

Product Specification 产品规格书

Type (类型): LiFePO4 Battery (磷酸铁锂电池)

Model (型号): 50175130/4S1P

Capacity(容量) :80Ah

Voltage (电压) : 12.8V

P/N (物料编码): MS-50H5D0-8002-412

Specification Approved (规格书审批项)	Prepared By(编制)	Qin Zun Ze
	Drawn By(绘图)	Qin Zun Ze
	Checked By(审核)	Wang Fei
	Approved By(批准)	Huang Jian
Customer Approved (客户审批项)	Checked By(审核)	
	Approved By(批准)	
	Please sign and return one copy to us. 请签名盖章确认后回传我司.	Seal the (盖章处)

Product Specification Amendment Records

(产品规格书修正记录)

Edition (版本)	Contents (内容)	Date (日期)
A1.0	First Edition 首次发行	2018-08-06

Product Summary 产品概要

1: Preface 前言

This Product Specification describes the technique requirements, test procedure and precaution notes of prismatic type LiFePO4 Battery to be supplied to customer by Macsun Solar Energy Technology Co.,Limited.

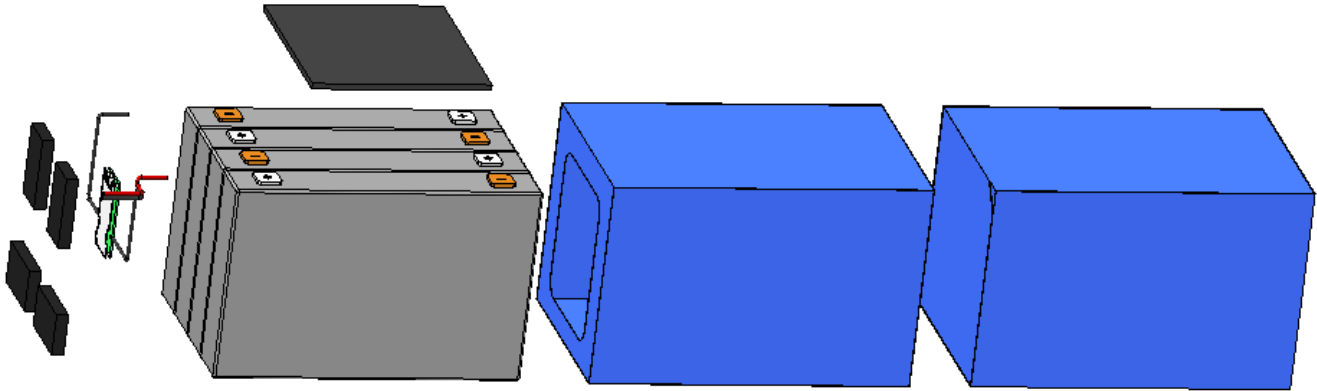
本规格书描述了由深圳市泰晶太阳能科技有限公司生产的可充电磷酸铁锂电池组的技术要求、测试方法及注意事项。

1、Production description 产品描述

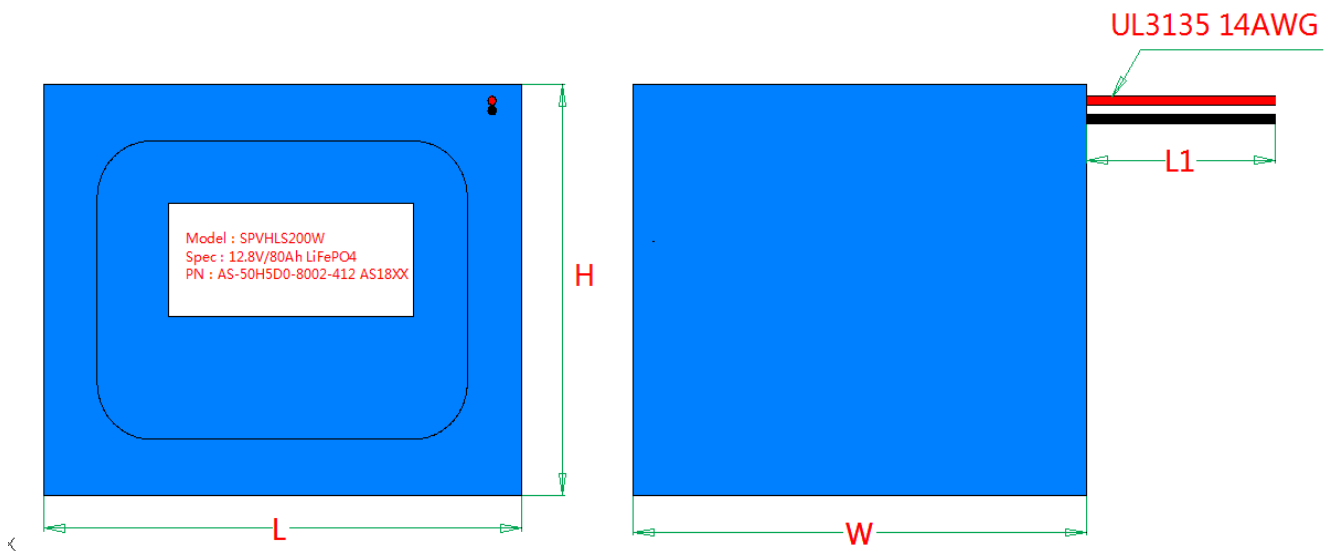
- a) Name 名称: LiFePO4 Battery (磷酸铁锂电池)
- b) Model 型号: 50175130/4S1P/80Ah/12.8V
- c) Cell 电芯: 50175130/80Ah/3.2V
- d) Shelf period 保质期限: 3 年
- e) Structure Drawing 电池结构图: (长 L: 192 ± 5 *宽 W: 185 ± 5 *高 H: 136 ± 5 mm)
e-1: 产品外观图 (Product appearance) :



e-2: 产品爆炸图 (Assembly Drawing) :



e-3: 产品尺寸图:



Item 项目	Specifications 规格
L 电池长度	192.0±5 mm .
W 电池宽度	185.0±5 mm .
H 电池高度	136.0±5 mm .
L1 引线长度	200.0 mm +/- 10.0 mm (UL3135 14# AWG wire)

e-4: 产品电池标签 Battery Label

Model: SPVHLS200W

Spec: 12.8V/80Ah LiFePO4

PN: MS-50H5D0-8002-412 MS18XX

(18 means 2018, xx means week of year)

电池标签尺寸: 70*40mm

3、Specification 主要技术参数

NO 序号	Items 项目	Parameter 参数	Remarks 备注
3.1	Rated Capacity 标称容量	80Ah	Discharge:0.2C 放电: 0.2C cut-off voltage:10.0V 截止电压: 10.0V
	Minimum Capacity 最小容量	80Ah	
3.2	Energy 能量	1024Wh	
3.3	Nominal Voltage 标称电压	12.8V	
3.4	Open Voltage 出厂电压	12.5V~13.5V	
3.5	Load Voltage 负载电压	≥13.2V	10Ω
3.6	Internal Impedance 内阻	≤40mΩ (pack)	AC 1KHz after standard charge 标准充电后 AC 1KHz 测试
3.7	Charge voltage 充电电压	14.4V	
3.8	Standard charge current 标准充电电流	10A	0~45°C
3.9	Max charge current 最大充电电流	20A	0~45°C
3.10	Standard discharge current 标准放电电流	10A	0~45°C
3.11	Max continuous discharge current 最大持续放电电流	15A	-10~60°C
3.12	Discharge cut-off voltage 放电截止电压	10.0V	
3.13	Operating Temperature 工作温度	0~45°C	Charge 充电
		-20~60°C	Discharge 放电

3.14	Storage Temperature 贮存温度	-20°C~40°C	Less than 1 month 小于一个月
		-20°C~25°C	Less than 6 months 小于六个月
3.15	Outline size 外形尺寸	L:192±5*W:185±5*H:136±5mm	
3.16	The leakage line length 外露线长	L1:200mm±10mm UL3135 14AWG)	
3.17	Weight 重量	About:8.6Kg	

4、Battery configuration 电池组成

NO 序号	Item 项目	Criteria 标准	Remarks 备注
4.1	Cell 电芯	50175130/80Ah/3.2V	LiFePO4
4.2	PCM 保护板	HY2112-HB	

5、Battery Performance Test 电池性能检查及测试

5.1 Appearance 外观

There shall be no such defect as scratch, bur and other mechanical scratch, and the connector should be no rust dirt.

电池的表面应无明显的划痕毛刺及其其它机械划伤，外露的金属端子应无锈蚀污垢。

5.2 Test Equipment 测试设备要求

(1) Dimension Measuring Instrument 尺寸测量设备

The dimension measurement shall be implemented by instruments with accuracy no less than 0.01mm.

测量尺寸的仪器的精度应不小于 0.01mm。

(2) Voltmeter 电压表

Class with national standard or more sensitive class with inner impedance not less than 10 KΩ/V.

国家标准或更灵敏等级,内阻不小于 10 KΩ/V。

(3) Ammeter 电流表

Class with national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01Ω.

国家标准或更灵敏等级，外部总内阻包括电流表和导线应小于 0.01Ω。

(4) Impedance Meter 内阻测试仪

Impedance shall be measured by a AC impedance method (AC 1kHz LCR meter).

内阻测试仪测试方法为交流阻抗法(AC 1kHz LCR)。

5.3 Standard Test Condition 标准的测试条件

Test should be conducted with new batteries within one month after shipment from our factory and the cells shall not be

cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under temperature of $25\pm 5^{\circ}\text{C}$ and relative humidity of $65\pm 20\%$.

测试电池必须是本公司出厂时间不超过一个月的新电池，且电池未进行过五次以上充放电循环。除非其它特殊要求，本产品规格书规定的测试的环境条件为：温度 $25\pm 5^{\circ}\text{C}$ ，相对湿度 $65\pm 20\%$ 。

5.4 Standard Charge 标准充电

0.125C=10A Full charge condition: Constant current **0.2C**, Constant voltage **14.4V** for **6.5** hours in all at $25\pm 5^{\circ}\text{C}$.

0.125C=10A 充电状态：恒流 **0.2C** 恒压 **14.4V** 总充电时间不超过 **6.5** 小时，其中在 $25\pm 5^{\circ}\text{C}$ 环境下充电。

5.5 Common Performance 产品的常规性能

No	Items/项目	Testing method and determinant standard /测试方法和判定标准
1	Charge Performance 充电性能	The battery can be charged when using the original charger. The standard charge mode: under the temperature of $25\pm 5^{\circ}\text{C}$, charge the battery with the current of 0.125C until the voltage reaches up to 14.4V , then charge with constant voltage until the charge current $\leq 0.01\text{C}$, then stop charging. 使用原装充电器能够充电。标准充电模式：在 $25\pm 5^{\circ}\text{C}$ 条件下，电池用 0.125C 充电，当电池电压达到 14.4V 时改为恒压充电，直到充电电流小于或等于 0.01C 时停止充电。
2	Discharge Performance 放电性能	When connecting with load, the battery can supply power. Charge the battery with standard charge mode, then rest for 0.5h, then discharge with 0.125C until the voltage is 10.0V , and the discharge time is required $\geq 295\text{min}$. 电池外接负载能够供电。将电池按标准充电模式充好电后，开路搁置 0.5h，再以 0.125C 放电至 10.0V ，要求放电时间 $\geq 295\text{min}$ 。
3	Cycle Performance 循环寿命	Under the temperature of $25\pm 5^{\circ}\text{C}$, charge the battery with 0.125C , when the voltage reaches up to 14.4V charge with constant voltage until the charge current $\leq 800\text{mA}$, then stop charging, rest for 0.5h, then discharge with 0.125C to 10.0V . Cycle with the above mode, when the continuous discharge time $< 80\%$ stop cycling. The cycle life is required ≥ 2500 times. 在 $25\pm 5^{\circ}\text{C}$ 条件下电池按 0.125C 充电，当电压达到 14.4V 时改为恒压充电，直到充电电流小于或等于 800mA 时停止充电，静置 0.5h 后， 0.125C 放电至 10.0V 的方式进行循环，当连续三次放电容量 $<$ 初始容量 80% 时寿命为终止，要求循环寿命 ≥ 2500 次。

4	Charged Storage Characteristics 荷电保持能力	<p>Charge the battery with 0.125C, then shift to charge with constant voltage until the voltage reaches up to 14.4V, when the charge current $\leq 0.01C$ stop charging; rest under the temperature of $25\pm 5^{\circ}C$ for 28d then discharge with 0.2C to 10.0V. The discharge time is required $\geq 4.25h$.</p> <p>电池按 0.125C 充电, 当端电压达到 14.4V 时改为恒压充电, 充电电流小于或等于 0.01C 时, 充电停止; 将电池开路放置在 $25\pm 5^{\circ}C$ 条件下 28 天后, 以 0.125C 放电至 10.0V, 要求放电时间 $\geq 4.25h$。</p>
5	Storage Characteristics 存放性能	<p>Charge the battery, which is newly manufactured shorter than 3 months, with 0.125C until the capacity reaches to 40~50%, after resting for 12 months under the temperature of $25\pm 5^{\circ}C$ and the humidity of 45~85%, then charge with 0.125C to 14.4V then shift to charge with constant voltage, after full-charge rest for 0.5h, then discharge with 0.125C to 10.0V. The discharge time is required $\geq 4h$. 将生产日期到实验日期不足 3 个月的电池按 0.125C 充入 40~50%容量后, 放置在温度 $25\pm 5^{\circ}C$、湿度为 45~85%的环境中开路存放 12 个月后, 电池按 0.125C 充电至 14.4V 时改为恒压充电, 充饱后; 静置 0.5h, 再以 0.125C 放电至 10.0V, 要求放电时间 $\geq 4h$。</p>

5.6 Safety Performance 产品可靠性

No	Items/项目	Test method and determinant standard /测试方法和判定标准
1	High Temperature Characteristics 高温性能	<p>Under the temperature of $25\pm 5^{\circ}C$, after charging the battery with 0.125C then put the battery into the constant temperature and humidity oven with $55\pm 2^{\circ}C$ for 2h, then discharge with 0.125C to 10.0V. The discharge time is required $\geq 255min$ and the battery should no deformation and smoking.</p> <p>在 $25\pm 5^{\circ}C$ 条件下, 电池按 0.125C 充电结束后, 将电池放入 $55\pm 2^{\circ}C$ 的恒温恒湿箱中恒温 2h 后, 然后以 0.125C 电流放电至 10.0V, 要求放电时间 $\geq 255min$, 且电池外观无变形、冒烟。</p>
2	Low Temperature Characteristics 低温性能	<p>Under the temperature of $25\pm 5^{\circ}C$, after charging the battery with 0.125C, then put the battery into the constant temperature and humidity oven with $-10\pm 2^{\circ}C$ for 4h, then discharge with 0.125C to 10.0V. The discharge time is required $\geq 3h$ and the battery should no deformation and smoking.</p> <p>在 $25\pm 5^{\circ}C$ 条件下, 电池按 0.125C 充电结束后, 将电池放入 $-10\pm 2^{\circ}C$ 的恒温恒湿箱中恒温 4h, 然后以 0.125C 电流放电至 10.0V, 要求放电时间 $\geq 3h$, 且电池外观无变形、冒烟。</p>

3	<p>Overcharge Protection Characteristics 过充电保护性能</p>	<p>Battery standards after charging, the charging current of 0.125C to 16.8V, and then in the 16.8V under constant voltage charging 7h batteries, no fire, no explosion. 电池标准充电结束后,以 0.125C 电流充电至 16.8V, 然后再在 16.8V 下恒压充电 7h, 电池不起火、不爆炸。</p>
4	<p>Over-discharge Protection Characteristics 过放电保护性能</p>	<p>Under the temperature of 25±5℃, after discharging the battery with 0.125C to 10.0V, then connect the load with 30Ω and discharge for 24h. It is required the battery should be no leakage, fire, smoking and explosion during the test processes. 在 25±5℃ 条件下, 电池按 0.125C 放电至 10.0V 后, 外接 30Ω 负载再放电 24h, 要求实验过程中电池不漏液、起火、冒烟和爆炸。</p>
5	<p>Short-circuit Protection Characteristics 短路保护性能</p>	<p>Under the temperature of 25±5℃, after full-charging the battery with 0.125C, then make the battery's anode and cathode short-circuit for 1h (the connecting resistance is smaller than 100mΩ), then cut the anode and cathode, after the battery momentary charge by 0.125C current, the voltage should come back to 10.0V, and there should be no leakage, deformation, smoking and explosion during the test processes. 在 25±5℃ 条件下, 电池按 0.2C 充满电后, 将电池正负极短路 (外接电阻小于 100mΩ) 持续 1h, 再将电池正负极断开, 电池以 0.125C 瞬时充电后电压应不小于 10.0V, 且试验过程中电池不漏液、变形、冒烟和爆炸。</p>
6	<p>Constant Humidity and Temperature Characteristics 恒定湿热性能</p>	<p>Under the temperature of 25±5℃, after charging the battery with 0.125C, then put the battery into the constant temperature and humidity oven with 40±2℃ and 90~95% for 48h, the battery should be no obvious deformation, leakage, rust, smoking and explosion. After testing take out the battery then rest for 2h under the temperature of 25±5℃, discharge with 0.125C to 10.0V. The discharge time is required ≥180min. 在 25±5℃ 条件下, 电池按 0.125C 充电结束后, 放入 40±2℃, 湿度 90~95% 的恒温恒湿箱内 48h, 电池应无明显变形、漏液、生锈、冒烟或爆炸, 试验结束后将电池取出搁置 2h, 在 25±5℃ 条件下, 以 0.125C 放电至 10.0V, 要求放电时间 ≥180min。</p>
7	<p>Drop Test 跌落实验</p>	<p>Under the temperature of 25±5℃, after full-charging the battery with 0.125C, then drop it freely from 1 meter height onto the hard board which 18~20mm thick (6 times each of X, Y, Z with positive and negative directions). The battery should be no smoking and explosion, after test discharge the battery with 0.2C, and the discharge time is required ≥255min (The battery should be cycled no more than 3 times, among them if one time is passed then stop). 在 25±5℃ 条件下, 电池按 0.2C 充满电后, 将电池从 1 米高度自由跌落至厚度为 18~20mm 的硬木板上 (X、Y、Z 正负方向 6 个方向每个方向分别朝下跌落一次) 电池应不冒烟、爆炸, 试验结束后, 将电池进行 0.125C 放电性能测试, 要求放电时间 ≥255min (最多可进行 3 次循环, 其中任何一次合格即可停止)。</p>

5.7 Rest Period 搁置时间

Unless otherwise defined, 30 min, rest period after charge; 30 min, rest period after discharge.

如无特殊要求，电池充放电间隔为30min。

6、 Storage and Others 贮存及其它事项

6.1 Long Time Storage 长期贮存

If stored for a long time (exceed three months), the cell should be stored in dry and cooling place. The cell's storage voltage should be **13.6V~14.2V** and the cell is to be stored in a condition as appendix No. 4

长期贮存的电池（超过3个月）须置于干燥、凉爽处。贮存电压为 **13.6V~14.2V** 且贮存环境要求如附录4。

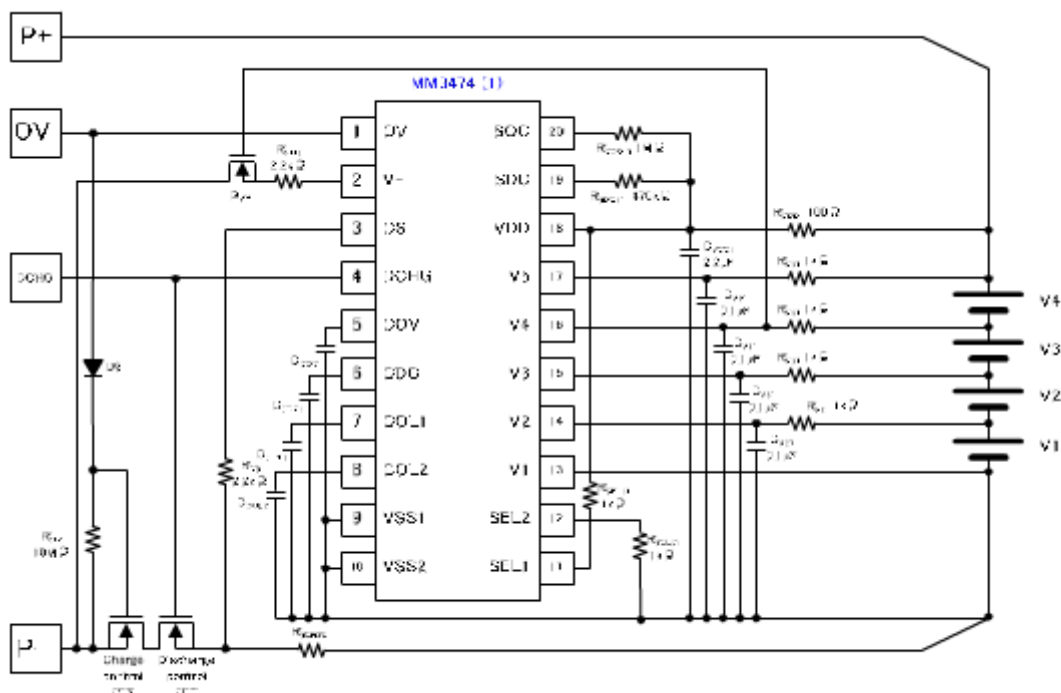
6.2 Others 其它事项

Any matters that this specification does not cover should be conferred between the customer.

任何本说明书中未提及的事项，须经双方协商确定。

7、 Protection Circuit 保护电路

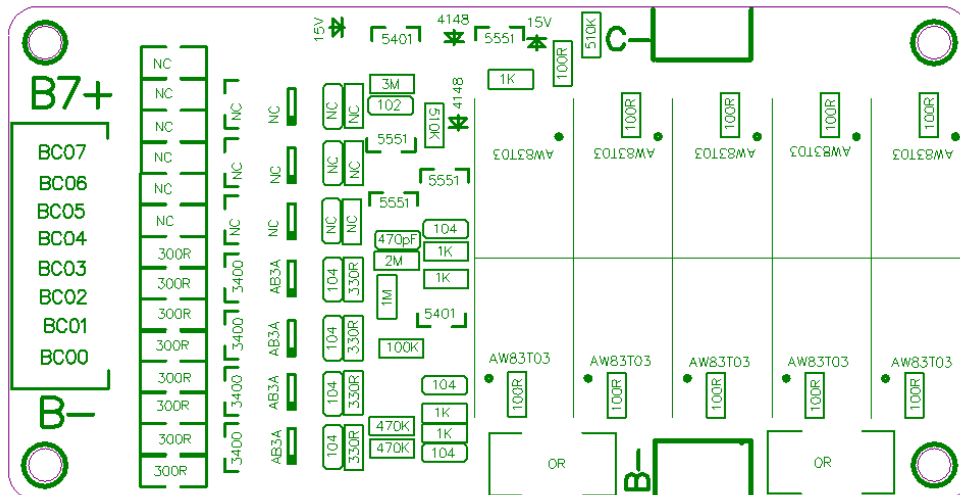
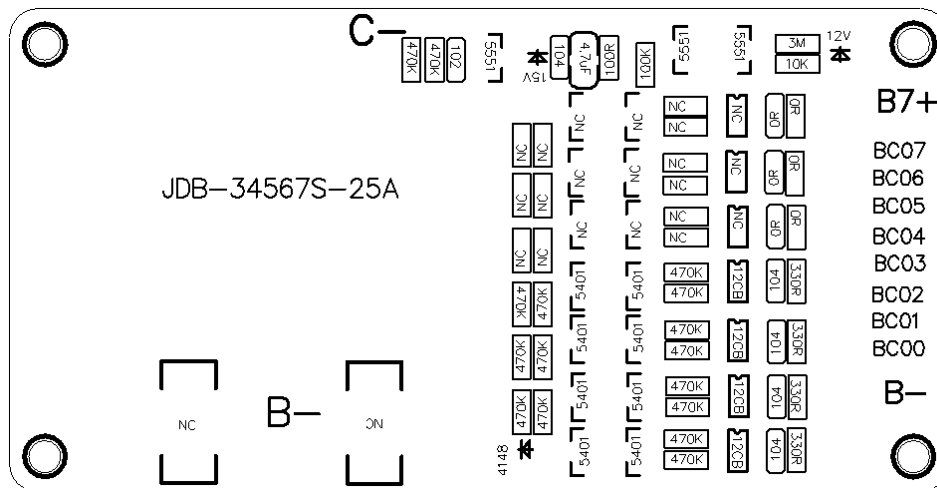
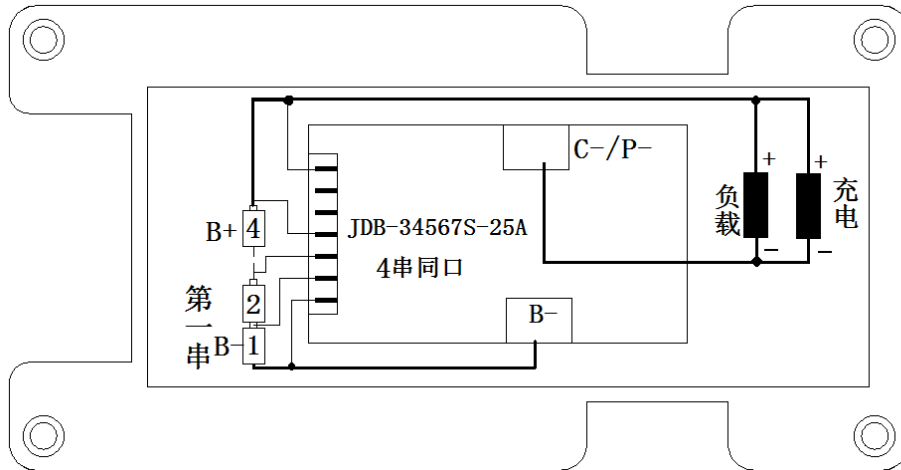
7.1 Circuit Diagram 电路原理图



7.2 电气参数 Electrical Characteristic (Ta = 25 °C.)

项目 Item	参数值 Parameter Value	单位 Unit	
最大持续放电电流 The maximum continuous discharge current	25.0	A	
最大瞬间放电电流 The maximum instantaneous discharge current	30.0	A	
充电电压 Charging voltage	14.4	V	
最大充电电流 Maximum charge current	25.0	A	
过充电检测电压 Overcharge detection voltage	3.625-3.650-3.675	V	
过充电保护延时 Overcharge protection delay	1000-1300-1600	mS	
过充电解除电压 Overcharge release voltage	3.40-3.45-3.50	V	
电量平衡检测电压 Battery balance detection voltage	3.575-3.600-3.625	V	
电量平衡电流 Electricity balance current	20-24-28	mA	
过放电检测电压 Overdischarge detection voltage	2.45-2.50-2.55	V	
过放电检测延时 Overdischarge detection delay	115-145-175	mS	
过放电解除电压 Over discharge discharge voltage	2.95-3.00-3.05	V	
过电流检测电压 Overcurrent detection voltage	0.20±0.015	V	
过电流检测延时 Overcurrent detection delay	9-12-15	mS	
放电过电流保护电流 Overcurrent protection current	26.0-28.0-33.0	A	
过电流保护解除条件 Overcurrent protection release conditions	断开负载 Disconnect the load	/	
短路检测延时 Short circuit detection delay	≤1000	uS	
短路保护解除条件 Short circuit protection release conditions	断开负载 Disconnect the load		
温度保护 Temperature protection	/	°C	
主回路导通内阻 Main circuit conduction resistance	≤30	mΩ	
自耗电 Self-consumption	工作功耗 Working power consumption	≤50	uA
	休眠功耗 Sleep power consumption	≤10.0	uA
工作温度 Operating temperature	-40~+85	°C	
保护板尺寸 PCB yardstick: 7.5±0.5*34±0.5*66±0.5mm			

7.3 Diagram connection of PCM 保护板连接示意图



Appendix 附录

Handling Precautions and Guideline

For LIP (LiFePO4 Battery) Rechargeable Batteries

磷酸铁锂充电电池操作指示及注意事项

1、Charging 充电

1.1 Charging current 充电电流

Charging current should be less than maximum charge current specified in the Product Specification. Charging with higher current than recommended value may cause damage to cell electrical, mechanical, and safety performance and could lead to heat generation or leakage.

充电电流不得超过本规格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泄漏。

1.2 Charging voltage 充电电压

Charging shall be done by voltage less than that specified in the Product Specification (14.4V/battery). Charging beyond 14.4V, which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with this condition.

充电电压不得超过本规格书中规定的额定电压（14.4V/电池）。14.4V为充电电压最高极限，充电器的设计应满足此条件。

It is very dangerous that charging with higher voltage than maximum voltage may cause damage to the cell electrical, mechanical safety performance and could lead to heat generation or leakage.

电池电压高于额定电压值时，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，可能会导致发热或泄漏。

1.3 Charging temperature 充电温度

The cell shall be charged within 0~45°C range in the Product Specification.

电池必须在 0~45°C 的环境温度范围内进行充电。

1.4 Prohibition of reverse charging 禁止反向充电

Reverse charging is prohibited. The cell shall be connected correctly. The polarity has to be confirmed before wiring.

In case of the cell is connected improperly, the cell cannot be charged. Simultaneously, the reverse charging may cause

damaging to the cell which may lead to degradation of cell performance and damage the cell safety, and could cause heat generation or leakage.

正确连接电池的正负极，严禁反向充电。若电池正负极接反，将无法对电池进行充电。同时，反向充电会降低电池的充放电性能、安全性，并会导致发热、泄漏。

2、Discharging 放电

2.1 Discharging current 放电电流

The cell shall be discharged at less than the maximum discharge current specified in the Product Specification. High discharging current may reduce the discharging capacity significantly or cause over-heat.

放电电流不得超过本规格书规定的最大放电电流，大电流放电会导致电芯容量剧减并导致过热。

2.2 Discharging temperature 放电温度

The cell shall be discharged within $-20\sim 60^{\circ}\text{C}$ range specified in the Product Specification.

电池必须在 $-20\sim 60^{\circ}\text{C}$ 的环境温度范围内进行放电。

2.3 Over-discharging 过放电

It should be noted that the cell would be at an over-discharged state by its self-discharge characteristics in case the cell is not used for long time. In order to prevent over-discharging, the cell shall be charged periodically to maintain between $13.5\text{V}\sim 14.4\text{V}$.

需要注意的是，在电池长期未使用期间，它可能会因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，将其电压维持在 $13.5\text{V}\sim 14.4\text{V}$ 之间。

Over-discharging may causes loss of cell performance, characteristics, or battery functions

过放电会导致电芯性能、电池功能的丧失。

Charger should be installed to prevent the battery discharge below the cut-off voltage to this specification. In addition, the charger should also device to preventrepeated charging. The steps are as follows: the battery in the fast charge before,should first with a small current (0.01C) pre charging for 15~35 minutes, so that thebattery voltage reaches above 14.4V for rapid charging, a timer to achieve the precharge process. If in the pre charge time, battery voltage does not rise more than 14.4V , the charger should be able to stop the next step fast charging, and display the electric core / battery is in a non normal state.

充电器应有装置来防止电池放电至低于本规格书规定的截止电压。此外，充电器还应有装置以防止重复充电，步骤如下：电池在快速充电之前，应先以一小电流（0.01C）预充电 15~30 分钟，以使电池的电压达到 14.4V 以上，再进行快速充电。可用一记时器来实现该预充电步骤。如果在预充电规定时间内，电池的电压仍未升到 14.4V 以上，充电器应能够停止下一步快速充电，并显示该电芯/电池正处于非正常状态。

3. Protection Circuit Module 保护电路模块

The cell/battery pack shall be with a PCM that can protect cell/battery pack properly. PCM shall have functions of (1) overcharging prevention, (2) over-discharging prevention, (3) over current prevention to maintain safety and Prevent significant deterioration of cell performance. The over current can occur by external short circuit .

电芯/电池包装应配有 PCM 板以正确保护电芯/电池。PCM 板应具有以下功能以保证安全并防止损坏电池性能:

(1) 过充保护功能 (2) 过放保护功能 (3) 过流保护功能。

3.1 overcharging protection: 过充保护电压

Overcharging protection function shall stop charging if any one of the cells of the battery pack reaches $3.65 \pm 0.050V$; 当电池中任一电芯的电压达到 $3.65 \pm 0.050V$ 时, 过充电保护功能应立即启动并停止充电。

3.2 over-discharging protection: 过放电保护

Over-discharging prevention function shall work to avoid further drop in cell voltage of $2.5 \pm 0.05V$

Or less per cell in any cell of the battery pack. It is recommended that the dissipation current of PCM Shall be minimized to 0.5uA or less with the over-discharging prevention, the protection function shall monitor each bank of the battery pack and control the current all the time.

当电池中任一电芯的电压降至 $2.5 \pm 0.05V$ 以下时, 过放保护功能应起保护作用以避免电芯的深度放电。推荐 PCM 板的静态电流小于 5uA, 并具有过放保护功能。该保护功能应实时监控所有电芯。

4、Storage 贮存

The battery shall be storied within $-20 \sim 30^{\circ}C$ range environmental condition.

电池储存温度必须在 $-20 \sim 30^{\circ}C$ 的范围内。

If the battery has to be storied for a long time (Over 3 months), the environmental condition should be: Temperature: $25 \pm 5^{\circ}C$, Humidity: $65 \pm 20\%RH$.

长期存储电池 (超过 3 个月) 须置于温度为 $25 \pm 5^{\circ}C$ 、湿度为 $65 \pm 20\%RH$ 的环境中。

The voltage for a long time storage shall be $13.6V \sim 14.2V$ range.

贮存电压为 $13.6V \sim 14.2V$ 。

5、Handling Instructions 电池的注意事项

Read and observe the following warnings and precautions to ensure correct and safe use of Li-ion batteries.

认真阅读下面的注意事项, 确保正确使用磷酸铁锂电池。深圳市泰晶太阳能科技有限公司对违反下述注意事项而产生的任何问题不予负责。

Danger!

危 险!

- Do not immerse the battery in water or allow it to get wet.
- 勿将电池投入水中或将其弄湿!
- Do not use or store the battery near sources of heat such as a fire or heater.
- 禁止在火源或极热条件下给电池充电! 勿在热源(如火或加热器)附近使用或贮存电池! 如果电池泄漏或发出异味, 应立即将其从接近明火处移开;
- Do not use any chargers other than those recommended.
- 请使用专用充电器!
- Do not reverse the positive (+) and negative (-) terminals.
- 勿将正负极接反!
- Do not connect the battery directly to wall outlets or car cigarette-lighter sockets.
- 勿将电池直接连接到墙上插座或车载点烟式插座上!
- Do not put the battery into a fire or apply direct heat to it.
- 勿将电池投入火中或给电池加热!
- Do not short-circuit the battery by connecting wires or other metal objects to the positive (+) and negative (-) terminals.
- 禁止用导线或其它金属物体将电池正负极短路, 禁止将电池与项链、发夹或其它金属物体一起运输或贮存!
- Do not pierce the battery casing with a nail or other sharp object, break it open with a hammer, or step on it.
- 禁止用钉子或其它尖锐物体刺穿电池壳体, 禁止锤击或脚踏电池!
- Do not strike, throw or subject the battery to sever physical shock.
- 禁止撞击、投掷或者使电池受到机械震动
- Do not directly solder the battery terminals.
- 禁止直接焊接电池端子!
- Do not attempt to disassemble or modify the battery in any way.
- 禁止以任何方式分解电池!
- Do not place the battery in a microwave oven or pressurized container.
- 禁止将电池置入微波炉或压力容器中!
- Do not use the battery in combination with primary batteries (such as dry-cell batteries) or batteries of different Capacity type or brand.
- 禁止与一次电池(如干电池)或不同容量、型号、品种电池组合使用!
- Do not use the battery if it gives off an odor, generates heat, becomes discolored or deformed, or appears abnormal in any way. If the battery is in use or being recharged, remove it from the device or charger immediately and discontinue use.
- 如果电池发出异味、发热、变形、变色或出现其它任何异常现象时不得使用; 如果电池正在使用或充电, 应立即从用电器中或充电器上取出并停止使用!

Caution!

注 意!

Do not use or store the battery where is exposed to extremely hot, such as under window of a car in direct sunlight in a hot day. Otherwise, the battery may be overheated. This can also reduce battery performance and/or shorten service life. 不要使用处于极热环境中的电池，如阳光直射或热天的车内。否则，电池会过热，可能着火（点燃），这样就会影响电池的性能、缩短电池的使用寿命。

If the battery leaks and electrolyte gets in your eyes, do not rub them. Instead, rinse them with clean running water and immediately seek medical attention. If left as is, electrolyte can cause eye injury.

如果电池漏液后电解液进入眼睛，不要擦拭，应用水冲洗，立即寻求医疗救助。如不及时处理，眼睛将会受到伤害。

Use the battery only under the following environmental conditions. Failure to do so can result in reduced performance or a shorten service life. Recharging the battery outside of these temperatures can cause the battery to overheat, explode or catch fire.

只能在下述条件下使用电池，否则将会降低电池的性能或缩短电池的使用寿命。

Operating environment:

工作环境:

When charging the battery: 0~45°C

充电: 0~45°C

When discharging the battery: -20~60°C

放电: -20~60°C

When stored up to 30 days: -20~40°C

储存 30 天: -20~40°C

When stored up to 90 days: -20~25°C

储存 90 天: -20~25°C

6、Amendment of this Specification 产品规格书的修订

This specification is subject to change with prior notice.

本公司有权对本产品规格书进行修订，在对产品规格书修订后深圳市泰晶太阳能科技有限公司将会通知客户。

-End-