Product Specification

LiFePO4 Cell Module

3.2V 60Ah 1C

(Model No.:LFP60SA)

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1. 序言 PREFACE

此规格书适用于深圳风云电池有限公司的锂聚合物可充电电池产品

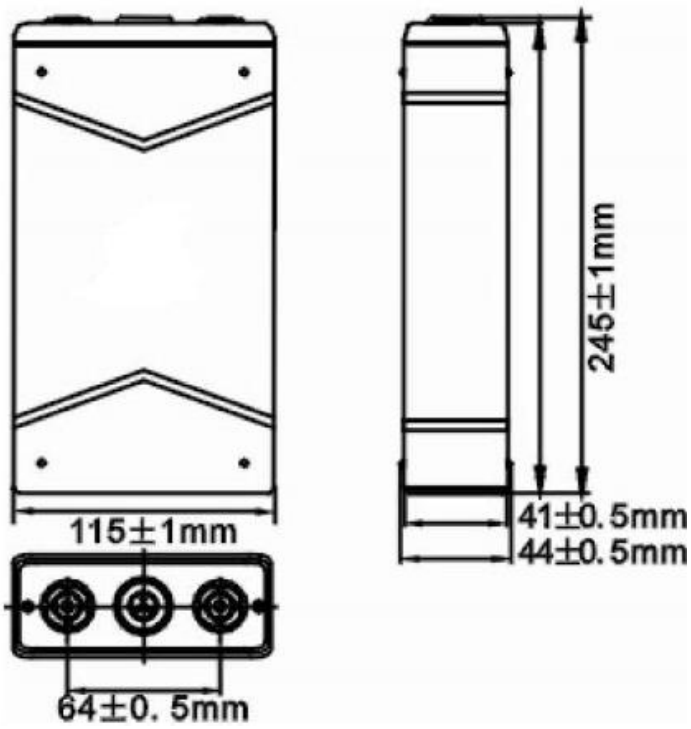
The specification is suitable for the performance of LiFePO4 Polymer (LFP) rechargeable battery produced by the SHENZHEN MELASTA BATTERY CO., LTD.

2. 型号 MODEL

LFP60SA 60Ah 3.2V 1C

3. 产品规格 SPECIFICATION

单颗电池规格 Specifications of single cell



项目 Item	描述 Description	尺寸 Dimension
L	长度 Length	115mm ±1mm
W	宽度 Width	41mm±1mm
H	高度 Height	243.5mm±1mm

4.标称技术参数 Nominal Technical Parameters

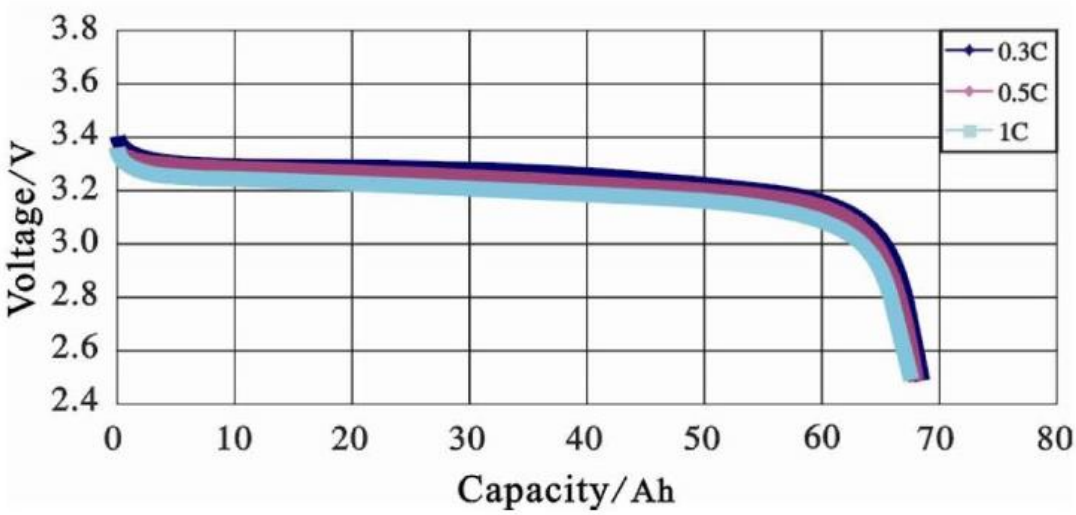
No. (序号)	Item （项目）	General Parameter (常规参数)		Remark （备注）
1	Rated Capacity （额定容量）	Typical （标称容量）	61Ah	0.3C discharge after Standard charge（0.2C5A) （标准充电后 0.3C_5A 放电）
		Minimum （最小容量）	60Ah	
2	Nominal Voltage （正常电压）	3.2V		Mean Operation Voltage （即工作电压）
3	Voltage at end of Discharge （放电终止电压）	2.5V		Discharge Cut-off Voltage （放电截止电压）
4	Charging Voltage (充电电压)	3.65V		Charge Cut-off Voltage （充电截止电压）
5	Internal Impedance (内阻)	≤1mΩ		Internal resistance measured at AC 1KH_Z after 50% charge （半电态下用交流法测量内阻） The measure must uses the new batteries that within one week after shipment and cycles less than 5 times (使用出货后不到一个星期及循环次数少于 5 次的新电池测量)
6	Standard charge （标准充电）	Constant Current 0.3C_5A Constant Voltage 3.65V 0.05 C_5A cut-off （持续电流：0.3C_5A 持续电压：3.65V 截止电流：0.05C_5A）		Charge time : Approx4.0h （充电时间：大约 4 个小时）
7	Recommended SOC Usage Windom 推荐 SOC 使用窗口	SOC ： 10%~90%		
8	Fast charge (快速充电)	Constant Current 1.0C_5A Constant Voltage 3.65V 0.05 C_5A cut-off （持续电流：1.0 C_5A 持续电压：3.65V 截止电流：0.05C_5A）		Charge time : Approx 1h （充电时间：大约 1 个小时）
9	Max continuous discharge current 最大持续放电	1 C_5A		Peak discharge current ≤2 C_5A 峰值放电≤2C_5A
10	Operation Thermal Ambient 工作温度	Charge 充电		0°C ~ 45°C
		Discharge 放电		-20°C ~ 55°C

11	Storage Thermal Ambient 环境温度	Short-term (within 1 month) 短期一个月	-20°C ~ 45°C
		Long-term (within 1 year) 长期一年	-20°C ~ 20°C
12	Battery Weight 电池重量		Approx. 2kg
13	Shell Material 外壳材料		Plastic 塑料

5.电池产品电性能曲线图

Battery Electrical Properties Curves

discharging curve ：



6.电芯性能检查及测试 BATTERY CELL PERFORMANCE CRITERIA

在进行下例各项测试前每颗电池应用 0.3C 放至 2.5V。如果没有特别规定，测试应在电池交付 1 个月内按以下各项条件进行：

Before proceed the following tests, the cells should be discharged at 0.3C to 2.5V cut off. Unless otherwise stated, tests should be done within one month of delivery under the following conditions:

环境温度 Ambient temperature: 20℃±5℃

相对湿度 Relative Humidity: 65±20%RH

注意标准充放电为 Note Standard Charge/Discharge Conditions:

充电 Charge: 以 0.3C 电流恒流充电至限制电压 3.65V 时,改为恒压充电,直到截止电流为 0.05C 时停止充电;The battery will be charged to 3.65V with 0.3C from constant current to constant voltage, when the current is 0.05C, stop to charge.;

放电 Discharge: 0.3C to 2.5V/cell

测试项目 Test	单 位 Unit	规格 Specification	条 件 Condition	备 注 Remarks

容量 Capacity	Ah	≥60	标准充放电 Standard Charge / Discharge	允许循环 3 次 Up to 3 cycles are allowed
开路电压 Open Circuit Voltage (OCV)	V	≥3.2	标准充电后 1 个小时内 Within 1 hr after standard charge	单位颗 Unit cell
内阻 Internal Impedance (IR)	mΩ	≤1	充满电后用 1kHz 测试 Upon fully charge at 1kHz	*
高倍率放电 High Rate Discharge (1C)	min	≥60	标准充电/休息 5 分钟 用 1C 放电至 2.0V Standard Charge/rest 5min discharge at 1C to 2.0V	允许循环 3 次 Up to 3 cycles are allowed
自放电 Charge Reserve	min	≥90% （初始容量 First Capacity）	标准充满电后 20 度贮藏 30 天， 标准 0.3C 放电 Standard charge Storage at 20 degree: 30days Standard discharge (0.5C)	2.5V/cell Cut-off
寿命测试 Cycle Life Test	Cycle	≥2000	充电：0.3C 充电至 3.65V，放电，0.3C 放电至 2.0V，当放电容量降至初始容量的 80%时，所完成的循环次数定义为该电芯的循环寿命 Charge:0.3C to 3.65V ,Discharge: 0.3C to 2.5V, 85% or more of 1st cycle capacity at 1C discharge of Operation	Retention capacity 容量保持 ≥ 80% of initial capacity
短路测试 External Short Circuit	N/A	不着火不爆炸 No Fire and No Explosion	电池标准充电后，在 20℃±5℃条件下搁置 1h。然后 将蓄电池经外部短路 10min，外部线路电阻应小于 10mΩ。 After the process of standard charging, shelving the cell for 1 hour at the ambient temperature of 20℃±5℃. Afterwards, shorting circuit it for 10mins, and make sure the resistance of outside line should be less than 10mΩ.	*
自由跌落测试 Free Falling(drop)	N/A	不着火不爆炸 No Fire and No Explosion	跌标准充电后，搁置 2 小时。从 150CM 高任意方向自由跌落 30MM 厚木板 2 次 Standard Charge,and then leave for 2hrs,check battery before / after drop Height: 150 cm Thickness of wooden board: 30mm Direction is not specified Test for 2times	*

7.运输 Transportation

电池应在半荷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，适用于汽车、火车、轮船、飞机等交通工具运输。

The cells should be packed as boxes to transport which should be conducted under the state of half charged of the cells. The cells should be prevented from vibration, shock , extrusion, sun-scorched and rain-drenched. It could be delivered by car, train, boat, airplane ,etc.

8.贮存及其它事项 Storage And Others

8.1 长期贮存 Long-term Storage

电池应贮存（超过 1 个月）在环境温度为-20℃~45℃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。每 6 个月对电池进行一次充放电，储存电压为 3.2～3.35V。

The cell should be stored(more than 1 month) in clear, dry and ventilated room under ambient temperature of -20℃~45℃, and it should be kept away from caustic material, combustion source and heat source. Charging and discharging the cell every six months, and make sure the storage voltage should be 3.2～3.35V.

8.2 其它事项 Others

任何本规格书中未提及的事项，须经双方协商确定。

Any items not mentioned in this specification should be determined between Melasta and customer.

9. 电池使用时操作指示及注意事项 Operating Indications And Cautions When Using It

9.1 充电 Charging

9.1.1 充电电流 Charging Current

充电电流不得超过本标准书中规定的最大充电电流。使用高于推荐值电流充电将可能引起电池的充放电性能、机械性能和安全性能的问题，并可能会导致发热或漏液。

The charging current should not be higher than the maximum one fixed in this specification. Using the current which is higher than the recommenced one could incur a series of problems of charging and discharging capability, mechanical property and safety, or even leads to fever and leakage.

9.1.2 充电电压 Charging Voltage

充电电压不得超过本标准书中规定的最大上限电压。电池电压高于最大上限电压值时，将可能引起电池的充放电性能、机械性能和安全性能的问题，并可能会导致发热或漏液。

The charging voltage should not be higher than the maximum one fixed in this specification. If the voltage is than the maximum one, then a series of problems of charging and discharging capability, mechanical property and safety Could occur, or ever leads to fever and leakage.

9.1.3 充电温度 Charging Temperature

电池必须在 0℃~45℃的环境温度范围内进行充电。

The cell should be charged under the ambient temperature of 0℃~45℃.

9.1.4 禁止反向充电 Reversal Charge Is Forbidden

正确连接电池的正负极，严禁反向充电。若电池正负极接反，将导致电池报废并产生安全隐患。

Properly assemble between the cathode and anode of the batteries. The reversal charge is forbidden. If the polarity is reversed, then the battery will be damaged or safety problem may be occurred.

9.2 放电 Discharging

9.2.1 放电电流 Discharging Current

放电电流不得超过本标准书规定的最大放电电流，大电流放电会导致电池容量剧减并导致过热。

The discharging current should not be higher than the maximum one fixed in this specification. Discharging it with a high current may incur the problem of intensely decrease of the capacity and over fever.

9.2.2 放电温度 Discharging Temperature

电池必须在-20℃~55℃的环境温度范围内进行放电。

The cell should be discharged under the ambient temperature of -20℃~55℃.

9.2.3 禁止过放电 Over Discharging Is Forbidden

在电池正常使用过程中，应安装电池管理系统防止电池过放电的发生，若电池过放电，将导致电池报废并产生安全隐患。

In the curse of normal use, the battery management system should be applied to avoid the phenomenon of over discharging occurring. If the battery is over discharged, then the battery will be damaged or safety problem may be occurred.

需要注意的是，在电池长期未使用期间，它可能会由于其自放电特性而处于某种过放电状态。为防止过放电的发生，电池应定期充电，将电压维持在 3.2V 以上。

What should be pay attention to is that the battery can be in the state of over discharged because of self-discharge during the process of storage of the batteries which haven't be used for a long time. To avoid the phenomenon of over discharging occurring, the battery should be charged according to a fixed schedule, and the voltage should be maintained above 3.2V.

9.3 电池操作注意事项 Battery Operation Cautions

9.3.1 使用电池前，请仔细阅读使用说明书和注意电池表面标识。

9.3.1 Please read the instruction carefully and pay attention to the marks on the surface of battery before using it.

9.3.2 请在正常的室内环境中使用电池，温度：-20℃~55℃，相对湿度：(65±20)%。

9.3.2 Please use the battery under normal indoor environment, temperature: -20℃~55℃; humidity: (65±20)%.

9.3.3 在使用过程中，应远离热源、火源，避免儿童玩弄电池，切勿摔打电池，禁止坠落、冲击电池。

9.3.3 In the procedure of using the battery, please isolate it from heat source, fire source, and keep the children away from playing with it, never beat, drop or shock it.

9.3.4 本电池只能使用配套的充电器充电。

9.3.4 This battery only can be used with configured charger.

9.3.5 任何时候禁止短路电池，它会导致电池严重损坏，以免发生危险。

9.3.5 Short circuit is forbidden at any time, which may leads to the damage of battery, or even incur danger.

9.3.6 长期不用时，请将电池贮存好，让电池处于半荷电状态，既不充满，也不放完。

9.3.6 If you do not use it for a long time, please make sure it is well stored, keep it on the state of being half charged, do not fully charge or discharge it.

9.3.7 废弃电池请安全妥当处理，不要投入火中或水中。

9.3.7 Discarded battery should be well disposed, do not throw it in the fire or under the water.

9.3.8 电池箱设计注意事项 Notes For The Design Of Battery Box

l 电池箱应有足够的机械强度以保证其内部电池免受机械撞击

l Battery box should have enough mechanical strength to make sure the inside battery would not be impacted.

l 箱内安装电池的部位不应有锋利的边角

l Places inside of the box which are used to fix batteries should have no sharp edges.

l 需增加空气对流、防水防尘等措施

l Measures of increasing convention, waterproof and dustproof should be applied.

9.3.9 电池的连接 Connection Of The Cells

l 使用前应用细砂纸打磨，否则可能会导致接触不良功能失效

l Rubbing the battery with sandpaper before using it, or poor contact can be occurred which may lead to improper

function.

l 建议使用铜连接片来连接电池

l Suggest using copper bus bar to connect the batteries.

l 采用专用扳手等工具进行连接操作

l Using special spanner and other tools to conduct connecting procedure.

9.3.10 维护保养请参见《风云公司离子动力电池安装维护说明》

9.3.10 Refers to <Melasta lithium ion battery installation and maintenance manual> for maintenance.

10. 电池使用时警告事项及注意事项 Warnings And Cautions For Using Batteries

为防止电池可能发生泄漏、发热、爆炸，请注意以下预防措施：

To avoid the phenomenon of leakage, fever, explosion occurring, please pay attention to the preventive measures

警 告 ！Cautions!

严禁将电池浸入水中，保存不用时，应放置于阴凉干燥的环境中

Do not immerse the battery under water, store it in the cool and dry environment when not use it.

禁止将电池在热高温源旁，如火、加热器等使用和留置

Keep it away from heat source like fire, heater when use or store it.

充电时请选用锂离子电池专用充电器

Please use lithium-ion special charger when charging it.

在使用过程中，严禁将电池正负极颠倒

Please make sure the polarity is not reversed during the usage.

禁止将电池丢于火或加热器中

Do not dispose battery into the fire or heater

禁止用金属直接连接电池正负极短路

Do not connect the cathode with the anode directly by metals which could cause short circuit.

禁止将电池与金属，如发夹、项链等一起运输或贮存

Do not transport or store the battery with metals like hairpin, necklace.

禁止敲击或抛掷、踩踏和弯折电池等

Do not strike, throw, tread or bend the battery

禁止直接焊接电池和用钉子或其它利器刺穿电池

Do not solder directly to the battery or penetrate it by using nails or other edge tools.

小 心 ！

禁止在高温下（炙热的阳光下）使用或放置电池，否则可能会引起电池过热或功能失效、寿命减短

Do not use or place the battery where has high temperature(under the hot sun) , otherwise the phenomenon of overheat, improper function, the shorten life span may occur.

禁止在强静电和强磁场的地方使用,否则易破坏电池安全保护装置，带来不安全的隐患

Do not use the battery in the high electrostatic field and high magnetic one, otherwise it leads to the damage of the safety device which causes unsafe issue.

如果电池发生泄露，电解液进入眼睛，请不要揉擦，应用清水冲洗眼睛，并立即送医治疗，否则会伤害眼睛

If the leakage of electrolyte happens, and the electrolyte enters into eyes, instead of rubbing your eyes, you

should rise it out with clear water, and get a treatment in the hospital immediately, or it may hurt the eyes

如果电池发出异味、发热、变色、变形或使用、贮存、充电过程中出现任何异常，立即将电池从装置或充电器中移离并停用

If the cell gives out peculiar smell, has a fever, changes color and becomes deformed, or any abnormal phenomenon occurs during the usage, storage, charging process, you should stop and remove it immediately from the device or charger.

注：Notes:

电池安全试验参考 QC/T 743-2006《电动汽车用锂离子蓄电池标准》

Refers to QC/T 743-2006 <lithium-ion battery standards for electric vehicles> for Battery safety test