

锂离子电池组技术说明书

Lithium-ion Battery Pack Specification

Product Name/产品名称 51.2V100AH LFP battery system

Specifications/Model/规格型号: 51.2V-100AH

Draw up/制定: _____

Review/审核: _____

Ratify/批准: _____

Date/日期: _____

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1. Scope 适用范围

(1) This product is designed and manufactured by Shenzhen Saijiaoyang Energy Technology Co., LTD. LFP battery pack (including BMS). It consists of 16S1P units in series. Battery assembly intelligent sorting, accurate and reliable. BMS uses a professional protection board test system, which is fully tested before going online to ensure that the battery pack is fully and effectively protected by BMS during use. This product has the characteristics of high energy density, long life, safety and reliability, light weight, wide temperature range, etc.

本产品由深圳赛骄阳能源科技股份有限公司设计制造的 LFP 电池组(含 BMS)。它由 16S1P 单元串联而成。电池装配智能分拣, 准确可靠。BMS 采用专业的保护板测试系统, 在上线前进行全面测试, 确保 BMS 在使用期间对电池组进行全面有效的保护。本产品具有能量密度高、寿命长、安全可靠、重量轻、温度范围宽等特点。

2. Battery Specification 电池规格参数

Electrical Characteristics 电气性能	Combination Method 组合方式	16 串 1 并 16S1P	
	Nominal voltage 标称电压	51.2V	
	Nominal capacity 标称容量	100Ah	Standard discharge after Standard charge (package)
	Minimum capacity 最小容量	97Ah	
	Energy 电量	5120Wh	
	Internal Resistance 内阻	≤50mΩ	
	Cycle Life 循环寿命	≥2500 cycles @0.2C 充放_温度 25℃≥80%	
Standard Charge 充电	Charge Voltage 充电电压	58.4V±0.2V	
	Charge Mode 充电制式	0.2C to 57.6V, then 57.6V, charge current to 0.02C(CC/CV)	
	Charge Current 充电电流	50A	
Standard Discharge 放电	Continuous Current 持续放电流	100A	
	Peak discharge current 峰值放电电流	150A/1S	
	Discharge Cut-off Voltage 放电截止电压	43.2V	
Environmental 环境	Charge Temperature 充电温度	0 °C to 45 °C @60±25% Relative Humidity	
	Discharge Temperature 放电温度	-20 °C to 55 °C @60±25% Relative Humidity	
	Storage Temperature 储存温度	0 °C to 40 °C @60±25% Relative Humidity	
	Dimension 尺寸	640*245*220mm	
	Weight(kg) 重量	37±0.5kg	

3. BMS Basic protection function BMS 基本功能介绍

Overcharge protection: When the battery is charged, the voltage continues to rise, and the protection board detects that the voltage of any cell is higher than that of the battery Charge protection value, the protection board starts timing immediately, when the time reaches the overcharge protection delay, the protection board turns off the charging MOSTube, charge cut-off, can not charge at this time.

过充保护: 电池在充电状态下, 电压不断升高, 当保护板检测到任意一节电芯电压高于过充保护值, 保护板立即开始计时, 当时间达到过充保护延时以后, 保护板关断充电 MOS 管, 充电截止, 此时不能充电。

Overcharge protection recovery: After the overvoltage protection occurs on the protection board, the battery voltage drops when the battery is standing or dischargingWhen the protection board detects that the voltage of each section is lower than the overcharge protection recovery voltage, the protection board outputs the signal and starts the charging MOS tube.It can be charged at this point.

过充保护恢复: 保护板出现过压保护以后, 电池静置或者放电状态下, 电池电压下降, 当保护板检测到每一节电压都低于过充保护恢复电压时, 保护板输出信号, 开启充电 MOS 管, 此时可以充电。

Overdischarge protection: When the battery is in the discharge state, the voltage continues to decrease, and the protection board detects that the voltage of any cell is lower than the overdischarge protection

Protection value, the protection board starts timing immediately, when the time reaches the over-discharge protection delay, the output signal of the protection board turns off the discharge MOS Tube, discharge cutoff, load lock circuit work, can not discharge at this time.

过放保护: 电池在放电状态下, 电压不断降低, 当保护板检测到任意一节电芯电压低于过放保护值, 保护板立即开始计时, 当时间达到过放保护延时以后, 保护板输出信号关断放电 MOS 管, 放电截止, 负载锁定电路工作, 此时不能放电。

Overdischarge protection recovery: After the protection board is over-discharge protection, the battery voltage continues to rise when the battery is standing or chargingWhen the protection board detects that the voltage of each section is higher than the recovery voltage of the overdischarge protection, the load is disconnected or charged again at this time, and the protection board outputs Out of the signal, open the discharge MOS tube, at this time can discharge.

过放保护恢复: 保护板出现过放保护以后, 电池静置或者充电状态下, 电池电压不断上升, 当保护板检测到每一节电压都高于过放保护恢复电压时, 此时再断开负载或者是充电, 保护板输出信号, 开启放电 MOS 管, 此时可以放电。

Overcurrent protection: When the battery is in the static or discharge state, the current suddenly increases. When the protection board detects that the current reaches the overcurrent protection Value, the protection board starts timing, when the circuit current duration reaches the overcurrent protection delay time, the protection board output signal Turn off the discharge MOS tube, the load lock circuit works, and the discharge cannot be performed at this time.

过流保护: 电池在静置或者放电状态下, 电流突然加大, 当保护板检测到电流达到过流保护值, 此时保护板开始计时, 当回路中电流持续时间达到过流保护延迟时间后, 保护板输出信号关断放电 MOS 管, 负载锁定电路工作, 此时不能放电。

Overcurrent protection recovery: After the discharge overcurrent protection occurs on the protection board, the discharge MOS tube is turned off and the current in the loop becomes 0. now Disconnect the load or charge, the protection board output signal, start the discharge MOS tube, then discharge

过流保护恢复: 保护板出现放电过流保护以后, 放电 MOS 管被关断, 回路中电流变为 0.此时断开负载或者是充电, 保护板输出信号, 开启放电 MOS 管, 此时可以放电

4. Reliability testing 可靠性测试

Note: Unless otherwise specified, the charge and discharge tests of the battery pack and cell are performed under the environment of temperature $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$, relative humidity 25% ~ 85%, and atmospheric pressure 86Kpa ~ 106Kpa.

注:除另有规定外, 电池组和电池单体的充放电试验是在温度 $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 、相对湿度25% ~ 85%、大气压力86Kpa ~ 106Kpa的环境下进行的。

NO. 序号	Item 检测项目	Test Method 检测方法	Criteria 检验标准
1	Discharge Capacity 放电容量	After the battery is fully charged, it is left for 0.5h to 1h at an ambient temperature of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$, and then discharged at 0.5C current to the termination voltage 电池充满电后在环境温度为 $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 的条件下搁置0.5h~1h,而后以0.5C电流放电到终止电压	Discharge time is not less than 2h 放电时间 $\geq 2\text{h}$
2	Cycle Life 循环寿命	Charge at 0.5C constant current to limit voltage, charge at 0.02C constant voltage to cutoff, stand for 30min, then charge at 0.5C constant discharge to stop voltage 43.2V, stand for 5min. Repeat the preceding steps to record the battery charging and discharging capacity 用0.5C恒流充电至限制电压, 0.02C恒压充电至截止, 静置30min后, 用0.5C恒流放电至终止电压43.2V, 静置5min。重复上述步骤, 记录电池充放电容量	≥ 2500 cycles. Retention capacity $\geq 80\%$ of the initial. 循环寿命不少于2500次, 剩余容量 $\geq 80\%$ 初始容量

3	<p>Storage Characteristics 储存性能</p>	<p>Capacity after 30days storage at 25°C±5°C from standard charge. 标准充电方式充电后, 25°C±5°C下储存30天后的容量</p>	<p>Retention Capacity ≥90% 剩余容量≥90%</p>
4	<p>Temperature Cycle performance 温度循环性能</p>	<p>After standard charging, the battery is placed in an open circuit at an ambient temperature of 60±2 ° C for 48h, then in an open circuit at -10 ° C ±2 ° C for 6h, then in an open circuit at room temperature for 24h, and then discharged at 0.2C to 43.2V. Three consecutive charge and discharge cycles were performed at 0.2C/0.2C 电池标准充电后, 在环境温度为60±2°C的条件下开路放置48h,后在-10 °C±2°C条件下开路放置6h后在室温条件下开路放置24h,然后0.2C进行放电至43.2V。以0.2C/0.2C连续做3次充放电循环。</p>	<p>No smoking ,exploding, No fire 电池不冒烟、不起火、不爆炸</p>
5	<p>invariableness moist heat performance 恒定湿热性能</p>	<p>After standard charging, the battery is placed in a constant temperature and humidity box with a temperature of 40±5°C and a relative humidity of 90%. After shelving for 48h, the battery is removed and shelved for 2h, and discharged to 43.2V at 0.2C. 电池标准充电后, 置于温度为40±5°C, 相对湿度为90%的恒温恒湿箱中, 搁置48h后, 取出电池搁置2h, 以0.2C放电至43.2V。</p>	<p>Discharge capacity >60% after shelving the battery has no obvious deformation, no smoke, and no explosion 搁置后放电容量>60% 电池外观无明显变形、不冒烟、不爆炸</p>
6	<p>Vibration 振动</p>	<p>After standard charge, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz~55 Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes. 将标准充电后的电池固定在振动台上, 沿X,Y,Z三个方向各振动30分钟, 振幅1.6mm, 振动频率为10Hz~55 Hz, 每分钏变化为1Hz.</p>	<p>The battery shall not rupture, smoke, catch fire, vent or leak and the voltage not be lower than 43.2V 电池应无破裂、冒烟、着火、泄漏或漏液, 并且电压不低于43.2V</p>

5 .Battery Required Protection Functions 电池组保护功能要求

PCM Electrical Characteristics (at 25°C)

Item 项目	Content 详细内容	Criterion 标准
Over charge Protection 过充保护	Over charge detection voltage 过充电检测电压	3.650±0.050V
	Over charge detection delay time 过充电检测延迟时间	500mS—1500mS
	Over charge release voltage 过充电解除电压	3.55±0.050V
Over discharge protection 过放保护	Over discharge detection voltage 过放电检测电压	2.7±0.1V
	Over discharge detection delay time 过放电检测延迟时间	500mS—1500mS
	Over discharge release voltage 过放电解除电压	2.9±0.1V
current protection 过流保护	Continuous Current 持续放电流	100A
	Discharge protection overcurrent 放电保护过电流	150±20A
	过电流检测延迟时间	500mS—150mS
	Release condition 保护解除条件	Load off or charge off 断开负载或充电解除
Short protection 短路保护	<p>Short circuit description: Short circuit current less than the minimum or higher than the maximum may cause short circuit protection failure, short circuit When the current exceeds 2000A, short circuit protection is not guaranteed, and it is not recommended to perform a short circuit protection test. 短路说明: 短路电流小于最小值或高于最大值可能会造成短路保护失效, 短路电流超过 2000A, 不保证有短路保护, 也不建议做短路保护测试。</p>	
	Release condition 保护解除条件	Load off 断开负载
	短路保护延迟时间	200-800µs

Temperature protection 温度保护	Discharge high temperature protection 放电高温保护	65±5℃
	Low temperature discharge protection 放电低温保护	-
	Charging high temperature protection 充电高温保护	50±5℃
	Charge low temperature protection 充电低温保护	-
Balance 均衡	Balance Start Voltage 均衡开启电压	3.3±0.05V
	Balance Current 均衡电流	225±5mA
	Balance Mode均衡方式	被动均衡
Power consumption of protection board 保护板功耗	Static current consumption 静态消耗电流	≤150μA

6. Warranty Period & Product Liability 质保期限及产品责任

6.1 The shelf life of the battery is 12 months from the date of shipment. The battery should be charged and activated at least once within 3 months after it has been idle. The company will not be responsible for any damage to the battery performance caused by prolonged idle time.

电池的保质期从出货之日算起为 12 个月。电池闲置 3 个月之内至少要给电池充电激活一次，如果因为闲置时间过长而导致电池性能受损本公司概不负责。

6.2 The Company promises that if the defects of the battery are proved to be caused in the manufacturing process of our company, the company is responsible for the replacement of the battery by the battery, and will not be replaced if the problem is caused by user abuse or misuse.

本公司承诺如果证明电池的缺陷是在我们公司制造过程中造成的，本公司负责进行一对一的调换，如果是由于用户滥用或误用而产生的问题，不予调换。

7. Safety warning 安全警示

Dangerous 危险

In order to prevent battery leakage, heat, explosion, please observe the following precautions:

为了防止电池泄漏、发热、爆炸，请遵守以下防范事项：

Don't put battery into water or seawater, note moist;

不要将电池浸入水或海水中，注意防潮；

Don't the battery near heat sources, such as fire or heater;

不要将电池接近热源，如火或发热器；

When charging, please use the specific charger;

在充电时，请用特定的充电器；

Don't reverse battery is negative;

不要颠倒电池的正负极;

Do not connect the battery in the power of export;

不要将电池连接在电源的出口;

Do not place the battery in fire or hot items;

不要将电池放置于火里或热的物品上;

Don't across the electrodes of the battery short circuit conductors;

不要将电池的正负极用导体短路;

Don't put the battery and the metal conductor, such as necklace, hairpin, etc connected or stored together;

不要把电池和金属导体,如项链、发夹等一起连接或存储;

Do not knock or throw the battery;

不要敲打或丢抛电池;

Don't Pierce the battery with pin or other sharp;

不要用针或其他锋利物刺穿电池;

Don't use hammer strike or step on the top;

不要用锤击打或者踩在上面;

Don't direct welding power source;

不要直接焊接电源;

Battery with safety device, in order to guarantee its inherent security features, please don't split the battery or change any part;

电池内有安全装置,为了保证其固有的安全功能,请不要将电池分解或改变任何的部分;

Don't charge near the fire or in a hot environment.

不要在接近火源或在酷热的环境中充电。

Warning 警告

Don't put the battery in a microwave oven or pressure in the closet;

不要将电池放入微波炉或压力柜子里;

Do not put batteries and other chemical battery (such as dry cell) or pooling of different capacity, brand of battery, if the battery scent, fever, discoloration, deformation, or in the use of charge, storage process, any abnormal please immediately from the device or charger, stop using;

不要将电池与其他化学电池(像干电池)或不同容量、牌子的电池合用,若电池发出气味、发热、变色、变形或者在使用充电、存储过程中,出现任何的不正常请立即从装置或充电器取出,停止使用;

Specify the charging time if can't charge please do not continue to charge;

指定充电时间内若不能再充电请不要继续充电;

Batteries in the children can't touch place, if children ingest batteries, please immediately go to a doctor;

电池放于小孩子不能触摸的地方,若小孩咽下电池,请立即就医;

If the battery leaks or electrolytic gas emit odor, please away from the fire, otherwise leaked solution catches fire, the battery will be on fire;

若电池泄露或电解放出怪味之气体,请速离火源,否则泄露解质会着火,电池将会着火;

If the battery leaks or electrolytic into eyes, do not rub eyes, after the application of clean water to rinse the eye doctor, otherwise will cause eye diseases.

若电池泄露或电解后进入眼睛,切勿揉眼睛,应用清水冲洗眼睛后就医,否则将致眼疾。

Matters needing attention 注意事项

Don't put the battery in high temperature place (such as direct sunlight or heat the world in the car), otherwise, will overheat and fire performance degradation or shorten the life.

不要将电池放于高温处（如阳光直射或热天下汽车里），否则，会过热着火，性能降低或寿命缩短。

Safety device, in order to ensure safety, the battery should be installed in the electrostatic manufacturing when required by the electrostatic when do not use, otherwise, the safety device failure, lead to the battery's cells from overheating, rupture, explosion and fire.

为确保安全，电池应安装安全装置，在静电强于制造时所要求的静电时请勿使用，否则，安全装置会失效，导致电池过热、破裂、爆炸及着火。

Please in normal use under the following conditions, otherwise it will overheat and catch fire, performance degradation or shorten the life span.

请在下列条件下正常使用，否则会过热，着火，性能降低或缩短寿命。

Environmental conditions 环境条件:

(T 温度) charge 充电: 0 ~ + 45°C

discharge 放电: -20 ~ +55°C

Within 30 days of preservation 30 天内保存: -20 ~ +45°C

Within 90 days of preservation 90 天内保存: -20 ~ +30°C

If the battery leaks, electrolytic touch on the skin or clothing, application of water to rinse or use running water to wash clothes, otherwise the skin will be corrosion.

若电池泄露，电解沾于皮肤或衣服上，应用水冲洗掉或用流水洗衣服，否则将会腐蚀皮肤。

In order not to put the wrong battery or spoilage battery, please carefully read the instructions for installation and remove from the device.

为了不装错电池或损耗电池，请认真阅读使用说明书进行安装与拆卸（从装置上）。

If the battery is not long time use, please take the battery out and put in dry place, otherwise will be corrosion ,performance and life.

若是电池不长时间使用，请把电池拿出并放于干燥的地方，否则将会被腐蚀、降低性能和减少寿命。

8. Transport and Store 运输和存储

8.1 Transport 运输

Batteries should be in half charged states (50%) for charging status into boxes for shipping, should avoid violent vibration and impact during the transit or extrusion, prevent from, adapt to sea air transport.

电池应在半荷电状态（50%充电状态）下包装成箱进行运输，在运输过程中应防止剧烈振动、冲击或挤压，防止日晒雨淋，适应于海陆空的交通运输。

8.2 Store 储存

Batteries should be stored at ambient temperature of 5 °C to 35 °C in clean, dry and ventilated indoor, should avoid contact with corrosive substances, stay away from fire and heat source.

电池应储存在环境温度为-5°C至 35°C的清洁、干燥通风的室内，应避免与腐蚀性物质接触，应远离火源及热源。

9. Logo and packaging 标志和包装

9.1 The packing 包装

a. Packing: packing box inside must also be attached product inspection certificate, specification, and certificate of three guarantees.

包装方式: 包装盒内还必须附有产品检验合格证、使用说明书、产品三包凭证;

b. Equipped with battery products packing box should be placed in dry, dust-proof, moisture-proof packaging box;

装有电池产品的包装盒应放在干燥、防尘、防潮的包装箱内;

c. Outside should indicate the product name, model, quantity, gross weight, manufacturers and contact address, date of production, should be "handle with care", "keep dry", "up" necessary signs, such as the packing storage icon marking shall comply with the terms of GB191-1990.

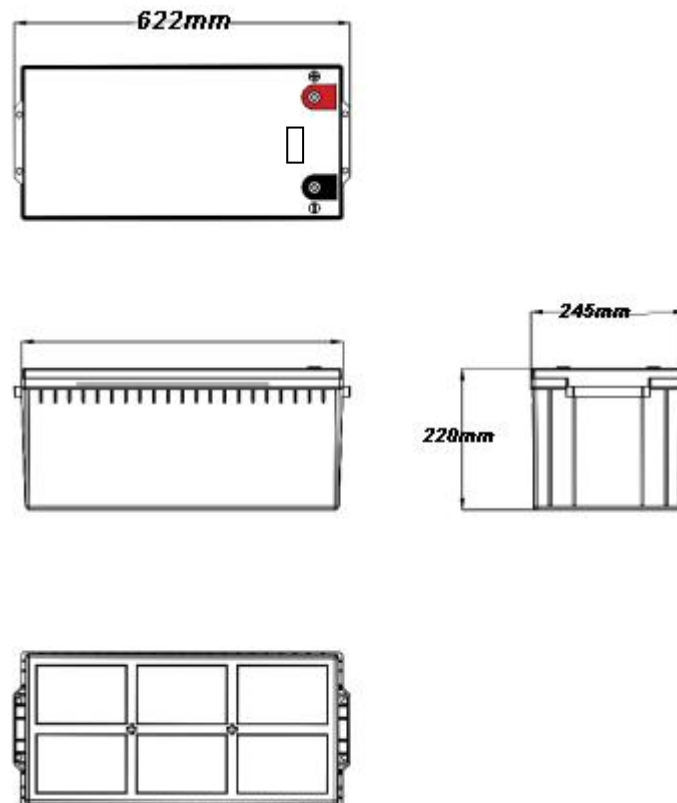
包装箱外应标明产品名称、型号、数量、毛重、制造厂商及联络地址、出厂日期, 应有“小心轻放”、“怕湿”、“向上”等必要标志, 其包装储运图标标志应符合 GB191-1990 的规定。

9.2 mark 标志

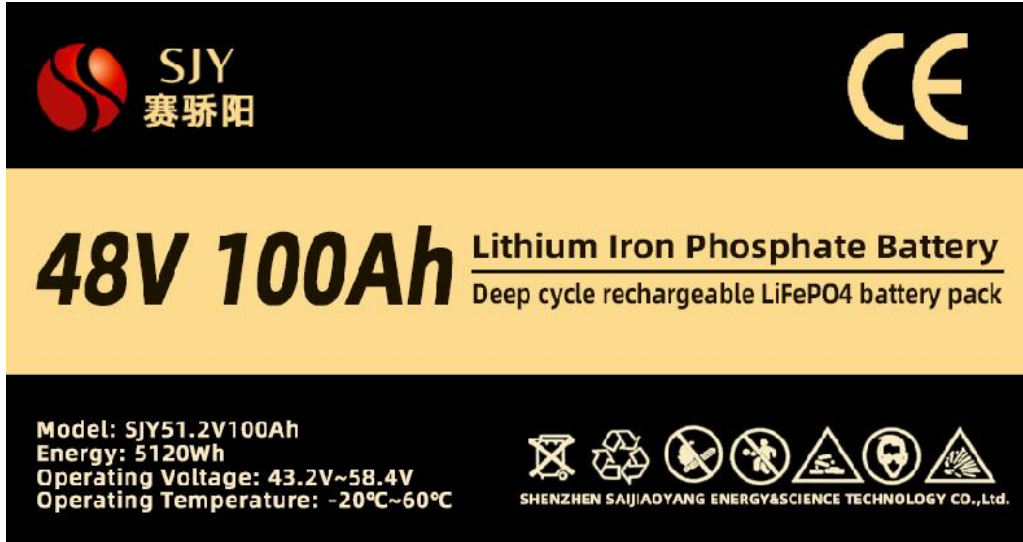
Each battery shall have the Chinese sign of the following: product name, type and nominal voltage, nominal capacity, the positive and negative polarity, marks and warning specifications, manufacturing date, batch number, manufacturing factory name.

每个电池上应有下列中文标志: 产品名称、型号、标称电压、额定容量、正负极性、商标和警示说明、制造日期、批号、制造厂名。

10. Battery dimension drawing 电池尺寸图



11 Label size 标签尺寸

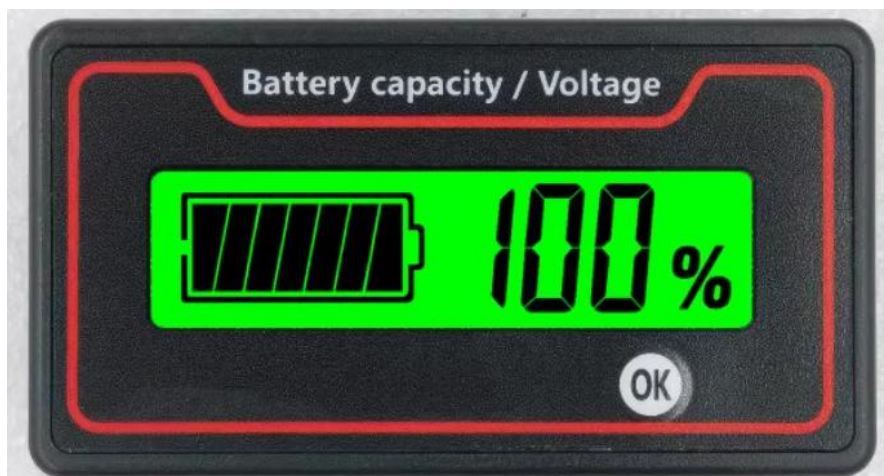


N/A

12 Screen introduction 屏幕介绍

12.1 GY-6DT display screen, which can observe the percentage of battery charge and battery voltage

12.1 GY-6DT 显示屏，可观察到电池的电量百分比及电池电压。



You can light the screen through the screen switch button, and click continuously to switch the battery display information

可通过屏幕切换按钮点亮屏幕，连续点击切换电池显示信息