JIERONG	超级电容模组系列			
	编　号	JR-AP-ZSS-01	制订日期	2022年3月23日
	发行版次	A/1	页　数	共11页

HSF

规格承认书

客户名称：立创商城

客户料号：C2981376

捷容料号：UMZSS5R5255N201022E

规格型号：2.5F -0%~+30% 5.5V

★ 产品环保要求：RoHS 要求 ☑　　REACH 要求☑

卤素要求 ☐

制　作	客户确认（签署）
朱亚平	（签认后，敬请惠还一份）
审　核	
张　纯	
批　准	
汤小荣	

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东莞市捷容薄膜科技有限公司 工程专用章

1 适用范围 Scope

本产品规格书描述了东莞市捷容薄膜科技有限公司生产的超级电容器的产品性能指标。

This product specification describes the product performance indexes of supercapacitors produced by Dongguan Jierong Film Technology Co., Ltd

2 测试条件 test conditions

标准测试条件 Test Conditions：

环境温度 Ambient temperature：15℃~35℃

湿度 Humidity：≤85%RH

气压 Pressure ：86kPa~106kPa

依据标准 Basis standard：

IEC 62391-1 《Fixed electric double-layer capacitors for use in electronic equipment-Part1: Generic specification》

IEC 62391-2 《Fixed electric double-layer capacitors for use in electronic equipment-Part2: Generic specification》

QC/T 741 《车用超级电容器 Automotive supercapacitor》

3 编码规则 Designation

1	2	3	4	5	6	7	8	9
U	M	Z S S	5 R 5	2 5 5	N	2 0 1 0 2 2	E	
电容类型	产品种类	系列	电压（V）	标称容量（F）	容量偏差	尺寸（mm*mm）	套管材质	附加说明
U 超级电容	M 模组	ZSS	5R5 5.5	255 2.5	N 0~30%	201022 20*10*22	E PET	

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4 基本特性 Parameters

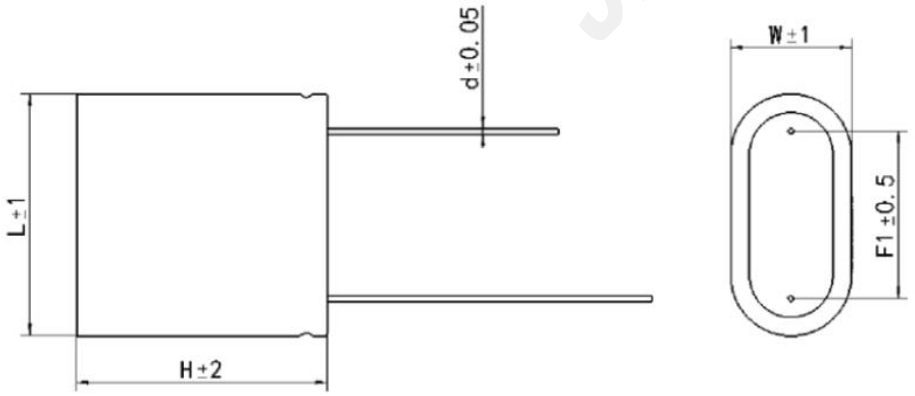
编号 Number	项目 Project	参考值 reference value	备注 Remarks
01	工作温度范围 Temperature for Operation	-40~+85℃	(-40~+85℃@2.3V)
02	额定工作电压 Rated Voltage	5.5V	
03	浪涌电压 Surge Voltage	5.7V	
04	额定容量 Rated Capacitance	2.5 F	
05	容差范围 Capacitance Tolerance	0~+30%	
06	交流内阻 AC Internal Resistance	≤160m Ω	1 kHz
07	直流内阻 DC Internal Resistance	≤280 m Ω	
08	额定电流 Rated current	1.2 A	$I = \frac{C \cdot U}{2(\Delta t + ESR_{DC} \cdot C)}$，$\Delta t = 5s$
09	峰值电流 1s Maximum peak Current	4.0A	$I = \frac{C \cdot U}{2(\Delta t + ESR_{DC} \cdot C)}$，$\Delta t = 1s$
10	短路电流 short-circuit current	19.6 A	$I = \frac{U}{ESR_{DC}}$
11	漏电流 72-hour Leakage Current	≤0.016 mA	72 hrs
12	存储能量 Typical mass	10.5mWh	$E = \frac{1/2\, CU^2}{3600}$
13	能量密度 Energy Density	2.1Wh/kg	$\frac{E}{mass}$
14	功率密度 Power Density	2.59kW/kg	$P = \frac{0.12U^2}{ESR_{DC} \cdot mass}$
15	峰值功率密度 Maximum peak Power Density	5.4 kW/kg	$P = \frac{0.25U^2}{ESR_{DC} \cdot mass}$
16	存储温度范围 Temperature for Storage	-40~+85℃	
17	循环寿命 Cycle Life	＞500,000 cycles	
18	重量 Typical mass	5g	

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5 环境特性

编号 Number	项目 Project	规格/条件 Specifications / Conditions
01	温度特性 temperature characteristic	+70℃，容量变化：初始值的 10%以内，ESR:不超过规格值 +70 ℃, capacity change: within 10% of the initial value, ESR: not exceeding the specification value；-40℃，容量变化：初始值的 30%以内，ESR:不超过 2 倍规格值-40 ℃, capacity change: within 30% of the initial value, ESR: not more than twice the specification value
02	高温负荷 High temperature load	+70℃，额定电压下，负荷 1000h，容量变化：初始值的 30%以内，ESR:不超过 2 倍规格值+70 ℃, rated voltage, load 1000h, capacity change: within 30% of the initial value, ESR: not more than twice the specification value
03	高温存储 High temperature storage	+70℃，高温存储 1000h，容量变化：初始值的 30%以内，ESR:不超过 2 倍规格值+70 ℃, high temperature storage for 1000h, capacity change: within 30% of the initial value, ESR: not more than twice the specification value
04	稳态湿热 Steady state damp heat	+40℃±2，90~95%RH，高温高湿存储 240h，容量变化：初始值的 30%以内，ESR:不超过 2 倍规格值+40 ℃± 2, 90 ~ 95% RH, high temperature and high humidity storage for 240h, capacity change: within 30% of the initial value, ESR: not more than twice the specification value
05	循环寿命 cycle life	+25℃，500,000 次，容量变化：初始值的 30%以内，ESR:不超过 2 倍规格值+25 ℃, 500000 times, capacity change: within 30% of the initial value, ESR: not more than twice the specification value
06	寿命测试 Life test	+25℃，额定电压 10 年，容量变化：初始值的 30%以内，ESR:不超过 2 倍规格值+25 ℃, rated voltage for 10 years, capacity change: within 30% of the initial value, ESR: not more than twice the specification value

6 产品尺寸 Product size



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项目 Project	尺寸 Size	项目 Project	尺寸 Size
W	10+0.5mm	F	15.5±0.5mm
L	20±1mm	d	0.6±0.05mm
H	22±2mm		

7 测试方法 Test conditions

7.1 容量 Rated Capacitance

7.1.1 测试电路原理Test circuit principle

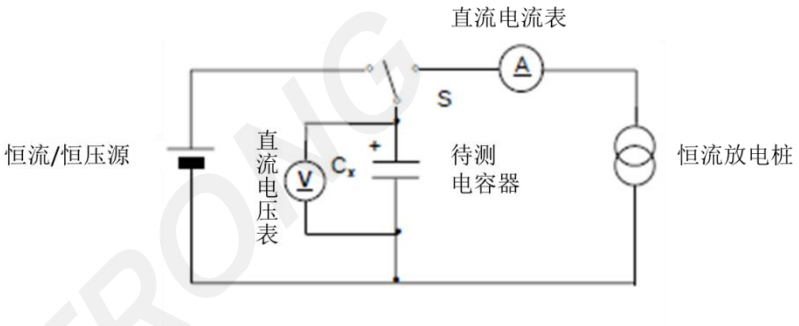


图1 恒流放电方法电路Constant current discharge method and circuit

7.1.2 测量方法Measuring method

——恒流/恒压源的直流电压设定为额定电压 The DC （U_R）voltage of the constant current / constant voltage source is set to the rated voltage（U_R）；

——设定恒电流放电装置的恒定电流值 ISet the constant current value of the constant current discharge deviceI；

——将开关 S 切换到直流电源，电容器恒流充电到额定电压并恒压 30min 后转换为恒流放电 Switch the switch s to the DC power supply, charge the capacitor at constant current to the rated voltage and convert it to constant current discharge after 30min。

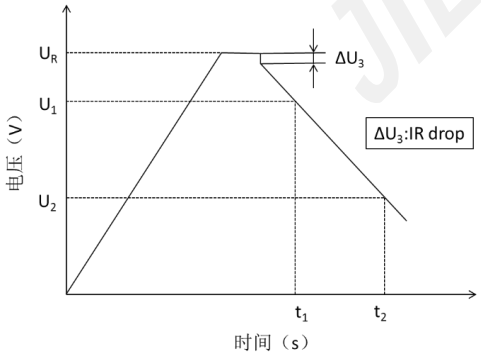


图2 电容量测试示意图Schematic diagram of capacitance test

测量电容器两端电压从 U_1 到 U_2 的时间 t_1 和 t_2，如图 2 所示，根据下列等式计算电容量值 Measure the time T1 and T2 of the voltage at both ends of the capacitor from U1 to U2, as shown in Fig. 2, and calculate the capacitance value according to the following equation：

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

式中 In the formula：

C_R——容量 Capacitance（F）；

I——放电电流，按照 10mA/F 计算，取整 Discharge current, calculated as 10mA / F, rounded off（A）；

U_1——测量初始电压 Initial voltage measurement，$0.8U_R$（V）；

U_2——测量终止电压 Measure the termination voltage，$0.4U_R$（V）；

t_1——放电初始到电压达到 U_1(s)的时间 Time from initial discharge to voltage reaching U1 (s)；

t_2——放电初始到电压达到 U_2(s)的时间 Time from initial discharge to voltage reaching U2 (s)。

7.2 交流内阻 AC internal resistance

7.2.1 测试电路原理 Test circuit principle

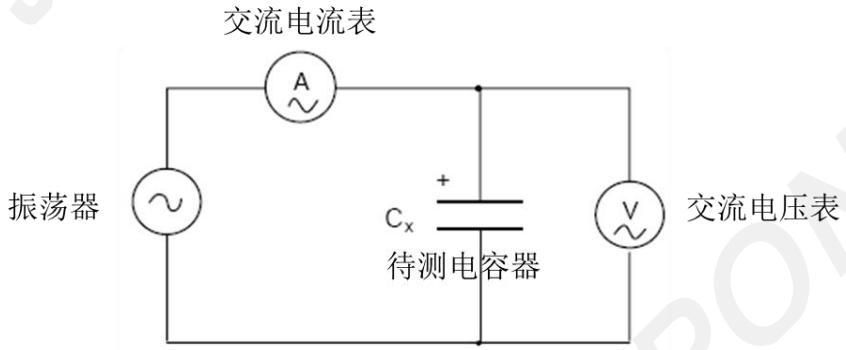


图3 交流阻抗电路AC impedance circuit

7.2.2 测量方法Measurement method

电容器的交流内阻 ESR_{AC} 应通过下式计算 The AC internal resistance esrac of the capacitor shall be calculated by the following formula：

$$ESR_{AC} = \frac{U}{I}$$

式中 In the formula：

ESR_{AC}——交流内阻 Internal impedance（Ω）；

U——交流电压有效值 Effective value of AC voltage（V）；

I——交流电流有效值 Effective value of AC current（A）；

测量电压的频率应为 1kHz The frequency of measuring voltage shall be1kHz；

交流电流应为 1mA 至 10mA The AC current shall be 1mA to 10mA。

7.3 直流内阻 DC internal resistance

7.3.1 测试方法Test conditions

——恒流/恒压源的直流电压设定为额定电压(U_R)The DC voltage of the constant current / constant voltage source is set to the rated voltage (UR)；

——设定恒电流放电装置的恒定电流值 I Set the constant current value I of the constant current discharge device；

——将开关 S 切换到直流电源，电容器恒流充电到额定电压并恒压 30min 后转换为恒流放电 Switch the switch s to the DC power supply, charge the capacitor at constant current to the rated voltage and convert it to constant current discharge after 30min；

——用电压记录仪记录电容器充放电转换端电压瞬间 10ms 电压降的变化量ΔU_3，如图 2 所示。

根据下式计算直流内阻 ESR_{DC} Use a voltage recorder to record the change of 10ms voltage drop at the moment of capacitor charge discharge conversion terminal voltage Δ U3, as shown in Figure 2.Calculate the DC internal resistance esrdc according to the following formula：

$$ESR_{DC} = \frac{\Delta U_3}{I}$$

式中：

ESR_{DC}——直流内阻 Internal resistance（Ω）；

ΔU_3——10ms 电压降 Voltage drop（V）；

I——放电电流 Discharge current（A），按照 10mA/F 计算，取整 Calculated as per 10mA / F, rounded off（A）。

7.4 漏电流 leakage current

7.4.1 测试方法Test method

——测量之前，电容器应充分放电，并短路 6h Before measurement, the capacitor shall be fully discharged and short circuited for 6h；

——恒流/恒压源的直流电压设定为额定电压(U_R) The DC voltage of the constant current / constant voltage source is set to the rated voltage (UR)；

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——选择合适的保护电阻 R_S，经过最大 30min 充电时间后达到 95%充电电压 Select the appropriate protection resistor RS and reach 95% charging voltage after a maximum charging time of 30min；

——用电压表记录 72h 后保护电阻两端的电压 U_S，如图 4 所示 Use a voltmeter to record the voltage us at both ends of the protection resistance after 72h, as shown in Figure 4；

——漏电流 L_C 值即为 U_S/R_S 的比值 The leakage current LC value is the ratio of us / rs。

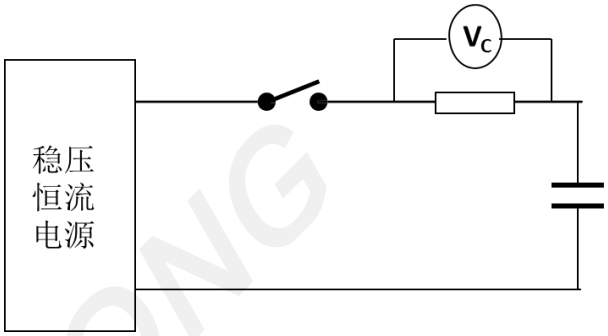


图4　漏电流测试电路图Leakage current test circuit diagram

7.4.2 有关相应标准规定Relevant standards and regulations

——测试参考温度为20℃，在其他温度测量时，应有相关修正系数 The test reference temperature is 20 ℃, and there shall be relevant correction factors when measuring other temperatures；

——规定充电时间 Specified charging time；

——高精度的稳压电源 High precision regulated power supply；

——高精密的保护电阻 High precision protective resistor。

7.5 自放电 Self discharge

7.5.1 测试方法Test method

——测量之前，电容器应充分放电，并短路 6h Before measurement, the capacitor shall be fully discharged and short circuited for 6h；

——恒流/恒压源的直流电压设定为额定电压(U_R) The DC voltage of the constant current / constant voltage source is set to the rated voltage (UR)；

——设定规定的恒电流放电装置的恒定电流值 Set the constant current value of the specified constant current discharge device；

——将开关 S 切换到直流电源进行恒流充电，经过最大 30min 充电时间后达到 95%充电电压 Switch switch s to DC power supply for constant current charging, and reach 95% charging voltage after a maximum charging time of 30min；

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——在恒流/恒压源达到额定电压后恒压充电 8h After the constant current / constant voltage source reaches the rated voltage, it shall be charged at constant voltage for 8h；

——在恒压充电 8h 结束后，将电容器两端从电压源断开，置于标准条件下 24h 后，测量电容器两端的残留电压 Uc，如图 5 所示 After 8h of constant voltage charging, disconnect both ends of the capacitor from the voltage source. After 24h under standard conditions, measure the residual voltage Uc at both ends of the capacitor, as shown in Figure 5。

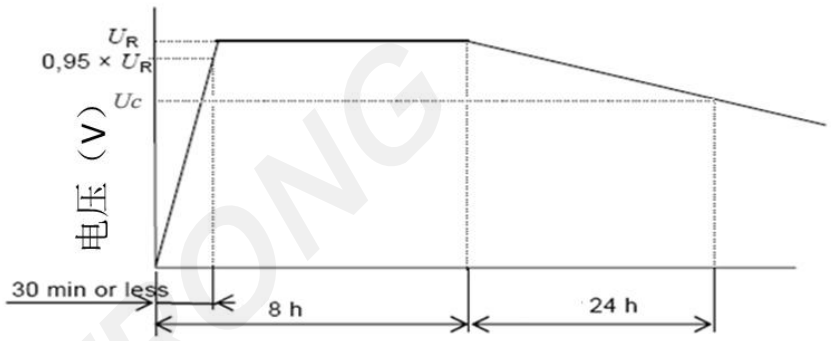


图5 自放电测试曲线图Self discharge test curve

8 使用指导和注意事项 Instructions and precautions

为安全起见，当设计的设备需要使用电容器时，请与捷容直接联系咨询技术规格、安装使用要求和注意事项 For the sake of safety, when the designed equipment needs to use capacitors, please contact JieRong directly for technical specifications, installation and use requirements and precautions。

8.1 使用指导 Instructions for use

1） 不可以用于以下场合：交流电路和滤波电路 It can not be used in the following occasions: AC circuit and filter circuit。

2） 电容的工作电压不应超过电池额定最高工作电压。否则，会导致缩短使用寿命，甚至引起气胀、泄露或开裂 The working voltage of the capacitor should not exceed the maximum rated voltage of the battery. Otherwise, it will shorten the service life and even cause inflation, leakage or cracking。

3） 使用前请检查极性。如果在在反极性下工作，电容不仅会缩短使用寿命，甚至还会造成严重的损坏，如气胀、电解液泄露等 Please check the polarity before use. If the capacitor works under reverse polarity, it will not only shorten its service life, but also cause serious damage, such as air inflation, electrolyte leakage and so on。

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4） 环境 Environment

工作温度会影响电容的使用寿命。通常，较高的工作温度会缩短使用寿命。因此，最好是在低环境温度下工作 The working temperature will affect the service life of the capacitor. Generally, higher operating temperatures will shorten the service life. Therefore, it is best to work at low ambient temperature。

电容的工作温度应考虑机组内部工作温度和电容工作时的内部温升 The working temperature of the capacitor shall consider the internal working temperature of the unit and the internal temperature rise when the capacitor works。

5） IR 下降 Descend

当主电源关闭，电容会从电源失效检测模式转变为后备电源工作模式，此时由于瞬间启动电流和电容内阻会导致开路电压下降。因此，请根据产品规格书和应用电流中指定的阻抗选择合适的产品类型 When the main power supply is turned off, the capacitor will change from the power failure detection mode to the backup power supply working mode. At this time, the open circuit voltage will drop due to the instantaneous starting current and the internal resistance of the capacitor. Therefore, please select the appropriate product type according to the impedance specified in the product specification and application current。

6） 串联连接的电容 Series connected capacitor

当多个单体电容串联使用以提高工作电压时，应保证每个电容的工作电压不得超过电容的最大工作电压，否则会缩短寿命，甚至引起气胀、泄露或开裂 When multiple single capacitors are used in series to improve the working voltage, it shall be ensured that the working voltage of each capacitor shall not exceed the maximum working voltage of the capacitor, otherwise it will shorten the service life and even cause inflation, leakage or cracking。

7） 焊接 Welding

手工焊接：推荐的钎头温度低于 350℃，焊接时间不超过 4 秒。尽量缩短烙铁与电容器端子直接接触的时间，因为引线过热可能导致更高的 ESR。Manual welding: the recommended temperature of the bit is lower than 350 ℃, and the welding time shall not exceed 4 seconds. Try to shorten the time of direct contact between the soldering iron and the capacitor terminal, because overheating of the lead may lead to higher ESR。

回流焊:不要在 EDLC 上使用回流焊、红外线或对流方法。Reflow soldering: do not use reflow soldering, infrared or convection methods on EDLC.

波峰焊：对于 0.8 毫米或更厚的 PC 板，最长预热时间为 60 秒。预热温度应限制在 100℃以下。Wave soldering: for PC boards 0.8mm or thicker, the maximum preheating time is 60 seconds. The preheating temperature shall be limited to below 100 ℃.

8） 存储说明 Storage description

建议 EDLC 保存在环境温度 5~35℃，相对湿度 75%或以下。It is recommended that EDLC be stored at an ambient temperature of 5 ~ 35 ℃ and a relative humidity of 75% or less.

如果产品放置 2 年或 2 年以上未对其施加电压，请在使用该零件前确认产品性能或者与我们联系，因为其特性可能受到环境条件的影响。If the product has been placed for 2 years or more without voltage applied to it, please confirm the product performance or contact us before using the part, because its characteristics may be affected by environmental conditions.

8.2 注意事项 Precautions

1） 禁止拆卸 Do not disassemble

拆卸电容会导致内部短路，可能导致产气、泄露、爆炸或其他问题。Removing the capacitor will lead to internal short circuit, which may lead to gas production, leakage, explosion or other problems.

电解液是有害的：如果电解液接触到皮肤或眼睛，应立即用清水冲洗并寻求医生的治疗。Electrolyte is harmful: if the electrolyte comes into contact with skin or eyes, wash it with clean water immediately and seek medical treatment.

2） 禁止将电容投入火中 Do not put the capacitor into fire or heat it under high pressure

这可能会导致电容爆炸，这是非常危险的，是被禁止的。This may lead to capacitor explosion, which is very dangerous and prohibited.

3） 禁止将电容浸入液体 Do not immerse the capacitor in liquid

电容不能用水、海水、果汁、咖啡或其他饮料等液体浸泡。Capacitors shall not be soaked in water, sea water, fruit juice, coffee or other beverages.

4） 禁止使用损坏的电容 Do not use damaged capacitors

在运送过程中，电容可能因受到冲击而损坏。如果发现电容有任何异常情况，如包装破损、电解液气味、电解液泄露等，请勿使用该电容。During transportation, the capacitor may be damaged due to impact. If any abnormality is found in the capacitor, such as package damage, electrolyte smell, electrolyte leakage, etc., do not use the capacitor.

有电解液味道或泄露的电容应放置在远离火的地方，以避免起火或爆炸。Capacitors with electrolyte smell or leakage should be placed away from the fire to avoid fire or explosion.

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