金美储能产品规格承认书

JINMCN SPECIFICATION FOR APPROVAL

客　　户：_____

CUSTOMER ： _____

品　　名：锂离子超级电容器

DESCRIPTION：70F 3.8V-2.5V 1313

承制方

制定	审查	批准
袁泉	张广发	

使用方

审核人员	确认

请核实本规格书内容，若无异议请签名盖章回传以表示知晓该规格书承诺的全部内容

深圳前海金裕美程储能技术有限公司
Shenzhen QH JinYMC Energy Storage Co.,Ltd.

金美储能官网:http://www.jinmcn.com

地址：广东省深圳市南山区前海深港合作区前海华润金融中心A栋

金美储能提示您：

1.金裕美程储能公司提供的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；

2.金美系列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。

3.金美系列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。

4.禁止将金美储能超级电容器投入火中或进行高压加热。

5.禁止将金美储能超级电容直接与水、油、酸或碱接触。

6.禁止挤压、钉刺和拆解金美储能超级电容器。

7.禁止将带有 0.5V 以上电压的金美储能超级电容器进行正/负极短接；

8.在使用或储存期间如发现金美储能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。

9.超级电容器所使用的电解液极易挥发，请不要随意分解金美储能超级电容器。

Cautions from JinYMC Energy Storage Co.,Ltd

1.The capacitor of JinYMC should be used in the rated voltage and specified operating temperature range with no more than 65 ℃, and stay away from heat sources that exceed the operating temperature range;

2.The positive/negative electrodes of the capacitor of JinYMC 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 servicelife

3.Clean the positive/negative terminals with a dry cloth before use to avoid excessive contact resistance, which would degrade the performances of the JinYMC capacitor;

4.Do not put the JinYMC capacitor into fire or heat it under high pressure

5.Do not contact directly the JinYMC capacitor with water, oil, acid or alkali

6.Do not squeeze, prick and disassemble the JinYMC capacitor;

7.Do not short-circuit the positive/negative electrodes of the JinYMC capacitor with voltages above 0.5V;

8.Stop using the JinYMC capacitor if it is found to emit odor, discoloration, deformation or other abnormalities during use or storage;

9.Do not disassemble the JinYMC capacitor at will because the electrolyte is volatile;

10.Do not discard the JinYMC capacitor at will, Please dispose of it according to national environmental protection standards.

1. 适用范围 Scope

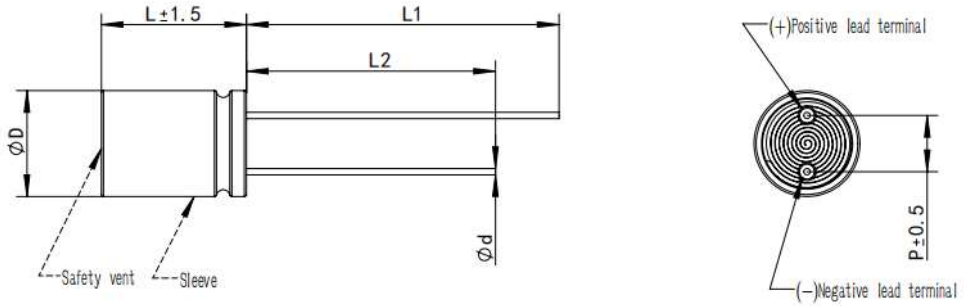
此金美储能规格书对产品的性能，测试方法进行了规范，作为技术确认的依据。

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

2. 产品特性&应用领域 Features & Applications

产品特性 Features	应用领域 Applications
工作电压高 High working voltage	消费电子 Consumer electronics
高能量 High energydensity	物联网 Internet of Things
长寿命-金久耐用 Long cycle life	智能仪器 intelligent instrument
安全可靠 Safe and reliable	玩具 Electric toys
低碳环保 Environment-friendly	自动化设备 Automation equipment
免维护 为您省钱 Maintenance-free	UPS
充放电速度可达秒级（部分毫秒级） Charge-discharge speed at the scale of second Some can reach millisecond level	程控交换机 SPC exchange
从结构到整件遵循金美jinmcn的抗震设计 From the structure to the whole piece, follow the seismic design of Jinmcn	电动汽车 electric vehicle

3. 外形尺寸(单位：mm) Dimensions (Units : mm)



ΦD (mm)	L (mm)	Φd (mm)	P (mm)	重量 (g)
12.5＋1.5 Max	13±1.5	Φ0.6±0.1	5.0±0.5	≤3.5

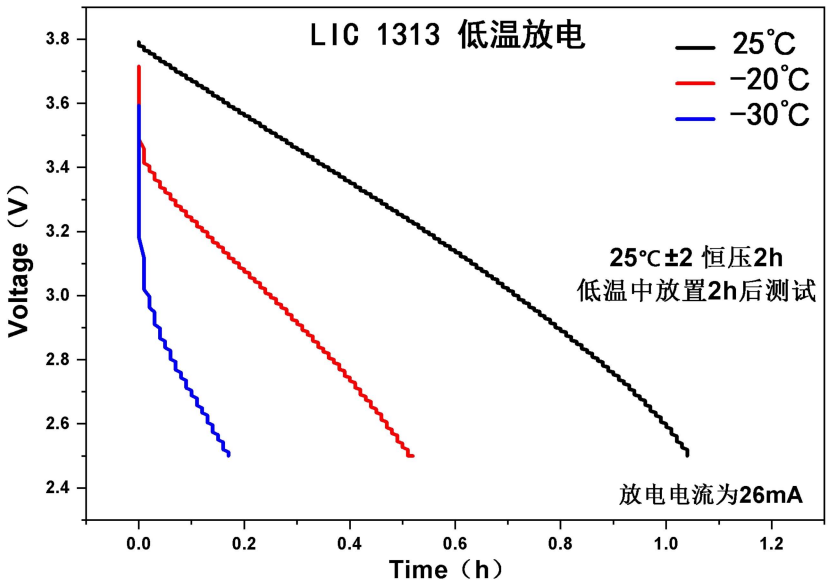
4. 性能参数 Parameters

电气性能 Electrical Performance		
容量 Capacitance	额定容量，Rated Capacitance, F	70F（26mah）
	容量偏差，Capacitance Tolerance, %	-20%~+50%
电压 Voltage	额定电压，Rated Voltage, V.DC	3.8
	工作电压范围	3.8V-2.5V
内阻 Internal Resistance	AC 1kHz/mΩ@25℃	≤ 175mΩ
电流 Current	自放电72小时	保持3.7V
	最大持续电流 Continuous Current A	0.25
	1s最大峰值电流，1sMaximumpeakCurrent,A	2.5
质量 Mass	典型质量，Typical mass, g	3.5± 0.5g
最大充电电压/电流 Max charge voltage/current	最大充电电压 Max charge voltage	4.2V
	最大充电电流 Max charge current	0.5A
	温度 Temperature	
温度区间 Temperature Range	工作温度范围，Temperature for Operation, ℃	-20 ~ +65 (3.8V)
	存储温度范围，Temperature for Storage,℃	-10~ +50
	寿命 Life	
使用期限 Life Time	额定电压下工作10万次(3.1V~3.7V)	

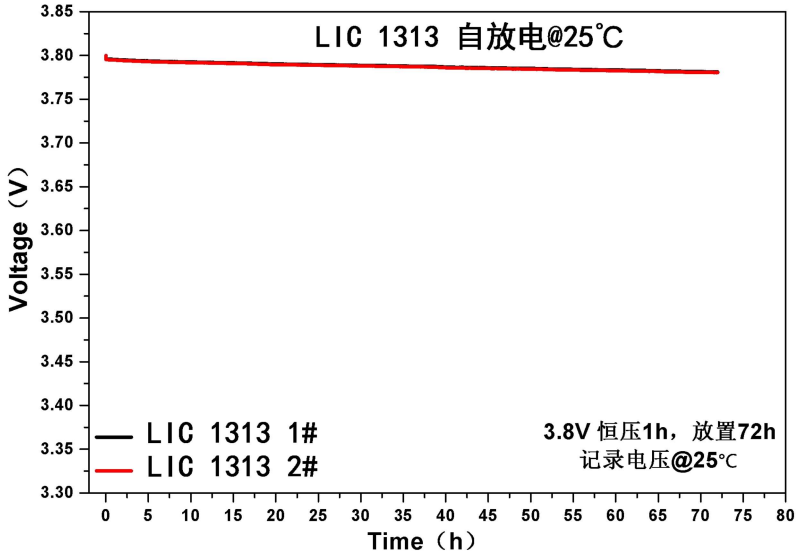
5. 性能特性 Technical Information

序号	项目 Items	性能 Properties	测试方法 Testing Method
5.1	高低温特性 High-low Temp. properties	电容(-20℃): 初始测量值的±30% 内阻(-20℃): ≤初始规定值的 10 倍 电容(+65℃): 初始测量值的±30% 内阻(+65℃): ≤初始规定值的 2 倍	见 7.5
5.2	过充电特性 Over-charge properties	电容: 初始测量值的±10% 内阻: ≤初始规定值的 2 倍	见 7.6
5.3	高温高湿存储特性 High temp. and high humility properties	电容: 初始测量值的±30% 内阻: ≤初始规定值的 2 倍	见 7.7
5.4	充电/放电循环特性 Charge/discharge cycling properties	电容: 初始测量值的±30% 内阻: ≤初始规定值的 4 倍	见 7.8
5.5	高温浮充性能 Floating test at high temp.	电容: 初始测量值的±30% 内阻: ≤初始规定值的 4 倍	见 7.9

倍率放电容量变化 Capacitance changes at different discharge rate



低温放电容量变化 Capacitance changes at low temp. discharge condition



7. 产品测试方法 Testing Methods

7.1 测试条件 Testing Conditions

本产品规格书标准测试条件为：标准大气压下，温度25±2℃，相对湿度小于65%。

This specification followed the standard testing criteria: 1 atm, 25±2 ℃ and a relative humidity < 65%.

7.2 测量工具要求 Testing Demands for Tools

尺寸：必须使用 JIS B 7503 / KS B 5206(千分尺), JIS B 7507 / KS B 5203-2(游标卡尺) JIS B 7502 / KS B 5205 / KS B 5202（外部千分尺）或精度等级相同的仪表。

Size: Need to use JIS B 7503 / KS B 5206 (Micrometer), JIS B 7507 / KS B 5203-2(Vernier caliper) JIS B 7502 / KS B 5205 / KS B 5202(External micrometer) or other same precision grade devices.

直流电压表：必须使用0.2级的JIS C 1102 / KS C 1303-2（电动指示仪）度相同或更高等级的仪表，其输入电阻超过10MΩ。

DC Voltmeter: Need to use 0.2 grade type JIS C 1102 / KS C 1303-2(Electric Indicator) or much high precision devices, its internal resistance should over 10MΩ

直流电流表和交流电流表：必须使用0.2级的JIS C 1102 / KS C 1303-2（电动指示仪）度相同或更高等级的仪表，其输入电阻超过10MΩ。

DC Ammeter and AC Voltmeter: Need to use 0.2 grade type JIS C 1102 / KS C 1303 2(Electric Indicator) or much high precision devices

容量测试 Test for Capacitance

依据图1所示，设定充电电压(E)后(参照表1)，将SW开关转向1处进行充电，根据表1中充电(T)与充电电压(V)的要求，借助保护电阻(R)进行充电。当达到规定充电时间后，将开关SW2，按照表2中的放电电流(I)进行恒流放电，记录产品从起始电压(V_1)至结束电压V_2过程所用($T_d=T_2-T_1$)，依据下述公式计算产品容量(C):

According to Fig. 1, setting the charging voltage (E, Based Table 1), put the switch SW to 1 for charging. And based on the Charging Time (T) and Charging Voltage (V)' s requirements, charge the cell by using Protection Resistance (R). Once reached the Charging Time, switch the SW to position 2, meantime, galvanostatic discharge the cell to the target voltage with the discharge current (Table 2). Record the time between the starting voltage V_1 and the ending voltage V_2 ($T_d=T_2-T_1$), finally, Calculating the Capacitance (C) by the following formula:

$$C = \frac{I \times (T_2 - T_1)}{V_1 - V_2}$$

其中，C为测试样品的容量(F)，E为直流恒压电源(V)，R为保护电阻(Ω)，V为直流电压表，I为恒流负载装置，A为直流电流表

Specifically, C was the cell' s capacitance(F), E named the DC constant power (V), R was the protection resistance(Ω), V was the DC Voltmeter, I was the constant current load, A was the DC ammeter.

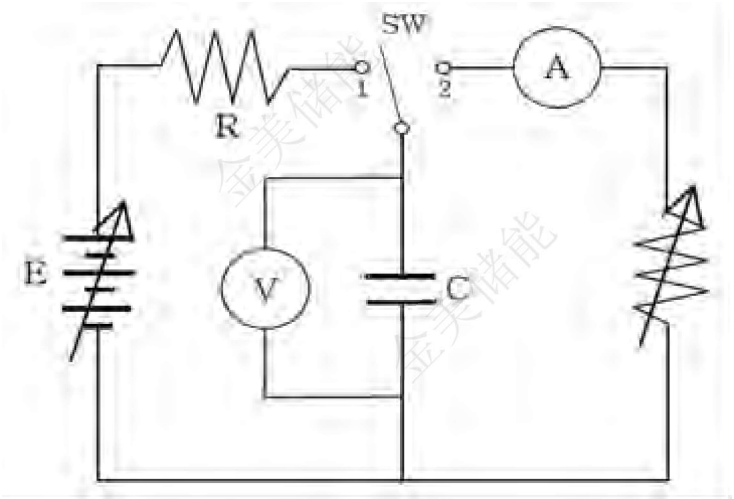


图1 容量测试电路图

Fig. 1 Circuit Diagrams for Capacitance Test

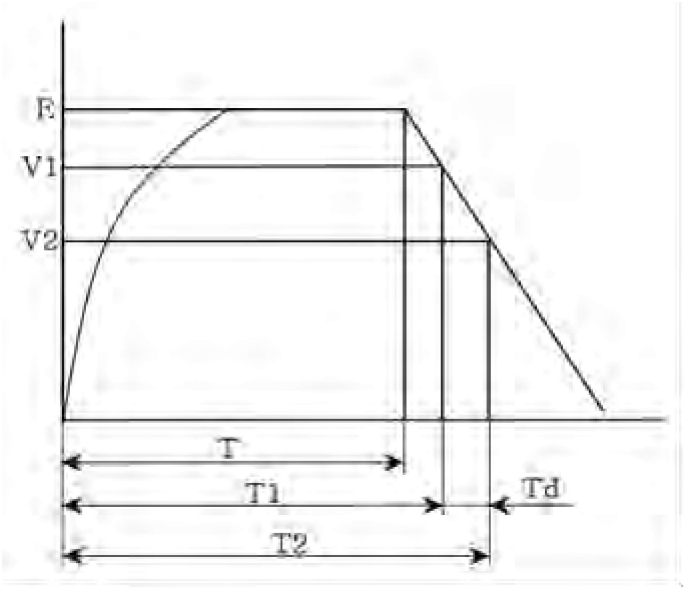


图2 样品的充放电曲线

Fig2. Charge/Discharge curves for Sample

表 1 容量测试过程的参数设定要求

Table1 Demands for Capacitance’ s Test

充电电压 (E)	保护电阻 (R)	充电时间 (T)	放电电流 (I)	起始电压 (V_1)	结束电压 (V_2)
3.8V	10Ω	1 hours	See table 2	3.8V	2.5V

表 2 容量测试过程的放电电流

Table2 The discharge current for different products during the Capacitance Test

26mA

7.4 交流内阻测试 Test for AC Resistance

常温下，将单体充电至3.6V并恒压充电30min后，在1kHz条件下，采用交流阻抗仪进行交流内阻测试。

Charge the cell to 3. 6V and keep this voltage for 30min, then using the AC Internal resistance to test its AC Resistance at 1kHz.

7.5 高低温性能测试 Test for Low-high Temperature

25±2℃条件下，将单体参照《7.3 容量测试》方式充电至3.8V后，紧接着将其转移至设定温度(设定温度分别为-20±2℃，25±2℃，65±2℃)条件下，在3.8V持续稳压的同时将样品放置1h。此后，将产品按照表2中放电电流要求在设定温度条件下进行容量测试。

Based on the 《7.3 Test for Capacitance》 charging the cell to 3.8V at 25±2℃, and move the cell to a fixed temperature (-20±2℃，25±2℃，65±2℃), meantime charge the cell by constant voltage for 1h. After this, the cell’ s capacitance was tested at Table 2’ s current.

7.6 过充性能测试 Test for Over-charge properties

常温条件下，将单体在表3电流条件下充电至4.2V，然后以相同电流放电至2.5V，循环1000次后检查产品外观，并参照《7.3 容量测试》过程进行电化学性能测试。

According to Table 3’ s current, charging the cell to 4.2V at room temperature, and then discharge it to 2.5V at the same current. Once cycling 1000 times, check it’ s appearance, and the electrochemical properties were tested by 《7.3 Test for Capacitance》.

表 3 过充或充放电循环测试过程产品的电流设定值

Table 3 Values for Over-charge or Charge/discharge cycling current

260 mA

7.7 高温高湿存储特性 High temperature and high humidity storage properties

常温条件下，将单体在表2电流条件下充电至3.6V并恒压充电1h，后将其放置在60±2℃、90±2% RH的条件下存储1000h。接着将其冷却至室温，并参照《7.3 容量测试》和《7.4 交流内阻测试》方法测试样品的电化学特性。

Charge the cell to 3.6V at Table 2’ s current, and the charge 1h at constant voltage condition at room temperature. After this, put the cell to 60±2℃、90±2% RH conditions to storage 1000h. Finally, cooling the cell at room temperature and check its electrochemical properties by 《7.3 Test for Capacitance》and 《7.4 Test for AC Resistance》.

7.8 充/放电循环性能测试 Charge/discharge cycling properties

常温条件下，依据表3中电流值要求，将单体充电至3.7V，紧接着将其以该电流放电至3.1V循环100000次后，参照《7.3 容量测试》和《7.4 交流内阻测试》要求测量其电化学特性。

According to Table 3’ s requirements, charge the cell to 3.7V at room temperature, and the discharge it to 3.1V at the same current. Once cycling 100000times, re-checking its electrochemical properties by 《7.3 Test for Capacitance》and 《7.4 Test for AC Resistance》.

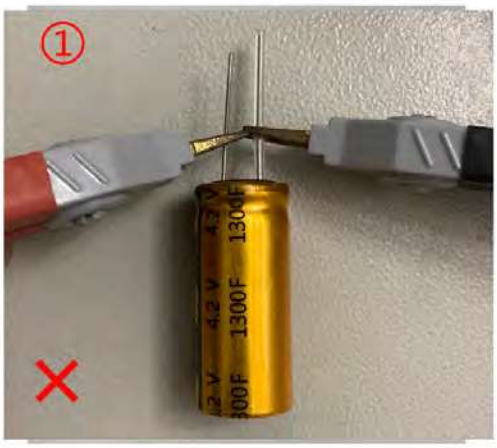
7.9 高温浮充性能测试 The floating test properties at high temperature

将产品置于55±2℃条件下，根据表3电流值要求将单体充电至3.8V，后在该条件下稳压1000h。紧接着将其自然冷却至室温，并参照《7.3 容量测试》和《7.4 交流内阻测试》要求进行电化学特性测试。

According to Table 3’ s requirements, charge the cell to 3.8V at 55±2℃, and kept the cell at this condition for 1000h. After this, cooling the cell to room temperature and testing its electrochemical properties by《7.3 Test for Capacitance》and《7.4 Test for AC Resistance》.

表 4 常见的使用过程产品短路情形

Table 4 Familiar short circuit situation

1.测量中发生短路 Short Circuit during Testing	2. 产品处理中发生短路 Short Circuit during connecting
① 	② 
3.产品放置在一起导致引线接触 Radial connecting during the storage or moving processes	4. 发生短路 Short circuit
③ 	④ 

自出货之日起，电容的保质期限依合同而定。但是，在此期限内，如果非本公司的制程原因而是客户的误用造成的电容质量问题，不承诺免费更换