

超级电容器 产品规格书

Electrical Double Layer Capacitor Data Sheet

版本号	A0
版本修改记录	首版发行

客户Customer :

产品Product : 3.0V 4000F (光柱引出 Columnar Terminal)

型号Code : SCD3R0R408C29CAZ

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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

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

3. 应用领域 Applications

- ★Energy storage system 储能系统
- ★HEV (hybrid electric vehicle) 大型UPS
- ★Heavy-duty machinery 重型机械
- ★Variable wind power propellers 风力变桨
- ★Automation equipment 自动化设备
- ★Rail transit 轨道交通
- ★Starting system for internal combustion engine 内燃机启动系统
- ★New energy vehicle 新能源汽车

4. 命名规则 Designation

<u>SCD</u>	<u>3R0</u>	<u>R</u>	<u>408</u>	<u>C</u>	<u>29</u>	<u>CA</u>	<u>Z</u>
产品系列 Product series	额定电压(V) Rated Voltage	容量偏差(%) Tolerance	额定容量(F) Rated Capacitance	特殊定义 Special Definition	尺寸 (mm) Dimensions	引出端形式 Terminal Structure	制造商 Manufacturer
EDLC圆柱单体 Cylindrical Cell	3.0V	0% ~ +20%	4000F	/	Φ60*138	光柱引出 Columnar terminal	中科超容 CAS SCAP

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

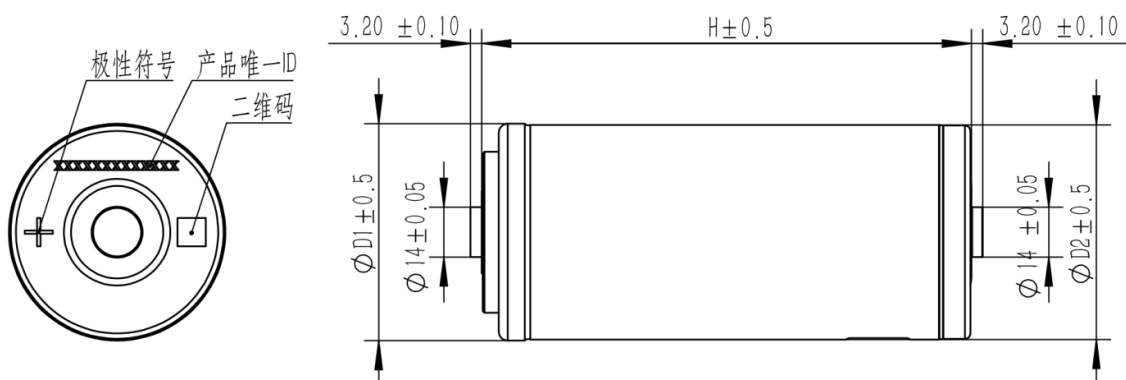
湿度 Humidity : 63%RH ~ 67%RH

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	4000
	容量偏差, Capacitance Tolerance, %	0% ~ +20%
电压 Voltage	额定电压, Rated Voltage, V.DC	3.0
	浪涌电压, Surge Voltage, V.DC	3.15
内阻 Internal Resistance	DC ESR 0.1s / mΩ @25℃	≤ 0.23
	DC ESR 5s / mΩ @25℃	≤ 0.29
电流 Current	72 小时泄漏电流, 72-hour Leakage Current, mA	< 14
	最大持续电流 Maximum Continuous Current (ΔT=15℃), A	128
	1s 最大峰值电流, 1s Maximum peak Current, A	3125
质量 Mass	典型质量, Typical mass, g	525
能量 Energy	最大存储能量, Maximum stored Energy, Wh	5.0
	能量密度, Energy Density, Wh/kg	9.5
功率密度 Power Density	功率密度, Power Density, kW/kg	8.9
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℃)	
	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℃)	
	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℃, 未充电) 4 years (25℃, uncharged)	
循环寿命 Cycle Life	25℃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, 1,000,000 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)

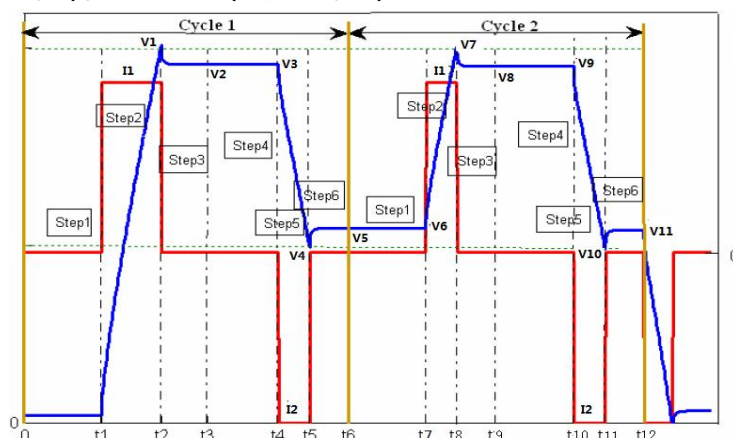


外径D1 Outer diameter D1	外径D2 Outer diameter D2	高度H Height
60.5	60	138

8. 产品测试方法 Testing method

8.1 Rated Capacitance (six-step, F) and DC internal resistance (six-step, Ω)

额定容量(六步法, F)和直流内阻(六步法, Ω)



No.	Items 项目	Condition 条件	Record 记录
1	Lay up for 10 seconds 搁置10秒		V_0
2	Charge I_1 with constant current 恒流充电 I_1	Charge to the rated voltage U_R with the constant current I_1 以 I_1 恒流充电至额定电压 U_R	I_1 、 V_1
3	Lay up for N seconds 搁置N秒	$N=0.1s$ or $N=5s$ N取0.1s 或 5s	
4	Lay up for 10 seconds 搁置10 秒		V_3 、 t_4
5	Charge I_2 with constant current 恒流放电 I_2	Discharge at a constant current of I_2 to 50% U_R 以 I_2 恒流放电至50% U_R	I_2 、 V_4 、 t_5
6	Lay up for N seconds 搁置N秒	$N=0.1s$ or $N=5s$ N取0.1s 或 5s	V_5 、 t_6
7	Repeat steps 1-6, once 重复步骤1-6, 重复1次		t_{10} 、 t_{11} 、 V_9 、 V_{10} 、 V_{11}
8	The end 结束	Discharge to below 0.1V with the constant current I_2 以 I_2 恒流放电至0.1V以下	

Parameter calculation 参数计算：

- Two-cycle discharge capacity 两次循环放电容量:

$$Cd_{ch1} = I_2 \times \frac{t_5 - t_4}{V_3 - V_4} ;$$

$$Cd_{ch2} = I_2 \times \frac{t_{11} - t_{10}}{V_9 - V_{10}}$$

- Discharge capacity 放电容量：

$$Cd_{ch} = \frac{Cd_{ch1} + Cd_{ch2}}{2}$$

- Two-cycle discharge DC internal resistance 两次循环放电直流内阻：

$$ESR_{dch1} = \frac{V_5 - V_4}{I_2} ;$$

$$ESR_{dch2} = \frac{V_{11} - V_{10}}{I_2}$$

- DC discharge resistance 直流放电内阻：

$$ESR_{dch} = \frac{ESR_{dch1} + ESR_{dch2}}{2}$$

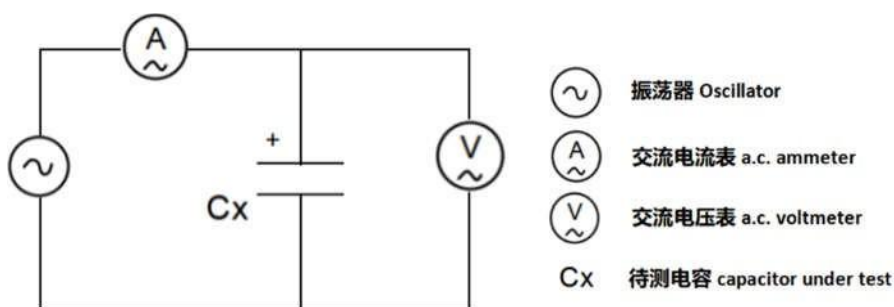
Among them: $I_1 = I_2$, in the parameter table, the DC internal resistance refers to the six-step DC discharge internal resistance.

*其中： $I_1 = I_2$, 参数表中，直流内阻 ESR_{DC} 指六步法直流放电内阻。

Product Code 产品编码	Capacitance 容量 (F)	$I_1 = I_2$ 电流 (A)
SCD3R0R408C29CAZ	4000	100

8.2 交流内阻 AC ESR (Ω):

测量电路：Measurement circuit:



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

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 should be : 1 kHz;

交流电流应为, The AC current should be : 1mA ~ 10mA

8.3 最大持续电流 Maximum Continuous Current：

最大持续工作电流 ($\Delta T = 15^\circ C$) : Maximum continuous working current within $15^\circ C$ of

temperature change (A) : $I_{cc} = \sqrt{\frac{\Delta T}{ESR_{DC} * R_{th}}}$

8.4 最大峰值电流 Maximum Peak Current :

一秒钟放电至一半额定电压的最大放电电流 (A) : Maximum current needed to discharged

from rated voltage to half rated voltage in 1 second (A) : $I_{\max} = \frac{\frac{1}{2}U_R}{ESR_{DC} + \frac{1}{C}}$

8.5 能量与功率 Energy and Power :

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

功率密度 Usable Specific Power (W/kg) : $P_d = \frac{0.12 \times U_R^2}{ESR_{DC} \times \text{mass}}$

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** 不承担任何责任。

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65℃，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 65 °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.