradually as voltage is applied to the capacitor. In cases where increased leakage current causes problems in the circuit, apply voltage(aging) before using.

(5).Ripple current applied to capacitor should not exceed the rated value.

Excessive heat will reduce capacitance and result in shortened life of capacitor if ripple currents exceeding the specified rated value are applied. The peak value of the ripple voltage should be less than the rated voltage.

(6).Ambient temperature.

Life of the aluminum electrolytic capacitor is affected by the ambient temperature. It is generally stated, that life doubles for each 10℃ decrease in temperature.

(7).Lead stress

When a strong force is applied to the lead wires or terminals, stress is put on the internal connections. This may result in short circuit, open circuit or increased leakage current. It is not advisable to bend or handle a capacitor after it has been soldered to the PC board.

(8).Heat resistance at the soldering process

In the dip soldering process of PC board with aluminum electrolytic capacitors mounted, secondary shrinkage or crack of PET sleeve may be observed when solder temperature is too high or dipping time is too long.

(9)Hole pitch and position of PC board.

A PC board must be designed so its hole pitch coincides with the lead pitch(lead spacing) of the capacitor specified by the catalog or specifications. when a capacitor is forcibly inserted into an unmatched hole pitch, a stress is put on the leads This could result in a short circuit or increased leakage current.

8.2 This product is Pb Free and Cd Free.

We product is according to the standard of ROHS , it means the max capacitance of six harmful material not over the following request

Cd-- 100PPM Pb--1000PPM Hg--1000PPM $Cr^{+6}$--1000PPM

PBBs--1000PPM PBDEs--1000PP