

超级电容器  
产品规格书

Electrical Double Layer Capacitor  
Data Sheet

客户Customer:

产品Product: 160V10F

型号Code: SMD161R011LAAZC00

日期Date: 2023/2/20



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工艺	品管	审核

客户核准

## 1. 适用范围 Scope

此规格书对产品的性能，测试方法进行了规范，作为技术确认的依据。

As a basis for technical confirmation, this sheet specifies the performance and test methods of the product .

## 2. 产品特性 Features

- ★比能量大 High energy density
- ★高功率 High power density
- ★寿命长 Long cycle life
- ★安全可靠 Safe and reliable
- ★环境友好 Environment-friendly
- ★免维护 Maintenance-free
- ★充放电速度可达秒级 Charge-discharge speed at the scale of second

## 3. 应用领域 Applications

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## 4. 命名规则 Designation

SMD                    161                    R                    011                    LA                    A                    Z                    C0                    0

Module classification 模组分类	Rated Voltage 额定电压(V)	Tolerance 容量偏差(%)	Rated Capacitance 额定容量(F)	Structure 引出方式	Packaging 包装	Manufacture 制造商	Module PCB status and version 模组PCB状态及版本信息	Module version 模组版本信息
EDLC Module 双电层电容器模组	160 V	0 ~ +20%	10F	导线引出	不锈钢外壳	中科超容	被动均压电阻泄放, 无信号输出	第1版

## 5. 标准测试条件 Test Conditions

环境温度 Ambient temperature: 15°C ~ 35°C

湿度 Humidity: 25%RH ~ 75%RH

气压 Pressure: 86kPa~106kPa

\*电容量、内阻和漏电流尤其受温度的影响很大，如对结果有疑问，应按以下条件进行测量：

The capacitance, internal resistance and leakage current are particularly affected by temperature.

If in doubt about results, make measurements under the following conditions:

环境温度 Ambient temperature: 20°C±2°C

湿度 Humidity: 63%RH ~ 67%RH

气压 Pressure: 86kPa~106kPa

## 6. 性能参数 Parameters

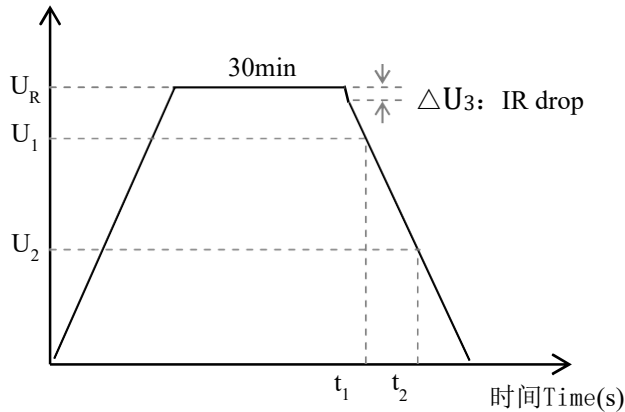
电气性能 Electrical Performance		
容量 Capacitance	额定容量, Rated Capacitance, F	10
	容量偏差, Capacitance Tolerance, %	0% ~ +20%
电压 Voltage	额定电压, Rated Voltage, V.DC	160
	浪涌电压, Surge Voltage, V.DC	168
内阻 Internal Resistance	DC/ mΩ@25°C	\
	AC 1kHz/mΩ@25°C	3.5
电流 Current	72 小时泄漏电流, 72-hour Leakage Current, μA	\
	最大持续电流 Maximum Continuous Current (ΔT=15°C), A	126.7
	1s 最大峰值电流, 1s Maximum peak Current, A	290.3
质量 Mass	典型质量, Typical mass, kg	\
能量 Energy	最大存储能量, Maximum stored Energy, Wh	\
	能量密度, Energy Density, Wh/kg	\
功率密度 Power Density	功率密度, Power Density, kW/kg	\
温度 Temperature		
温度区间 Temperature Range	工作温度范围, Temperature for Operation, °C	-40 ~ +65
	存储温度范围, Temperature for Storage, °C	-40 ~ +70
寿命 Life		
使用期限 Life Time	额定电压下工作 10 年 After 10 years at rated voltage(25°C)	
	容量变化 (初始值衰减) Capacitance change (decrease from initial value)	≤ 20%
	内阻变化 (初始值增大) Internal Resistance (increase from initial value)	≤ 2 倍 (times)
耐久性 Endurance	额定电压下工作 1500 小时 After 1500 hours at rated voltage (65°C)	
	容量变化 (初始值衰减) Capacitance change (decrease from initial value)	≤ 20%
	内阻变化 (初始值增大) Internal Resistance (increase from initial value)	≤ 2 倍 (times)
保存期限 Shelf Life	4 年 (25°C, 未充电) 4 years (25°C, uncharged)	
循环寿命 Cycle Life	25°C 恒定电流, 额定电压到 1/2 额定电压之间循环 100 万次 Constant current at 25 °C, 1000,000 cycles between rated and 1/2 rated voltages	
	容量变化 (初始值衰减) Capacitance Change (decrease from initial value)	≤ 20%
	内阻变化 (初始值增大) Internal Resistance (increase from initial value)	≤ 2 倍 (times)

**7. 外形尺寸(单位: mm) Dimensions (Units : mm)**

长度 Length (mm)	宽度 Width (mm)	高度 Height (mm)	备注 Remark
			不含导线长度

**8. 产品测试方法 Testing method**

8.1 额定容量(六步法, F)和直流内阻(六步法, Ω)



容量计算方式 Capacitance calculation:  $C = I \times \frac{t_2 - t_1}{U_1 - U_2}$

I: 放电电流, discharging current :  $4 \times C_R \times U_R$  (mA)

U<sub>1</sub>: 计算的初始电压, calculation start voltage :  $0.8 \times U_R$  (V)

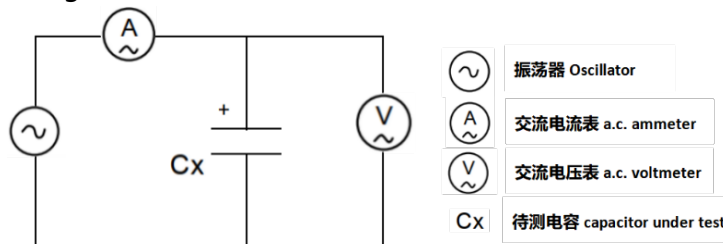
U<sub>2</sub>: 计算的结束电压, calculation end voltage :  $0.4 \times U_R$  (V)

t<sub>1</sub>: 放电开始到电压U<sub>1</sub>的时间, the time from the start of discharge to reach U<sub>1</sub>, (s)

t<sub>2</sub>: 放电开始到电压U<sub>2</sub>的时间, the time from the start of discharge to reach U<sub>2</sub>, (s)

**8.2 交流内阻ESR (Ω) AC internal resistance**

测量电路 Measuring circuit



内阻计算公式 ESR calculation:  $R_{EC} = R_{AC} = \frac{U}{I}$

U: 交流电压有效值 AC voltage rms (V r.m.s)

I: 交流电流有效值 AC current rms (A r.m.s)

测量电压的频率 Measurement frequency of the voltage: 1 kHz;

测量交流电流 Measurement the AC current: 1mA ~ 10mA

**8.2 最大持续电流 Maximum Continuous Current**

最大持续工作电流 (ΔT=15°C) :

Maximum continuous working current within 15 °C of temperature change

$$I_{cc} = \sqrt{\frac{\Delta T}{ESR_{DC} * R_{th}}}$$

8.4 最大峰值电流 Maximum Peak Current (A)

一秒钟放电至一半额定电压的最大放电电流:

Maximum current needed to discharged from rated voltage to half rated voltage in 1 second:

$$I_{max} = \frac{\frac{1}{2} \times U_R}{ESR_{DC} + \frac{1}{C}}$$

8.5 能量与功率 Energy and Power (mass: Product quality 产品质量)

最大储存能量 Maximum stored energy (Wh) :

$$E_{max} = \frac{\frac{1}{2} \times C \times U_R^2}{3600}$$

能量密度 Specific Energy (Wh kg) :

$$E_d = \frac{\frac{1}{2} \times C \times U_R^2}{3600 \times mass}$$

功率密度 Usable Specific Power (W kg) :

$$P_d = \frac{0.12 \times U_R^2}{ESR_{DC} \times mass}$$

9. 注意事项 Cautions

下述注意事项需严格遵守。对于没有按照以下注意事项所造成的任何意外事故，**重庆中科超容科技有限公司** 不负担任任何责任。

The warnings should be followed seriously, otherwise **Chongqing CAS Supercap Technology Co., Ltd.** is not responsible for any loss caused by misconduct.



**注意事项**

- 超级电容器应在额定电压和规定工作温度区间使用，不宜超过70°C，并远离超过工作温度区间的热源；
- 超级电容器在使用前需确认正/负极，禁止反向充电。若正负极接反，会降低超级电容器的充放电性能，并会导致发热、泄露和使用寿命快速衰减。
- 超级电容器在使用前用干布对正/负极端子进行清洁，避免接触电阻过大降低超级电容使用性能。
- 禁止将超级电容器投入火中或进行高压加热。
- 禁止将超级电容直接与水、油、酸或碱接触。
- 禁止挤压、钉刺和拆解超级电容器。
- 禁止将带有 0.5V 以上电压的超级电容器进行正/负极短接；
- 在使用或储存期间如发现超级电容器有散发气味、变色、变形或其它反常之处应停止使用。
- 超级电容器所使用的电解液极易挥发，请不要随意分解超级电容器。
- 超级电容器不能随意丢弃，需请根据国家环保标准进行处理。



**Cautions**

- The capacitor should be used in the rated voltage and specified operating temperature

range with no more than 70 °C, and stay away from heat sources that exceed the operating temperature range;

- The positive/negative electrodes of the capacitor must be confirmed before use, and reverse charging is prohibited. The reverse connection will reduce the performances of the capacitor and cause heat cause heat generation, leakage and rapid deterioration of service life;
- Clean the positive/negative terminals with a dry cloth before use to avoid excessive contact resistance, which would degrade the performances of the capacitor;
- Do not put the capacitor into fire or heat it under high pressure;
- Do not contact directly the capacitor with water, oil, acid or alkali ;
- Do not squeeze, prick and disassemble the capacitor;
- Do not short-circuit the positive/negative electrodes of the capacitor with voltages above 0.5V;
- Stop using the capacitor if it is found to emit odor, discoloration, deformation or other abnormalities during use or storage;
- Do not disassemble the capacitor at will because the electrolyte is volatile;
- Do not discard the capacitor at will, Please dispose of it according to national environmental protection standards.

**如有任何关于超级电容器的问题，请与我们联系。**

**Please contact with us if you have any question on our products.**