PRODUCT SPECIFICATION

产品规格书

客户名称 Customer	:	
产品型号 Part No.	:	HBA-3R8-J706F-TYJ1025(A14)
发布日期 Issue Date	:	2022.01

编制 Prepared	审核 Checked	批准 Approved
客户核准 Customer Approval		

1. 适用范围 Scope：

本产品规格书对HBA系列产品的性能，测试方法进行了规范，作为技术确认的依据。

This product specification specifies the performance and test methods of HBA series products as the basis for technical confirmation.

2. 典型应用 Typical Applications：

◆智能仪表：智能电表、智能水表、智能燃气表

Smart meters: smart electricity meters, smart water meters, smart gas meters

◆车载电子：汽车音响、ETC 系统、行车记录仪

Car electronics: car audio, ETC system, driving recorder

◆物联网 5G：智能电视、智能冰箱、智能电子门、防盗系统、5G 终端

Internet of Things 5G: smart TV, smart refrigerator, smart electronic door, anti-theft system, 5G terminal

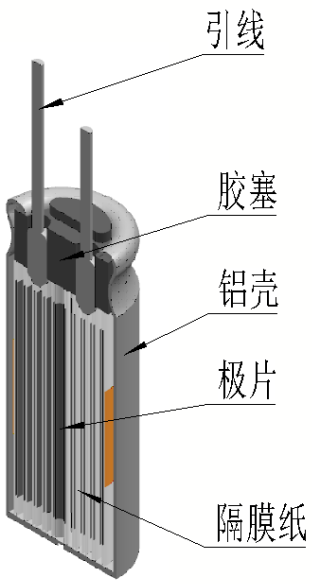
◆后备电源：通信设备、无线传输、RAM、UPS、小家电、小型储能装置、绿色能源、太阳能路灯

Back-up power supply: communication equipment, wireless transmission,RAM, UPS,small household appliances, small energy storage devices, green energy, solar street lights

3. 产品结构 Structure：

本产品采用圆柱形电容器外形。内部为卷绕式结构，正负电极片之间用隔膜隔开，并浸有电解液成分；铝制外壳与橡胶塞进行密封，引出方式为引线式引出，引出极在产品同侧。

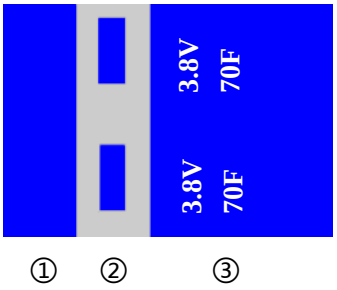
This product uses a cylindrical capacitor shape. The inside is a winding structure, the positive and negative electrode sheets are separated by a diaphragm, and are immersed in electrolyte components; the aluminum shell is sealed with a rubber plug, and the lead-out method is lead-out, and the lead-out pole is on the same side of the product.



4. 基本特性 General Specification：

额定电压 Rated Voltage (V)	**额定容量** Rated Capacitance (F)	**ESR_{DC}** (mΩ)	**ESR_{AC}** (1KHz) (mΩ)	**额定电流** Rated Current (A)	**脉冲电流** Pulse Current (A)	**自放电** Self Discharge (3months) (V)	**漏电流** Leakage Current (μA)	**重量** Weight (g)
3.8	70	320	120	0.4	2.3	3.0	9	3.7

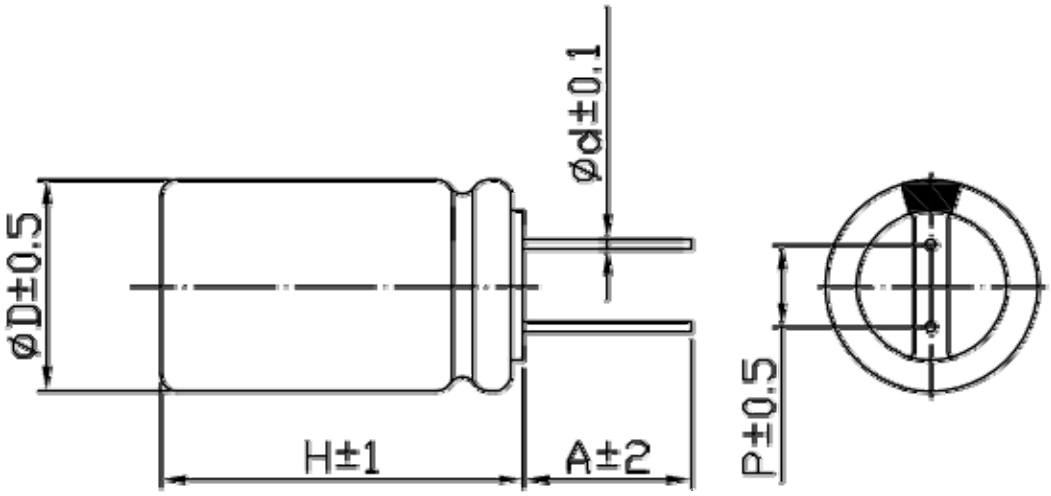
5. 产品标识



② **负极指示标识** Cathode Sign

③ **额定电压及容量** Rated Voltage and Capacitance

6. 产品外形尺寸图 Dimension：



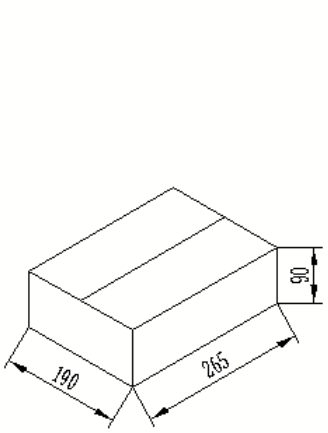
产品直径 **Product diameter** ΦD (mm)	**产品长度** **Product Length** H (mm)	**引线距离** **Pin distance** P (mm)	**引线直径** **Pin diameter** Φd (mm)	**引线长度** **Pin length** A (mm)
10	25	5	0.6	10

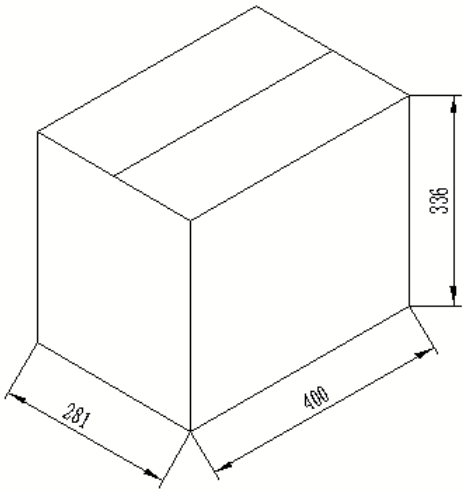
7. 特性指标 Characteristics：

项目 Items		规格/条件 Specification/Condition
01	**工作电压范围** Operating Voltage Range	2.5V~3.8V
02	**浪涌电压** Surge Voltage	4.2V
03	**放电终止电压** Cut-off discharge voltage	2.5V
04	**容量偏差范围** Cap. Tolerance	-20%~+20%
05	**工作温度范围** Operating Temp.	-20℃~65℃ -20℃~85℃ (3.5V)
06	**循环寿命** Cycle life Expectancy	常温循环充放电实验25万次。 250,000 cycles of charging and discharging experiments at room temperature. ｜△C/C｜≤30%，ESR≤2倍规定值 ｜△C/C｜≤30%, ESR≤2 times the specified value
07	**高温耐久** High temperature load	+65℃加额定电压，或+85℃加3.5V电压，1000h后， +65℃ plus rated voltage, or +85℃ plus 3.5V voltage, after 1000h, ｜△C/C｜≤30%，ESR≤2倍规定值 ｜△C/C｜≤30%, ESR≤2 times the specified value
08	**高温无负荷特性** High temperature without load	+65℃，1000h后， +65℃, after 1000h ｜△C/C｜≤30%，ESR≤2倍规定值 ｜△C/C｜≤30%，ESR≤2 times the specified value
09	**温度特性** Temperature characteristics	+70℃时｜△C/C｜≤50%，ESR≤规定值 +70℃,｜△C/C｜≤50%，ESR≤ specified value - 20℃时｜△C/C｜≤50%，ESR≤4倍规定值 - 20℃,｜△C/C｜≤50%，ESR≤4 times the specified value
10	**稳态湿热特性** The steady state damp heat test	+40℃，90--95%RH，240h， ｜△C/C｜≤30%，ESR≤2倍规定值。 ｜△C/C｜≤30%，ESR≤2 times the specified value

8. 产品包装 Packing：

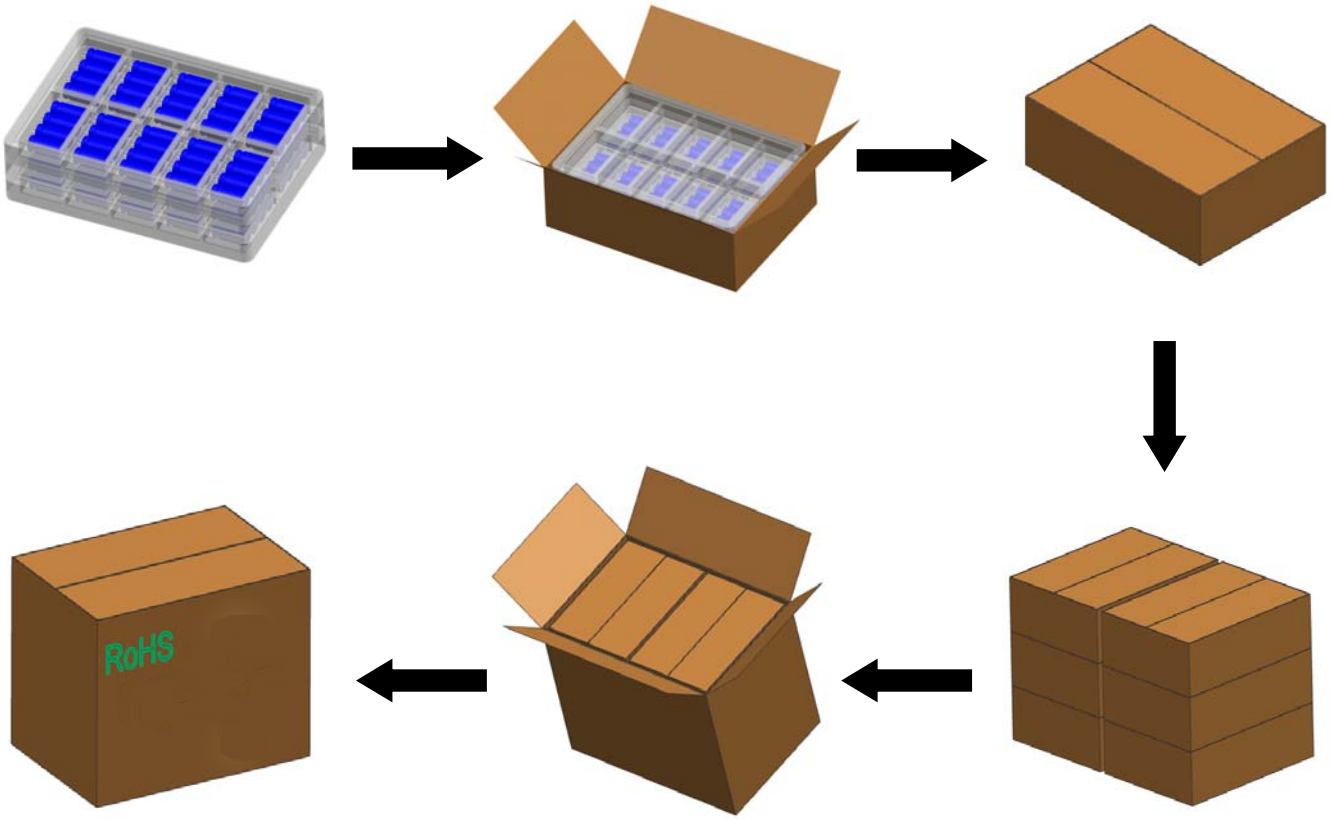
内包装箱尺寸 Size of inner packing (L×W×H)mm	外包装箱尺寸 Size of outer packing (L×W×H)mm
265×190×90	400×281×336





内包装箱 inner packing　　**外包装箱** outer packing

包装示意图 Packing Schematic



9. 性能测试方法 Test Methods：

9.1 标准测试条件 Standard Test Condition

本规格书标准测试条件为标准大气压，温度25±2℃，相对湿度小于60%。

The standard test conditions in this specification are standard atmospheric pressure, temperature 25 ± 2 ℃, and relative humidity less than 60%.

9.2 容量 capacitance

9.2.1 测试步骤 Test steps

a) **将产品以标准电流I_R恒流充电至额定电压 U_R；**

Charge the product with standard current and constant current IR to rated voltage U_R;

b) **以额定电压 U_R 保持恒压充电30min；**

Keep constant voltage charging at rated voltage U_R for 30min;

c) **以标准电流I_R恒流放电至终止电压 U_{min}，记录电容器两端电压从 U_1 到 U_2 的时间 t_1 和 t_2。**

Discharge with the standard current constant current IR to the termination voltage Umin, and record the time t1 and t2 of the voltage across the capacitor from U1 to U2.

根据下列等式计算电容量值：

The capacitance value is calculated according to the following equation:

$$C = \frac{I \times (t_2 - t_1)}{U_1 - U_2}$$

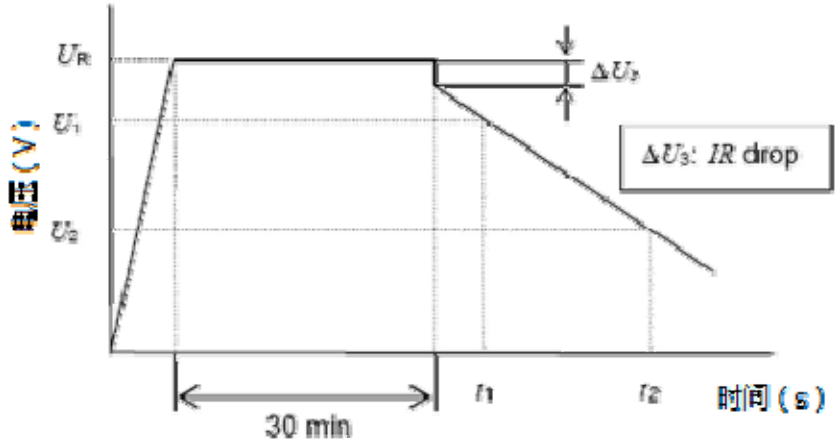


图1 容量测试曲线

Figure 1 Capacity test curve

其中 Among them

C **容量** capacity（F）；

I **放电电流** discharge current（A）；

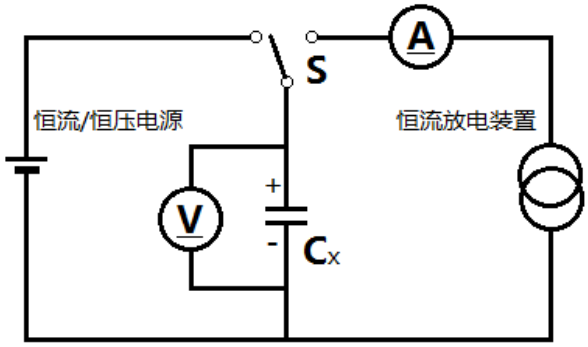
U1 **测量初始电压** measures the initial voltage（V）；

U2 **测量终止电压** measurement termination voltage（V）；

t1 **放电至U1 的时间**（s）；

t2 **放电至U2 的时间**（s）。

9.2.2 测量电路 Measuring circuit



A 直流电流表 DC ammeter

V 直流电压表 DC voltmeter

S 转换开关 Changeover switch

Cx 待测电容 Capacitance to be measured

图2 恒流放电方法电路

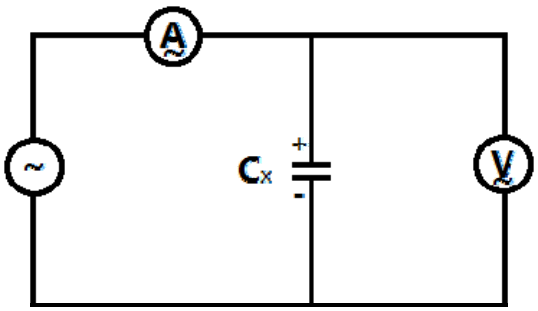
Figure 2 Constant current discharge method circuit

9.3 内阻 Internal resistance

9.3.1 测试方法：交流阻抗方法

Test method: AC impedance method

9.3.2 测量电路 Measurement circuit



~ 振荡器 Oscillator

A 交流电流表 AC ammeter

V 交流电压表 AC voltmeter

Cx 待测电容 Capacitance to be measured

图3 交流阻抗方法电路

Figure 3 AC impedance method circuit

9.3.3 计算方式 Calculation

电容器的内阻Ra应通过下式计算：

The internal resistance Ra of the capacitor should be calculated by the following formula:

$$R_a = \frac{U}{I}$$

其中 Among them

R_a **交流内阻** AC internal resistance（Ω）；

U **交流电压有效值** AC voltage effective value（V r.m.s）；

I **交流电流有效值** RMS value of AC current（A r.m.s）。

测量电压的频率，应为1kHz。

The frequency of the measured voltage should be 1kHz.

交流电流应为1mA至10mA。

The AC current should be 1mA to 10mA.

9.3.4 设备 Device

内阻测试仪 Internal resistance tester

9.4 充电/放电循环特性测试 Cycle life Expectancy

a) 充电：以规定电流 I_a 恒流充电至额定电压U_R；

Charging: charge to the rated voltage U_R with the specified current I_a and constant current;

b) 搁置：搁置10s；

Shelve: Shelve for 10s;

c) 放电：以规定电流 I_a 恒流放电至终止电压 U_{min}

Discharge: discharge at a constant current with the specified current I_a to the final voltage U_{min}

d) 循环：250,000次循环

Cycle: 250,000 cycles

9.5 温度特性测试 Temperature characteristics

a) 将电容器放置于相应测试温度（大气环境）保持1小时；

Place the super capacitor at the corresponding test temperature (atmospheric environment) for 1 hour;

b) 容量测试参照8.2方法；

Refer to method 8.2 for capacity test;

c) 交流内阻测试参照8.3方法。

Refer to method 8.3 for AC internal resistance test.

10. 使用注意事项 Precautions For Use：

10.1 超级电容器不可在下列条件使用，否则将可能会发生电解液分解、电容器发热现象，导致压力阀动作、内部气体和电解液泄出；以及容量下降、内阻增加等电气性能劣化，导致产品寿命缩短或失效。

Supercapacitors cannot be used under the following conditions. Otherwise, electrolyte decomposition and capacitor heating may occur, which will cause the pressure valve to operate, internal gas and electrolyte leakage; and electrical performance degradation such as reduced capacity and increased internal resistance, resulting in product life. Shorten or fail.

a) 超过标称温度 Exceeding the nominal temperature

超级电容器的使用寿命受使用温度的影响，一般情况下，使用温度提升10℃，超级电容器的寿命会缩短一半，请尽量在低于最高使用温度的环境下使用。超过最高使用温度使用的话，可能会造成产品性能急剧劣化及破损。超级电容器的使用温度不仅要确认设备周围温度，内部温度，还要确认设备内发热体（功率晶体管、电阻等）的放射热，纹波电流引起的自行发热温度。此外，请勿将发热体安装在电容器的附近。

The service life of a super capacitor is affected by the operating temperature. Generally, if the service temperature is increased by 10℃, the service life of the super capacitor will be shortened by half. Please try to use it in an environment lower than the maximum operating temperature. If it is used above the maximum operating temperature, it may cause rapid deterioration and breakage of the product's performance. The use temperature of supercapacitors must not only confirm the surrounding temperature and internal temperature of the equipment, but also confirm the radiated heat of the heating elements (power transistors, resistors, etc.) in the equipment, and the self-heating temperature caused by the ripple current. In addition, do not install the heating element near the capacitor.

b) 超过额定电压范围 Exceeding the rated voltage range

请严格按照额定电压范围进行充放电使用。充电时电压过高超过额定电压上限、放电时电压过低超过额定电压下限的情况都会损害电容器的性能，导致产品性能降低/失效、寿命缩短以及损坏。因此，请采用避免过充过放的设计方案。

Please strictly follow the rated voltage range for charging and discharging. Excessive voltage exceeding the upper limit of the rated voltage during charging and too low voltage exceeding the

lower limit of the rated voltage during discharging will damage the performance of the capacitor, resulting in product performance degradation/invalidation, shortened life and damage. Therefore, please adopt a design solution that avoids overcharging and overdischarging.

c) 反向电压或交流电压 Reverse voltage or AC voltage

请严格按照正负极标识使用，反向施加电压可能会导致产品性能降低/失效、寿命缩短以及损坏，或导致压力阀动作、内部气体和电解液泄出。

Please use it strictly in accordance with the positive and negative signs. Reverse application of voltage may cause product performance degradation/failure, shortened life, and damage, or cause the pressure valve to operate, and internal gas and electrolyte leakage.

10.2 请避免在以下环境中使用超级电容器。

Avoid using super capacitors in the following environments.

a) 直接溅水、盐水及油的环境、或处于结露状态、充满着气体状的油分或盐分的环境。

An environment where water, salt water, and oil are directly splashed, or an environment where condensation is present and filled with gaseous oil or salt.

b) 充满着有害气体（硫化氢、亚硫酸、氯、氨、溴、溴化甲基等）的环境。

An environment full of harmful gases (hydrogen sulfide, sulfurous acid, chlorine, ammonia, bromine, methyl bromide, etc.).

c) 溅上酸性及碱性溶剂的环境。

Environments splashed with acidic and alkaline solvents.

d) 阳光直射或有粉尘的环境。

The environment is exposed to direct sunlight or dust.

e) 遭受过度的振动及冲击的环境。

An environment subject to excessive vibration and shock.

10.3 在焊接过程中要避免使电容器过热（例如1.6mm的印刷线路板，焊接时应为260℃，时间不超过5s）。

Avoid overheating the capacitor during the soldering process (for example, a 1.6mm printed circuit board, the soldering temperature should be 260°C, and the time should not exceed 5s).

10.4 请避免在超级电容器的引出极间或连接板焊点间进行电路配线。

Please avoid wiring the circuit between the lead poles of the super capacitor or between the

solder joints of the connecting board.

10.5 快速充放电的使用状况下，充电开始时、放电开始时，会产生由内部阻抗导致的电压下降(也叫IR降），所以请采用已考虑到电压变化幅度的设计方法。

In the use of rapid charge and discharge, the voltage drop (also called IR drop) caused by the internal impedance will occur at the beginning of charging and at the beginning of discharge, so please adopt a design method that has considered the voltage variation range.

10.6 不要把电容器放入已溶解的焊锡中，只在电容器引线上粘焊锡，不可让焊接用焊棒接触电容器热缩管。

Do not put the capacitor in the dissolved solder, only stick the solder on the capacitor lead, and do not let the soldering rod touch the capacitor heat shrink tube.

10.7 在串联使用时，请在设计上考虑存在单体间的电压均衡问题。

When using in series, please consider the problem of voltage balance between cells in the design.

10.8 安装后，不可强行扭动或倾斜电容器，请勿使产品掉落或受到过度冲击或震动。

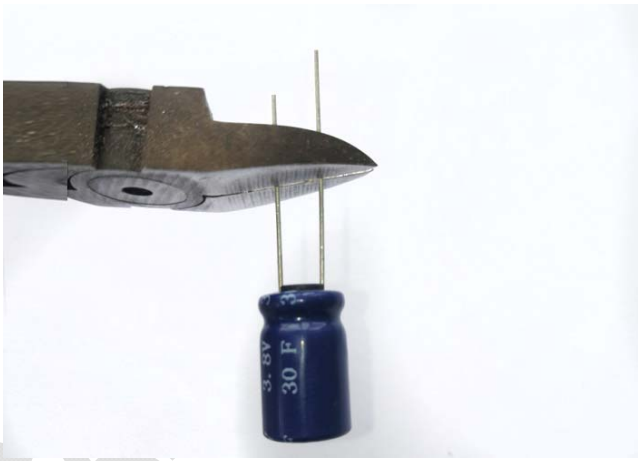
After installation, do not twist or tilt the capacitor forcibly, and do not drop the product or subject it to excessive shock or vibration.

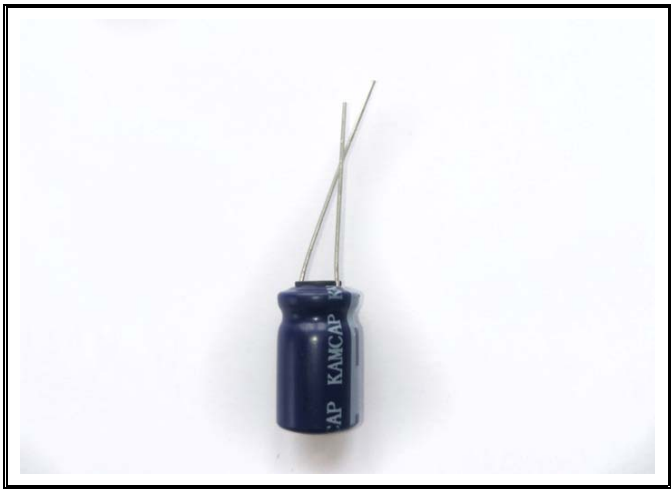
10.9 本产品在发货前已充电至一定电压，在使用过程中请勿将正极引线（+）和负极引线（-）短路，不要让产品的引线彼此直接接触、请勿用潮湿的手直接握住产品正负极引线。否则可能会产生大电流放电，造成电击、灼伤等危险。可能发生短路的情况包含但不限于下列示例，请一定避免类似操作：

This product has been charged to a certain voltage before shipment. Please do not short-circuit the positive lead (+) and negative lead (-) during use, do not let the leads of the product directly touch each other, and do not hold it directly with wet hands. Hold the positive and negative leads of the product. Otherwise, a large current discharge may occur, causing dangers such as electric shock and burns. The possible short-circuit situations include but are not limited to the following examples. Please avoid similar operations:

请注意避免如下错误操作示例：

Avoid the following incorrect operation:

测试时请勿将正负夹具互相接触 Do not touch the positive and negative clamps to each other during the test	修剪时请勿用工具同时接触正负极引线 Do not touch the positive and negative leads with tools at the same time when trimming
	
焊接时请勿用工具同时接触正负极引线 Do not touch the positive and negative leads with tools at the same time when welding	测量时请勿用工具同时接触正负极引线 Do not touch the positive and negative leads with a tool at the same time when measuring
	
请勿将产品正负极引线直接接触 Do not touch the positive and negative leads of the product directly	请勿将产品随意放置彼此引线接触 Do not place products at random



11. 保存要求 Storage：

11.1 不可存放于相对湿度大于85%RH，或含有有毒气体的场所和高温高湿复合的环境中。应储存在温度10℃~35℃、相对湿度小于60%的环境中。

Do not store in a place where the relative humidity is greater than 85%RH, or contains toxic gases, or in a compound environment with high temperature and high humidity. It should be stored in an environment with a temperature of 10°C to 35°C and a relative humidity of less than 60%.

11.2 长期存放时，请勿使电压高于其上限（3.8V）和低于其下限（2.5V）。建议每半年充一次电以防止产品过放电。

During long-term storage, do not make the voltage higher than its upper limit (3.8V) and lower than its lower limit (2.5V). It is recommended to charge the battery once every six months to prevent the product from over-discharging.

11.3 避免以下环境中保存超级电容器

Avoid storing super capacitors in the following environments

a) 直接溅水、盐水及油的环境、或处于结露状态、充满着气体状的油分或盐分的环境。

An environment where water, salt water, and oil are directly splashed, or an environment where condensation is present and filled with gaseous oil or salt.

b) 充满着有害气体（硫化氢、亚硫酸、氯、氨、溴、溴化甲基等）的环境。

An environment full of harmful gases (hydrogen sulfide, sulfurous acid, chlorine, ammonia, bromine, methyl bromide, etc.).

c) 溅上酸性及碱性溶剂的环境。

Environments splashed with acidic and alkaline solvents.

d) 阳光直射或有粉尘的环境。

The environment is exposed to direct sunlight or dust.

e) 遭受过度的振动及冲击的环境。

An environment subject to excessive vibration and shock.

12. 关于废弃 Disposal Considerations：

不要随意丢弃，遵循法令或地方公共团体等指定的条例，将废弃品交给工业废弃物处理商。

Don't throw it away randomly. Follow the laws and regulations or local public organizations and other designated regulations, and hand over the waste to the industrial waste disposal company.

13. 关于运输 Transport Information：

HBA系列产品属于电池电容类超级电容器，在产品发货时已充电至一定电压。运输方式可使用汽车、火车、轮船等交通工具运输，参照锂离子电池相关运输法律规定执行。运输过程中请注意防止雨淋、撞击、跌落、挤压等情况的发生。

HBA series products are battery capacitor supercapacitors, which have been charged to a certain voltage when the products are shipped. The mode of transportation can be transported by vehicles, trains, ships and other means of transportation, according to the relevant transportation laws and regulations of lithium-ion batteries. Please pay attention to prevent rain, impact, drop, squeeze, etc. during transportation.

超级电容器方面的其它问题，请向生产厂家咨询或参照超级电容器使用说明的相关技术资料执行。
For other questions about super capacitors, please consult the manufacturer or refer to the relevant technical data in the instructions for use of super capacitors.