承 认 书

APPROVAL SHEET

客户料号 Customer P/N	
客户名称 Customer Name	
产品名称 Product Name	导电高分子固态电容器 Conductive Polymer Aluminum Solid Capacitors
型号规格 Specification	PA 33uF160V 10X13 剪脚 2.9mm
厂商料号 Vendor P/N	PA160V33M10X13CA2R9
发行日期 Issue Date	2026/6/26

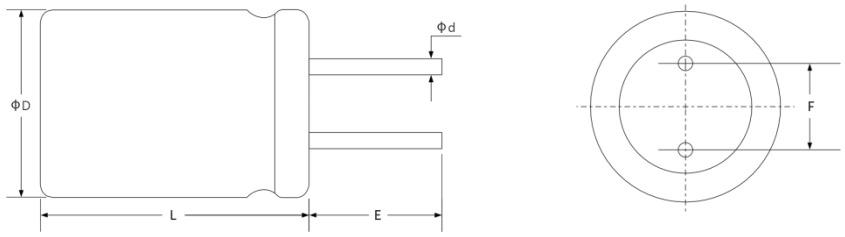
发行单位 ISSUED EPARTMENT	
深圳市捷而瑞科技有限公司	
制作 PREPARED BY	HE JIN HUAN
批准 APPROVED	LI WEI YE

客户承认 APPROVED COLUMN	
□合格 □不合格	
审核 CHECKED	
批准 APPROVED	

变更履历表
Change Record

序号 No.	日期 Date	版本号 Version No	修订记录 Revision records	校订者 Reviser
1	2026-6-26	A0	新版发行	-

1.外形尺寸图 Dimensions



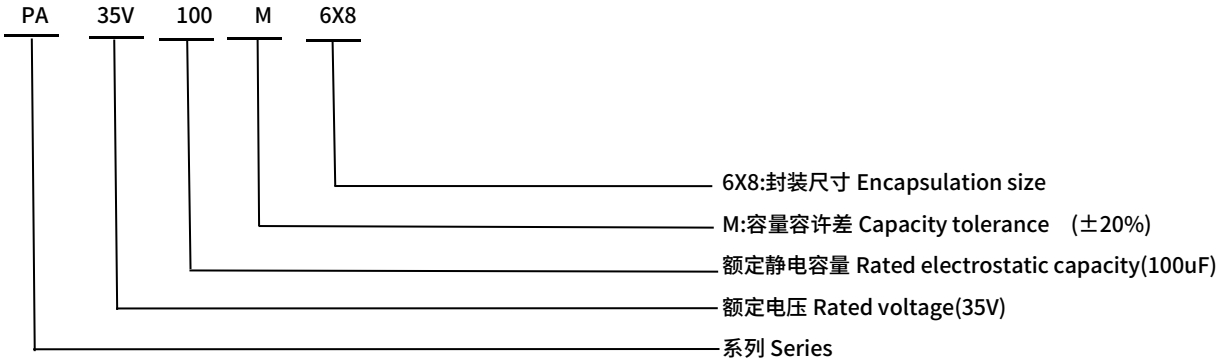
Item 项目	D+0.5max	L±1	F±0.5	d±0.05	E
尺寸(mm)	10	13	5	0.6	2.9±0.3

2.规格特性表 Specification and Specifications Table

料号 Part Number	参数 Parameter	单位 unit	条件 condition
系列 Series	PA	-	-
标称容量 Cap.	33	μF	-
额定电压 R.V.	160	V	-
尺寸 Size DXL	10×13	mm	-
容差 Tolerance	-20~+20	%	-
损失角 DF (max)	12	%	120Hz
漏电流 LC(max)	1000	μA	120S
阻抗 ESR(max)	130	mΩ	100KHz
纹波电流 R.C.(max)	1000	mA	100KHz/105℃
浪涌电压 S.V.	184	V	-
寿命 Life	2000	hrs	105℃
工作温度 Temp.	-55~105	℃	-

测试环境(In the test environment）:温度 T 15~35℃ ，湿度 RH 45%~75%

3.品号编码体系 Part Number Coding System（Example：35V100μF）

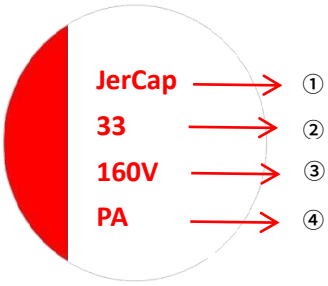


注释：型号中 R 表示小数点，如 4R7 表示 4.7μF Note: "R" in the model number denotes a decimal point (e.g., 4R7 = 4.7μF)

4.纹波电流补正系数 Multiplier for Ripple Current

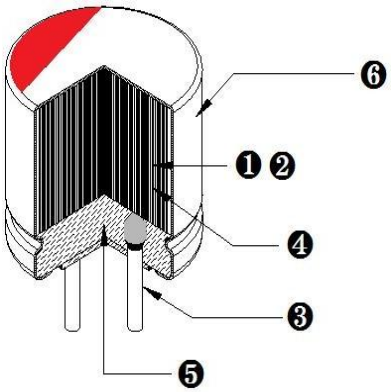
频率 Frequency	120Hz≤Freq.＜1KHz	1KHz≤Freq.＜10KHz	10KHz≤Freq.＜100KHz	100KHz≤Freq.＜300KHz
纹波修正系数 Coefficient	0.05	0.3	0.7	1.0

5.印字 Marking



1.公司商标 Logo
2.额定容量 Rated capacity
3.额定电压 Rated voltage
4.产品系列 Series

6.材料表 Material Table



序号 NO	构成部件 Component	材质成分 Material
1	阳极箔 Anode foil	铝 Aluminum
2	阴极箔 Separator Paper	铝 Aluminum
3	导针 leader pin	镀锡铜包钢线 TPCSW
4	电解纸 Electrolytic paper	马尼拉麻 Manila hemp
5	胶盖 Sealing	橡胶 Rubber
6	铝壳 Aluminum shell	铝 Aluminum

7.测试与试验项目 Test Item

<table>
<tr><th>No.</th><th>项 目
Items</th><th>条 件
Conditions</th><th>判 定
Decide</th></tr>
<tr><td>1</td><td>静电容量
Capacitance</td><td rowspan="2">测试频率：120Hz
Test Frequency:120Hz
测试电压:≤ 0.5Vrms
Test Voltage:≤ 0.5Vrms
测试温度：20±2℃
Test Temperature:20±2℃</td><td>静电容量允许偏差：≤参考规格参数
Capacitance tolerance：≤Refer to the SPEC TABLE</td></tr>
<tr><td>2</td><td>损耗角正切值
Dissipation Factor</td><td>参考规格参数
Refer to the SPEC TABLE</td></tr>
<tr><td>3</td><td>漏电流
Leakage Current</td><td>测试电压：额定电压
Test Voltage:Rated voltage
充电时间：2 分钟
Charging :2min
测试温度：20±2℃
Test Temperature: 20±2℃</td><td>I≤0.2CV 或 500μA（以较大值为准）
I≤0.2CV or 500μA(whichever is greater)</td></tr>
<tr><td>4</td><td>温度循环
Temperature Cycle</td><td>
<table>
<tr><td rowspan="5">周期
One Cycle</td><td>温度
Temperature(℃)</td><td>时间 Time
(minutes)</td></tr>
<tr><td>最低使用温度±3</td><td>30±3</td></tr>
<tr><td>25℃</td><td>3max</td></tr>
<tr><td>最高使用温度±3</td><td>30±3</td></tr>
<tr><td>25℃</td><td>3max</td></tr>
</table>
循环次数 Total number of cycles: 5</td><td>1.外观无损坏
No appearance defect
2.容量变化率在±20%以内
Capacitance change within ±20%
3.损耗角正切：≤初始规定值
Dissipation factor：≤ Initial specified value
4.漏电流：≤初始规定值
Leakage current：≤ Initial specified value</td></tr>
<tr><td>5</td><td>耐焊接热
Resistance to Soldering Heat</td><td>预热时间：120±2 秒，达到 120±2℃
Warm up time :120±2 seconds ,to reach 120±2℃
焊锡炉温度：260±5℃ .
Solder bath temperature: 260±5℃ .
焊料成分:
Solder bath composition:
Sn-96.5% ，Ag-3.0% ，Cu-0.5%
浸入深度：1.5~2.0mm
Immersion depth: 1.5 to 2.0mm
浸入时间：10±1 秒
Immersion duration: 10±1 seconds</td><td>1.无外观缺陷
No appearance defect
2.容量变化在±10%以内
Capacitance change within ±10%
3.损耗角正切：≤初始规定值
Dissipation factor：≤ Initial specified value
4.漏电流：≤初始规定值
Leakage current：≤ Initial specified value</td></tr>
<tr><td>6</td><td>可焊性
Solder Ability</td><td>焊锡炉温度：243±5℃
Solder bath temperature: 243±5℃
焊料成分:
Solder bath composition:
Sn-96.5% ，Ag-3.0% ，Cu-0.5%
浸入深度： 1.5~2.0mm
Immersion depth: 1.5 to 2.0mm
浸入时间： 2±0.5 秒
Immersion duration: 2±0.5 seconds</td><td>锡液要覆盖导针浸入表面积的 95%以上
A minimum of 95% the immersed surface is to be coated with the new solder.</td></tr>
</table>

<table>
<tr><th>No.</th><th>项 目
Items</th><th>条 件
Conditions</th><th>判 定
Decide</th></tr>
<tr><td>7</td><td>温度特性
Temperature Characteristics</td><td>
<table>
<tr><th>阶段 Stage</th><th>温度 Temperature(℃)</th><th>测试项目 Item(120Hz)</th></tr>
<tr><td>1</td><td>20±2</td><td>CAP/DF/ESR</td></tr>
<tr><td>2</td><td>最低使用温度±3</td><td>ESR</td></tr>
<tr><td>3</td><td>20±2</td><td>CAP/DF</td></tr>
<tr><td>4</td><td>最高使用温度±3</td><td></td></tr>
<tr><td>5</td><td>20±2</td><td></td></tr>
</table>
</td><td>1.电容量变化:初始值的±20%以内
Capacitance change: within ±20% of the initial value
2.损耗角正切: ≤规定值
Dissipation factor: ≤ Specified value
3.ESR: ≤规定值
ESR: ≤ Specified value</td></tr>
<tr><td>8</td><td>端子强度
Terminal strength</td><td>(a)引张强度 Tensile Strength:
电容器引脚向下，固定电容器本体，在引脚上静态负重至 10S，符合以下要求： Fixing capacitor body and pins down,static load on the pins for 10 seconds, meets the following requirements.
<table>
<tr><td>d(mm)</td><td>d≤0.5</td><td>0.5＜d≤0.8</td><td>0.8＜d≤1.2</td></tr>
<tr><td>Load(N)</td><td>5</td><td>10</td><td>25</td></tr>
</table>
(b)折曲强度 Bending strength:
电容器引脚向下，固定电容器本体，在引脚上负重，按图示折弯，试验两回
Fixing capacitor body and pins down,load on the pins and bending for 2 times according to following diagram, then meets requirements as below.
<table>
<tr><td>d(mm)</td><td>d≤0.5</td><td>0.5＜d≤0.8</td><td>0.8＜d≤1.2</td></tr>
<tr><td>Load(N)</td><td>2.5</td><td>5</td><td>10</td></tr>
</table>
</td><td>不能有如端子受损之类的机械特性上的损伤
There must be no damage in mechanical properties such as damaged terminals.</td></tr>
<tr><td>9</td><td>振动
Vibration</td><td>频率范围：10 Hz 至 55 Hz
Frequency range : 10 Hz to 55 Hz
振幅：0.75 毫米
Amplitude :0.75 mm
总持续时间：3×2h. X-Y-Z 方向各 2 小时
Total duration: 3×2h.
x-y-z directions each for 2 hours</td><td>1.外观:无明显的损伤或电解液漏出
Appearance: No visible damage or leakage of electrolyte
2.电容量变化: 初始值的±5%以内
Capacitance change: within ±5% of the initial value</td></tr>
<tr><td>10</td><td>高温负荷
Load Life</td><td>电容依照额定寿命在上限温度下施加额定电压及纹波电流，待其恢复室温后进行测量
In accordance with its rated life conditions, apply the rated voltage and ripple current to the capacitor under the upper limit temperature. Conduct the measurement after the capacitor returns to room temperature.</td><td>1.外观:无明显的损伤或电解液漏出
Appearance: No visible damage or leakage of electrolyte
2.电容量变化:初始值的±20%以内
Capacitance change: within ±20% of the initial value
3.损耗角正切: ≤150%规定值
Dissipation factor: ≤150% of specified value
4.漏电流: ≤规定值
Leakage Current: ≤Specified value</td></tr>
<tr><td>11</td><td>浪涌电压
Surge Voltage</td><td>试验温度: 15~35℃
Test Temp: 15~35℃
试验电压: 浪涌电压
Test voltage: surge voltage
施加浪涌电压 30 秒，然后放电 330 秒，共循环 1000 次
Charge surge voltage for 30 seconds and dischage for 330 seconds. Repeat this cycle 1000 times.
<table>
<tr><td>UR (V)</td><td>2.5</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td></tr>
<tr><td>S.V(V)</td><td>2.9</td><td>7.2</td><td>11.5</td><td>18.4</td><td>28.8</td><td>40.3</td><td>57.5</td><td>72.5</td></tr>
</table>
</td><td>1.电容量变化:初始值的±20%以内
Capacitance change: within ±20% of the initial value
2.损耗角正切: ≤150%规定值
Dissipation factor: ≤150% of specified value
3.漏电流: ≤规定值
Leakage current: ≤Specified value
4.外观: 无可见损伤
Appearance: No visible damage</td></tr>
</table>

No.	项 目 Items	条 件 Conditions	判 定 Decide
12	稳态湿热 Steady-State Damp Heat	环境温度 60±2℃，湿度 90-95% RH 条件下，储存 1000±48 小时 Stored for 1000±48 hours under the conditions of ambient temperature 60±2℃ and humidity 90-95% RH.	1.电容量变化:初始值的±20%以内 Capacitance change: within ±20% of the initial value 2.损耗角正切：≤150%规定值 Dissipation factor: ≤150% of specified value 3.漏电流：≤规定值 Leakage current: ≤Specified value 4.外观：无可见损伤 Appearance: No visible damage

8.铝电解电容使用注意事项 Precautions for Using Aluminum Electrolytic Capacitors

1. 铝电解电容是有极性的，请按正确的极性使用。当反向接入线路时，会导致回路短路或电容损坏。当回路的有可能反向或极性不明时，请使用无极性电容。

Aluminum electrolytic capacitors are polarized and shall be used with the correct polarity. Reverse connection in the circuit will result in short circuit or capacitor damage. If there is a possibility of reverse polarity or unclear polarity in the circuit, non-polarized capacitors shall be used.

2. 不要施加反向电压或超过额定电压的直流电压，当施加电压超过额定电压时，漏电流会显著增加导致电容损坏。推荐在额定电压下使用以保证寿命。浪涌电压是电容能短时间承受的最高电压。

Do not apply reverse voltage or DC voltage exceeding the rated voltage. When the applied voltage exceeds the rated voltage, the leakage current will increase significantly, leading to capacitor damage. It is recommended to use the capacitor at the rated voltage to ensure service life. Surge voltage refers to the maximum voltage that the capacitor can withstand for a short period.

3. 纹波电流应小于额定值。施加纹波电流超过额定值后，会导致电容器本体过热，容量下降，寿命缩短。所施加纹波电压的峰值与直流电压之和应小于额定工作电压。

The ripple current shall be less than the rated value. Applying a ripple current exceeding the rated value will cause the capacitor body to overheat, resulting in reduced capacitance and shortened service life. The sum of the peak value of the applied ripple voltage and the DC voltage shall be less than the rated working voltage.

4. 请在额定温度范围内使用电容器。如果在上限温度以上使用电容器将会导致使用寿命大大缩短或防爆阀开启，在室温下使用会保证更长的使用寿命。科学统计，使用环境温度每下降 10 摄氏度其使用寿命增加一倍。

Please use the capacitor within the rated temperature range. Using the capacitor above the upper limit temperature will significantly shorten its service life or trigger the explosion-proof valve. Use at room temperature will ensure a longer service life. Scientific statistics show that the service life doubles for every 10℃ decrease in the operating environment temperature.

5. 当电容器长期贮存后，其漏电流会升高，贮存温度越高，漏电流上升愈快。因此应注意贮存环境，在电容器上施加电压后，漏电值将不断下降，如果漏电流值上升对电路有不良影响，请在使用前充电处理。

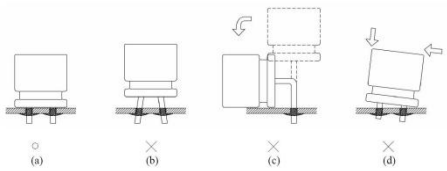
After the capacitor is stored for a long time, its leakage current will increase, and the higher the storage temperature, the faster the leakage current rises. Therefore, attention should be paid to the storage environment. When a voltage is applied to the capacitor, the leakage value will continuously decrease. If the increase in leakage current exerts adverse effects on the circuit, charging treatment should be performed before use.

6. 电容不适合用在频繁充放电的电路。容量会由于负极氧化膜的氧化而容量减小，或电容通过充放电产生的热量而损坏。

Capacitors are not suitable for circuits with frequent charging and discharging. The capacitance will decrease due to the oxidation of the negative electrode oxide film, or the capacitor may be damaged by the heat generated during charging and discharging.

7. 不良的安装或者对引线施加应力会使产品内部结构损坏，导致漏电流高或者漏液问题。

Poor installation or applying stress to the leads may damage the internal structure of the product, resulting in high leakage current or electrolyte leakage.



a). 焊接良好 Good soldering

b). PCB 孔与孔之间的间距与引线间距不同 The pitch between PCB holes does not match the lead pitch.

c). 不要弯曲引线 Do not bend the leads.

d). 当焊接不平时，不要弯曲或扭曲电容本体 Do not bend or twist the capacitor body if the soldering is uneven.

8. 在进行浸锡或焊接时，其胶管可能因焊接时间过长、温度过高为发生破裂或者二次收缩。

During tin dipping or soldering, the hose may crack or shrink secondary due to excessive soldering time or excessively high temperature.

9. 铝电解电容器不能使用卤化有机物系列的清洗剂进行清洗。如果必须清洗，请使用能够保证电容器质量的清洗剂。对于能够保证清洗质量的清洗剂，清洗后请不要在清洗溶液或者密封容器中保管。清洗后的电容器和电路板一起在热风下干燥 10 分钟以上，热风的温度不可高于电容器的上限温度。

Aluminum electrolytic capacitors shall not be cleaned with halogenated organic compound-based cleaning agents. If cleaning is necessary, use a cleaning agent that can ensure the capacitor quality. For cleaning agents that meet the cleaning quality requirements, do not store the cleaned capacitors in the cleaning solution or sealed containers after cleaning. Dry the cleaned capacitors together with the circuit board under hot air for more than 10 minutes, and the temperature of the hot air shall not exceed the upper limit temperature of the capacitor.

10. 请不要使用含有卤化有机物系列的固定剂及涂层剂。更不要让固定剂或涂层剂将电容器封口部位全部封住。
Do not use fixatives or coating agents containing halogenated organic compounds. Furthermore, do not allow the fixative or coating agent to completely seal the capacitor's sealing area.

11. 推荐储存在 5~35℃，相对湿度小于 75%RH 无阳光直射的环境。产品出厂储存期限为 12 个月。如果储存时间超过 12 个月，请检查电气特性及可焊性。

It is recommended to store the product in an environment with a temperature of 5~35℃, relative humidity (RH) <75%, and no direct sunlight. The shelf life of the product from the date of manufacture is 12 months. If the storage period exceeds 12 months, the electrical characteristics and solderability shall be inspected.

12. 当电容器需要报废时，请联系当地的工业废弃物处理商。

When the capacitor needs to be discarded, please contact the local industrial waste disposal company.

9.符合 RoHS　RoHS Compliance

符合欧盟 RoHS 的最新标准，若客户有特殊要求，按照双方签订的相关协议为准。

Completely in accordance with the latest standard of RoHS or relevant agreements reached by both parts if customer has special requirements.

附件：

剪脚示意图：

