

Customer 客户: \_\_\_\_\_

# Lithium-ion Battery Specification Approval Sheet 锂离子电池规格确认书

Model 型号: RD012512PM1-Li-EVE105-16S1P-51.2V  
100Ah-5.1kWh-PCM-外壳-A0

File number 成品编码: \_\_\_\_\_ / \_\_\_\_\_

| Approved by 批准 | Checked by 审核  | Prepared by 编制 | Date 日期    |
|----------------|----------------|----------------|------------|
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## 1 Scope 范围

本规格书描述本公司设计开发的电池，它是产品设计、生产和检验的依据。其作用是让顾客了解产品的质量及正确使用方法。

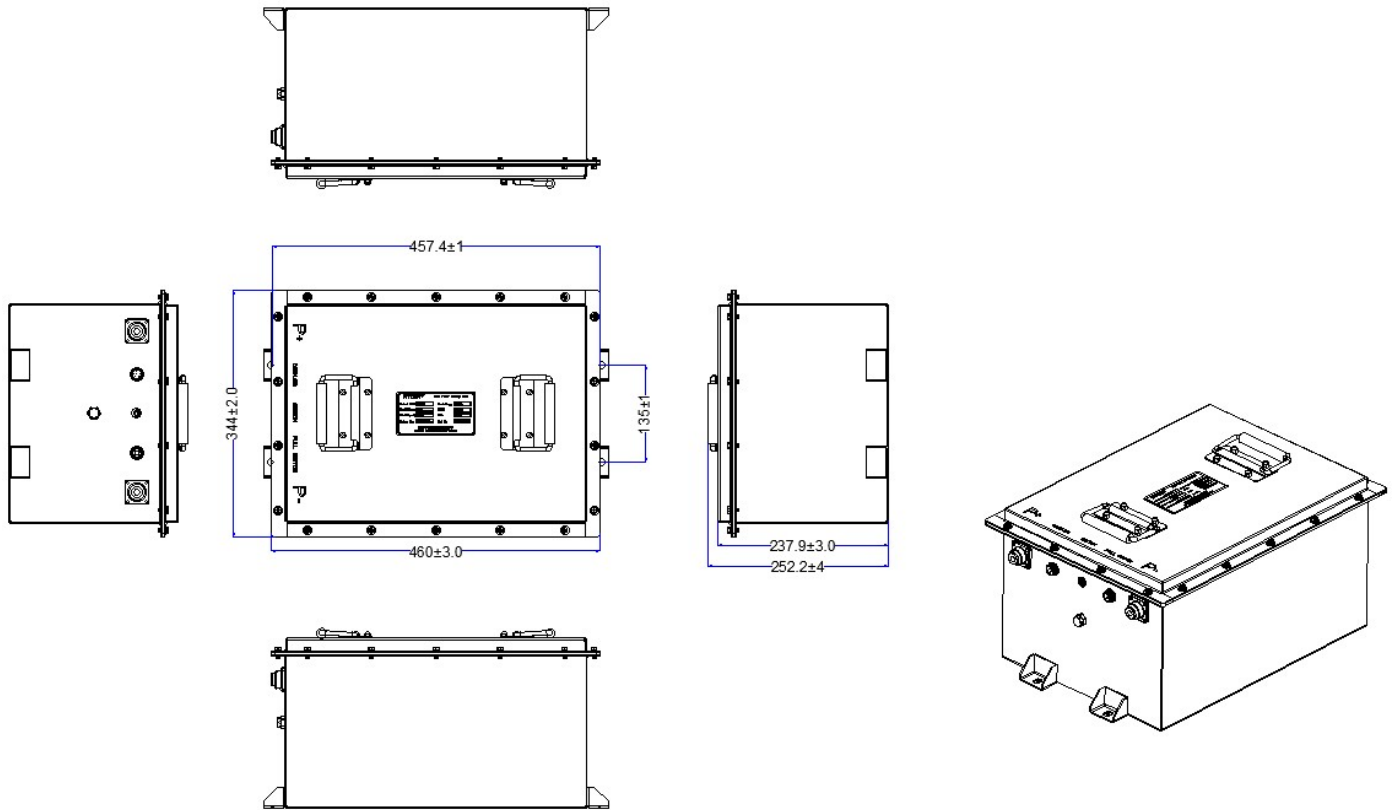
This specification describes the design and development of the company's battery; it is the product of design, production and inspection basis. Its role is to understand the quality of the product and using the correct method for customers.

本规范适用于由深圳瑞鼎电子有限公司制造的锂离子电池产品。This specification shall be applied to Li-ion battery manufactured by Shenzhen Ryder electronics Co., Ltd.

## 2 Product Configuration 产品配置

| No. | Item 项目                     | Criteria 标准                                  | Remark 备注   |
|-----|-----------------------------|--|---|
| 1   | 电芯 Lithium-ion Battery Cell | 磷酸铁锂圆柱电池: LFP-37130201-3.2V-105Ah (亿纬 LF105) |   |
| 2   | PCM                         | 16S200A 铁锂 100AH-CAN-RS485-LED 保护板           |   |
| 3   | 充电插头 Connector              | Charging plug: GRD-M8 RED /GRD-M8 BLACK      |       |
| 4   | 放电插头 Connector              | Discharge plug: GRD-M8 RED /GRD-M8 BLACK     |      |
| 5   | 外接开关插头 Connector            | External Switch plug: GX16-4 male connector  |  公插头 |
| 6   | CAN/LCD 插头 Connector        | CAN / LCD: GX16-6 male connector             |  公插头 |
| 7   | 电源开关 Connector              | Power Switch: M16 Switch                     |      |

### 3. Product Dimension 产品尺寸



### 4 Product Specification 产品规格

| No. | 内容<br>content                          | 测试方法<br>Testing method  | 备注<br>Remark |
|-----|--|---|--------------|
| 1   | 充电截止电压<br>Charge cut-off<br>voltage    | 58.4V   |              |
| 2   | 放电终止电压<br>Discharge cut-off<br>voltage | 40V   |              |
| 3   | 标准充电模式<br>Standard charge              | 在环境温度 $25 \pm 2^\circ\text{C}$ 条件下，以 $0.5\text{C}$ 电流恒流充电至 $58.4\text{V}$ ，转 $58.4\text{V}$ 恒压充电，直到充电电流 $\leq 0.05\text{C}$ 。Under the condition of the ambient temperature of $25 \pm 2^\circ\text{C}$ ，Charge the battery at constant current of $0.5\text{C}$ to reach $58.4\text{V}$ . Then charge the battery at constant $58.4\text{V}$ voltage until the charging current decreasing to $0.05\text{C}$ . |              |
| 4   | 标准放电模式<br>Standard discharge           | 以标准充电模式满充后，搁置2小时，以 $0.5\text{C}$ 电流恒流放电至 $40 \pm 1\text{V}$ 。<br>After the standard charging, rest for 2 hour then discharge to $40 \pm 1\text{V}@0.5\text{C}$ .  |              |
| 5   | 出货电压<br>Shipments voltage              | $50.4\text{--}53.6\text{V}$   |              |
| 6   | 最大充电电流<br>Maximum Charge<br>Current    | $\leq 50\text{A}$   |              |

|    |  |  |  |
|----|--|--|--|
| 7  | 最大持续工作电流<br>Maximum continuous working current | ≤150A  | 电芯表面温度超过 70℃或 PCB 温度超过 85℃停止放电<br>Stop discharge when the surface temperature of the cell exceeds 70 °C or the temperature of the PCB exceeds 85°C |
| 8  | 容量<br>Rated capacity                           | 标称容量Typical capacity: 105Ah<br>最小容量Minimum capacity: 100Ah   | 标准充电然后标准放电 standard discharge after standard charge  |
| 9  | 工作温度<br>Operation temperature range            | 充电Charge: 5~50℃<br>放电Discharge: -15~60℃  | 湿度: 60±25%<br>60±25%R.H  |
| 10 | 储存温度<br>Storage temperature                    | 小于 1 个月: -20 ~ 45℃<br>≤1 month: -20 ~ 45℃<br>小于 3 个月: -10 ~ 30℃<br>≤3 months: -10 ~ 30℃<br>小于 1 年: 0 ~ 30℃<br>≤1 year: 0 ~ 30℃ | 湿度: 60±25%<br>长时间储存最佳温度: 10~25℃<br>60±25%R.H<br>Best 10~25°C for long-time storage   |
| 11 | 内阻<br>Impedance                                | <50mΩ  |  |
| 12 | 重量<br>Weight                                   | 46kg±1kg   |  |

## 5 Product Electric Performance Test 产品电性能测试

| No. | 项目<br>Items  | 测试方法<br>Test Conditions   | 达到要求<br>Requirements               |
|-----|--|---|------------------------------------|
| 1   | 电芯荷电保持能力<br>Cell Capability of keeping electricity | 以标准模式充电后，在环境温度 20℃±5℃的条件下，将电池开路搁置 28d，再以 1/3C 电流进行放电至 2.5V。<br>Fully charging, store them at (20±5)°C for 28 days, then discharge to 1/3V @0.2C.(the residual capacity is above 85% of nominal capacity)  | 放电时间≥2.8h<br>Discharging time≥2.8h |
| 2   | 电芯常温循环寿命<br>Cycle Life @25℃                        | 以 1/3C 电流恒流放电至 2.5V，再以 1/3C 电流恒流充电至 3.65V，然后恒压 3.65V 充至电流≤0.05C，静止 10min，以 1/3C 电流恒流放电至 2.5V，放电结束后，静止 10min，再进行下一充放循环，直至连续三次放电容量小于 80% 的 1/3C 的首次放电容量。<br>Discharge to 2.5V @ 1/3C, then Charge the battery @ 1/3C to reach 3.65V. Then charge the battery at constant 1/3V voltage until the charging current decreasing to 0.05C. Rest for 10 min. discharge to 2.5V@ 1/3C and rest for 10 min. Continue the charge/discharge cycles until discharge capacity lower than 80% of rated capacity. | 循环次数≥1500 次<br>Cycles life ≥1500   |

|   |   |  |                                  |
|---|---|--|----------------------------------|
| 3 | 电芯储能性能<br>Cell energy storage performance | <p>以标准模式充电给电池充入 20%~50% 的容量，然后在环境温度 20°C±5°C，相对湿度 45%~85% 的环境中贮存。贮存 12 个月后满充以 1/3C 电流放电至终止电压 2.5V。进行贮存试验的电池应选自生产日期到试验日期不足 3 个月的电池。</p> <p>Charge the battery to 20%~50% of its rated capacity using standard charging mode, then keep it in an 20°C±5°C, humidity 45%~85% room for 12 months, fully charge and discharge it @ 1/3C until voltage down to 2.5V.<br/>(The testing sample should be within 3 months dated from production date)</p> | 放电时间≥2.8h<br>Discharge time≥2.8h |
|---|---|--|----------------------------------|

## 6 Mechanical Performance 机械特性

| 序号<br>No. | 内容<br>content          | 测试方法<br>Testing method  | 达到要求<br>Requirements  |
|-----------|------------------------|---|---|
| 1         | 振动实验<br>Vibration Test | <p>电池标准充电后固定在振动台上，以 X, Y, Z 三个方向从 10Hz~55Hz 循环振动各 30min，扫描速率为 1oct/min；振动频率：10Hz~30Hz；移位振幅/单振幅：0.38mm；振动频率：30Hz~55Hz；移位振幅/单振幅：0.19mm。</p> <p>After standard charging, put battery on the vibration table. 30 min experiment from X, Y, Z axis. Scan rate: 1oct/min; Frequency 10-30Hz, Swing 0.38mm; Frequency 30-55Hz, Swing 0.19mm.</p> | <p>电性能及外观不受影响<br/>No influence to batteries' electrical performance and appearance.</p> |

## 7 PCM Specification 保护板规格

### 7.1 PCM 参数

(注：以下参数除特殊注明以外，25°C 环温下测试)

(Note: The following parameters are tested at 25°C ring temperature unless otherwise stated)

| 序号<br>S/N | 指标项目 Index Items                         |  | 默认参数<br>Default Setting | 公差值<br>Tolerance value | 备注<br>Remark |
|-----------|--|--|-------------------------|------------------------|--------------|
| 1         | 电压告警<br>Voltage alarm                    | 单体过充告警电压<br>High cell voltage alarm                | 3500mV                  | ±25mV                  |              |
|           | 单体过充保护 Single cell overcharge protection | 单体过充保护电压 Single cell overcharge protection voltage | 3650mV                  | ±25mV                  |              |
|           |  | 单体过充保护延时 Single cell overcharge protection delay   | 1.0S                    | ±0.5S                  |              |
|           | 单体过压保护解除 Single cell overvoltage release | 单体过充保护解除电压 Single cell overvoltage release voltage | 3400mV                  | ±25mV                  |              |
|           |  | 单体过充保护解除延时 Single cell overvoltage release delay   | 2.0S                    | ±0.5S                  |              |

|   |  |   |        |        |  |
|---|--|---|--------|--------|--|
| 2 | 电压告警<br>Voltage alarm                            | 单体过放告警电压<br>Low cell voltage alarm                              | 2800mV | ±25mV  |  |
|   | 单体过放保护 Single cell over discharge protection     | 单体过放保护电压 Single cell over discharge protection voltage          | 2500mV | ±25mV  |  |
|   |  | 单体过放保护延时 Single cell over discharge protection delay            | 1.0S   | ±0.5S  |  |
|   | 单体过放保护解除 Single cell over discharge release      | 单体过放保护解除电压 Single cell over discharge release voltage           | 2900mV | ±25mV  |  |
|   |  | 单体过放保护解除延时 Single cell over discharge release delay             | 2.0S   | ±0.5S  |  |
| 3 | 总体过充告警 Battery high voltage alarm                | 总体过充告警电压 Battery pack high voltage alarm                        | 56.00V | ±300mV |  |
|   | 总体过充保护 Total over charge protection              | 总体过充保护电压 Over charge protection voltage                         | 58.08V | ±300mV |  |
|   |  | 总体过充保护延时 Over charge protection delay                           | 1.0S   | ±0.5S  |  |
|   | 总体过压保护解除 Total over voltage protection release   | 总体过充保护解除电压 charge overcurrent protection release voltage        | 54.40V | ±300mV |  |
|   |  | 总体过充保护解除延时 charge overcurrent protection release delay          | 2.0S   | ±0.5S  |  |
| 4 | 总体过放告警 Battery low voltage alarm                 | 总体过放告警电压 Battery pack low voltage alarm                         | 44.80V | ±300mV |  |
|   | 总体过放保护 Total over discharge protection           | 总体过放保护电压 over discharge protection voltage                      | 41.60V | ±300mV |  |
|   |  | 总体过放保护延时 over discharge protection delay                        | 1.0S   | ±0.5S  |  |
|   | 总体过放保护解除 Total over discharge protection release | 总体过放保护解除电压 over discharge protection release voltage            | 46.40V | ±300mV |  |
|   |  | 总体过放保护解除延时 over discharge protection release delay              | 2.0S   | ±0.5S  |  |
| 5 | 过流告警<br>Current alarms                           | 充电过流告警<br>Charge current alarm                                  | 180A   | ±5%    |  |
|   | 充电过流保护 charge overcurrent protection             | 充电过流保护电流 charge overcurrent protection current protection delay | 200A   | ±5%    |  |

|                        |  |  |                               |        |  |  |
|------------------------|--|--|-------------------------------|--------|--|--|
|                        |  | 充电过流保护延时 charge overcurrent protection delay           | 2.0S                          | ±0.5S  |  |  |
|                        | 充电过流保护解除 charge overcurrent protection release         | 自动解除 Auto release                                      | 1min                          | ±5S    |  |  |
|                        |  | 放电解除 discharge to release                              | Discharge current>1.6A        |        |  |  |
| 6                      | 过流告警 Current alarms                                    | 放电过流告警 Discharge current alarm                         | 320A                          | ±5%    |  |  |
|                        | 放电过流 1 保护 Discharge overcurrent protection 1           | 放电过流 1 保护电流 Discharge overcurrent protection 1 current | 352A                          | ±5%    |  |  |
|                        |  | 放电过流 1 保护延时 Discharge overcurrent protection 1 delay   | 2.0S                          | ±0.5S  |  |  |
|                        | 放电过流 1 保护解除 Discharge overcurrent protection 1 release | 移除负载 Remove load                                       | 移除负载解除 Remove load to release |        |  |  |
| 充电解除 charge to release |  | Charging current>1.6A                                  |                               |        |  |  |
| 7                      | 放电过流 2 Discharge overcurrent protection 2              | 放电过流 2 保护电流 Discharge overcurrent protection 2 current | 600A                          | ±200A  |  |  |
|                        |  | 放电过流 2 保护延时 Discharge overcurrent protection 2 delay   | 200mS                         | ±100mS |  |  |
|                        | 放电过流 2 保护解除 Discharge overcurrent protection 2 release | 移除负载 Remove load                                       | Remove load to release        |        |  |  |
|                        |  | 充电解除 Charge to release                                 | Charging current>1.6A         |        |  |  |
| 8                      | 短路保护 Short circuit protection                          | 短路保护电流 Short circuit protection current                | 1000A                         | ±200A  |  |  |
|                        |  | 短路保护延时 Short circuit protection delay                  | 384μS                         | ±200uS |  |  |
|                        |  | 短路保护解除 Short circuit protection release                | Remove load to release        |        |  |  |
| 9                      | 均衡功能 Balancing function                                | 均衡开启电压 Balancing start voltage                         | 3350mV                        | ±25mV  |  |  |
|                        |  | 开启压差 Start voltage difference                          | 30mV                          | ±10mV  |  |  |
|                        |  | 静态均衡 Static balancing                                  | ON                            | /      |  |  |
| 10                     | 电芯温度告警 Cell temperature alarm                          | 充电高温告警温度 Cell charging high temperature alarm          | 55°C                          | ±3°C   |  |  |
|                        | 电芯温度保护 Cell temperature protection                     | 充电高温保护温度 Charge high temperature protection            | 60°C                          | ±3°C   |  |  |

|                              |   |  |        |       |  |
|------------------------------|---|--|--------|-------|--|
| 11                           | 电芯温度告警<br>Cell temperature alarm              | 充电低温告警温度<br>Cell charging low temperature alarm            | 5°C    | ±3°C  |  |
|                              | 电芯温度保护<br>Cell temperature protection         | 充电低温保护温度<br>Charge low temperature protection temperature  | 0°C    | ±3°C  |  |
|                              |   | 充电低温保护解除温度<br>Charge low temperature protection release    | 5°C    | ±3°C  |  |
| 12                           | 电芯温度告警<br>Cell temperature alarm              | 放电高温告警温度<br>High temperature alarm for cell discharge      | 70°C   | ±3°C  |  |
|                              | 电芯温度保护<br>Cell temperature protection         | 放电高温保护温度<br>High temperature Protection for Discharge      | 70°C   | ±3°C  |  |
|                              |   | 放电高温保护解除温度<br>Discharge temperature protection release     | 65°C   | ±3°C  |  |
| 13                           | 电芯温度告警<br>Cell temperature alarm              | 放电低温告警温度<br>Cell discharge low temperature alarm           | -20°C  | ±3°C  |  |
|                              | 电芯温度保护<br>Cell temperature protection         | 放电低温保护温度<br>Discharge low temperature protection           | -25°C  | ±3°C  |  |
|                              |   | 放电低温保护解除温度<br>Discharge low temperature protection release | -20°C  | ±3°C  |  |
| 14                           | 掉电功能<br>Power-down mode                       | 掉电电压<br>Power-down voltage                                 | ≤2.40V | ±25mV | 同时满足以上三个条件<br>The above conditions are met simultaneously three conditions |
|                              |   | 掉电延时<br>Power-down delay time                              | 10min  | ±1min |  |
|                              |   | 掉电电流<br>Power-down current                                 | ≤2.0A  | ±5%   |  |
| 15                           | MOS 高温告警<br>MOS high temperature alarm        | MOS 高温告警温度<br>MOS high temperature alarm                   | 75°C   | ±3°C  |  |
|                              |   | MOS 高温告警恢复温度<br>Removal of MOS high temperature alarm      | 65°C   | ±3°C  |  |
|                              | MOS 高温保护<br>MOS High - temperature protection | MOS 过温保护温度<br>MOS high Temperature Protection              | 85°C   | ±3°C  |  |
|                              |   | MOS 过温恢复温度<br>MOS hightemperature release                  | 75°C   | ±3°C  |  |
|                              |   | MOS 过温保护延时<br>MOS high Temperature Protection Delay        | 10S    | ±1.0S |  |
| 环境温度告警<br>Ambient Temp Alarm | 环境高温告警温度<br>Ambient high temperature alarm    | 65°C   | ±3°C   |       |  |
|                              | 环境低温告警温度<br>Ambient low temperature alarm     | -25°C  | ±3°C   |       |  |

|                          |  |  |                                       |   |        |
|--------------------------|--|--|---------------------------------------|---|--------|
| 16                       | 环境温度告警<br>Ambient Temp Alarm                                 | 环境高温告警温度 Ambient high temperature alarm              | 65°C                                  | ±3°C  |        |
|                          |  | 环境低温告警温度 Ambient low temperature alarm               | -25°C                                 | ±3°C  |        |
|                          | 环境温度保护<br>Environmental temperature protection               | 环境高温保护温度 Environmental high temperature protection   | 70°C                                  | ±3°C  |        |
|                          |  | 环境高温恢复温度 Environmental High Temperature Release      | 65°C                                  | ±3°C  |        |
|                          |  | 环境低温保护温度 Environment low temperature protection      | -30°C                                 | ±3°C  |        |
|                          |  | 环境低温恢复温度 Environment low temperature recovery        | -25°C                                 | ±3°C  |        |
|                          | 17   | 充满保护 Full charge condition                           | 总压电压 Full charge voltage              | ≥55.20V   | ±300mV |
| 充电电流 Full charge current |  |  | ≤2.5A                                 | ±10%  |        |
| 充满延时 Full charge delay   |  |  | 10S                                   | ±2.0S   |        |
| 18                       | 容量默认设置 Default capacity setting                              | 低电量告警 Low capacity warning                           | 10%                                   | ±5%   |        |
|                          |  | 当前满容量 Full capacity setting                          | 100AH                                 | /   |        |
|                          |  | 设计容量 Design capacity                                 | 100AH                                 | /   |        |
| 19                       | 消耗电流 Current Consumption (总压 52.80V)<br>Total voltage 52.80V | 工作时自耗电电流<br>Self consumption current in working mode | ≤15mA                                 | 空载 Load empty   |        |
|                          |  | 休眠模式自耗电电流<br>Self consumption current in sleep mode  | ≤500μA (关闭蓝牙模块电源)<br>≤1.5mA(开启蓝牙模块电源) | 进入：无充放电无均衡无通讯 10S<br>Access: no charge/discharge no balancing no communication 10S<br>激活：1.充放电 2.通讯3按键<br>Activation: 1. Charge and discharge 2. communication 3. key |        |
|                          |  | 低功耗模式电流<br>Power down modecurrent                    | ≤30μA                                 | 进入：【参考掉电模式】<br>激活：充电电压<br>Entry :[ Reference Powerdown Mode]<br>Activation: Charge voltage  |        |
| 20                       | 满容量衰减系数设置 Full capacity decay Coefficient setting            | 循环一次衰减 Cycle one decay                               | 0.020%                                | 常温25°C情况下单次充放电循环产生的容量衰减 Capacity attenuation caused by a single charge-discharge cycle at temperature of 25°C   |        |
|                          |  | 自放电率 Self discharge rate                             | 1%                                    | 静置状态下每月自耗电比例<br>Monthly self-consumption ratio under static state   |        |
|                          |  | 循环容量比 Cycle capacity ratio                           | 80%                                   | 累积放电容量达到电池总容量的80%为一个循环<br>The cumulative discharge  |        |

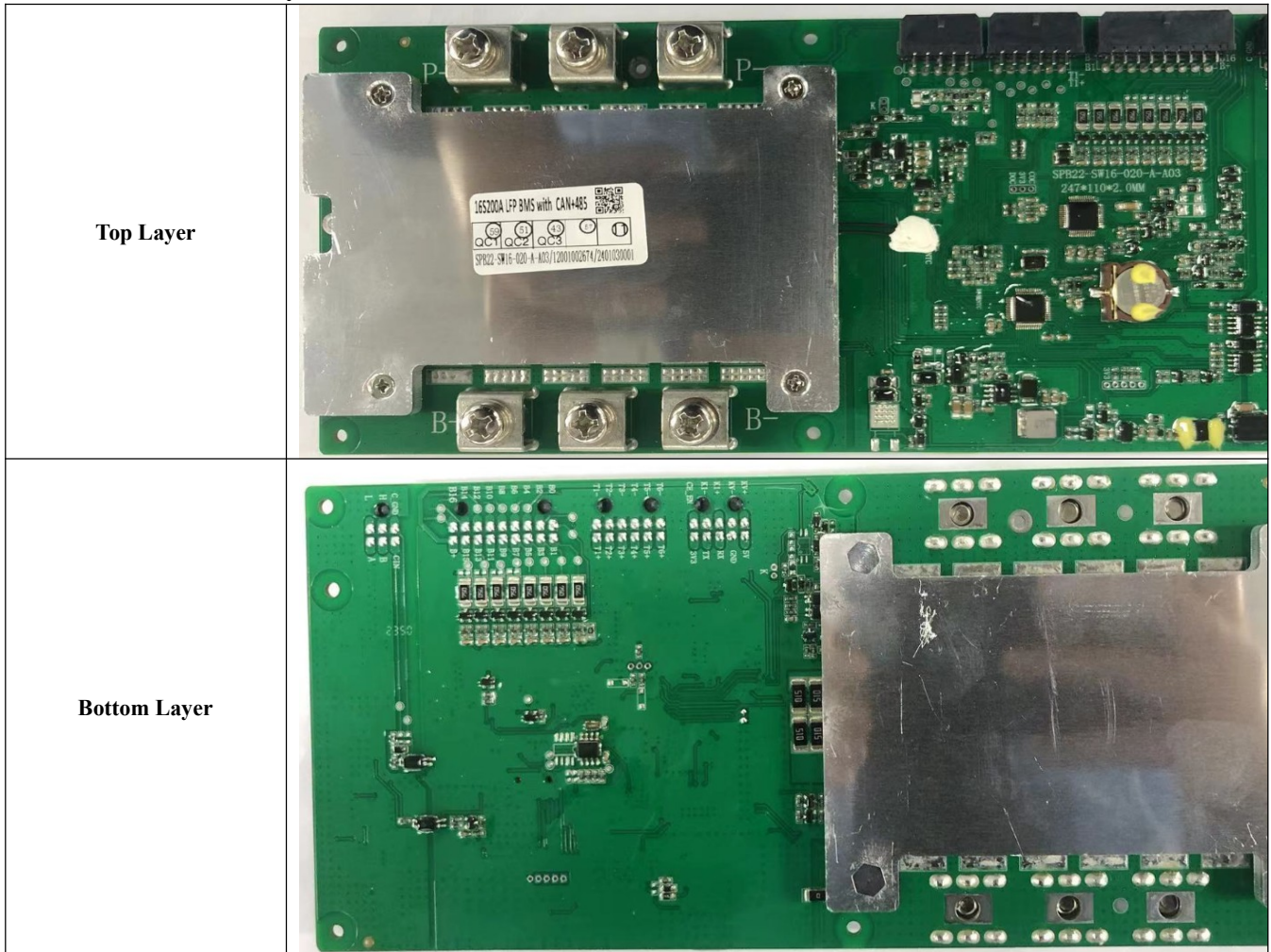
|    |                |                |   |
|----|----------------|----------------|---|
|    |                |                | capacity reaches 80% of the total battery capacity as a cycle         |
|    |                | SOC 0% voltage | 2.60V<br>容量比0%对应的单体电压 Cell voltage corresponding to 0% capacity ratio |
| 21 | 保护板尺寸 BMS size | L*W*H (mm)     | 247 (±0.5) *110 (±0.5) < 25   |

## 7.2 可靠性参数 Reliability parameters

| 序号 S/N | 项目 Item                       | 条件 Condition   |
|--------|-------------------------------|--|
| 1      | 检测精度<br>Detection Accuracy    | 电流检测精度: Current detection accuracy: $\leq (\pm 2\%FSR \pm 0.05A)$<br>电压检测精度: Voltage detection accuracy $\leq \pm 0.3\%FSR \pm 10mV$<br>温度检测精度: Temperature detection accuracy: $\leq 4^{\circ}C$<br>SOC 平均精度: SOC Average Accuracy: $\leq 8\%$  |
| 2      | 电流阈值<br>Current Threshold     | 充电电流: Charge current: 1.6A<br>放电电流: Discharge current: 1.6A  |
| 3      | 失效类型<br>Failure types         | 1. 充电 MOS 失效 1.Charge MOS failure 2. 放电 MOS 失效 2. Discharge MOS failure<br>3. 温度检测失效 3. Temp detect failure 4. 电压检测失效 (电压低于 1.5V 禁止充电) 4. Voltage detect failure ( Voltage<1.5V forbid charge )  |
| 4      | 信息存储<br>Information Storage   | 最大存储 1000 条履历信息, 含保护次数, 当前总电压、电流、温度、SOC、SOH、循环次数及运行状态等。<br>Maximum 1000 pcs record information, including protection times, time point and existing overall voltage, current, temperature, capacity, SOC, SOH, Cycles, operation status, etc.  |
| 5      | 通讯接口<br>Communication Port    | CAN 通讯, 波特率 250Kbps, 支持通讯端口升级程序;<br>RS485 通讯, 波特率 9600bps, 支持通讯端口升级程序<br>UART 通讯, 波特率 9600bps, 蓝牙模块通讯, 支持升级程序。<br>CAN communication, baud rate 250Kbps, support communication port upgrade program;<br>RS485 communication, baud rate 9600bps, support communication port upgrade program; ,<br>UART communication, baud rate 9600bps, Bluetooth module communication, support communication port upgrade program. |
| 6      | SOC 计量 SOC Measurement        | 采用电流积分算法。Using current integration algorithms.   |
| 7      | 短路<br>Short circuit           | 电池包和短路回路内阻不低于 40mΩ, 短路电流不超过 2600A, 使用空气开关短路 50 次。 Impedance between pack and short circuit loop should be no less than 40mΩ, short current less than 2600A, use air break switch to short 50 times.  |
| 8      | 工作环境条件<br>Working environment | 工作温度: Working temp: $-20^{\circ}C \sim 60^{\circ}C$ 推荐: Reccomand: $25^{\circ}C$<br>相对湿度: Relative humidity: $5\% \sim 90\%RH$<br>大气压: ATM: $86kPa \sim 106kPa$ (海拔小于 2km altitude <2km)   |

|   |            |  |
|---|------------|--|
|   | conditions |  |
| 9 | 存储环境条件     | 存储温度:Storage temp: -40℃~85℃                |
|   | Storage    | 相对湿度:Relative humidity. 5%~75%RH           |
|   | condition  | 大气压:ATM:86kPa ~ 106kPa (海拔小于 2km altitude) |

### 7.3 保护板布局图 PCM layout



## 8 Storage and Transportation 储存和运输

### 8.1 Storage 储存

- 8.1.1 The Li-ion battery pack should be stored in a cool , dry and well ventilated area avoiding exposure to heat and high temperatures. Do not place the battery in direct sunlight or heat.  
锂离子电池需保存在阴凉，干燥，通风的环境中，避免接触火源与热源。
- 8.1.2 The battery should be stored in accordance with the manufacturer’ s specifications. Ideally, a temperature of 25+5° C and humidity of 60+15% is recommended.  
电池需按规格书规定温度范围进行储存，最佳储存温度为 25±5℃，最佳湿度为 60±15%。
- 8.1.3 The battery should be stored within the recommended room temperatures with a charge of 20%-40% of rated capacity. In order to avoid over-discharge, we suggest charging and discharging the batteries every three (3) months, then charge to 20%-40% of rated capacity.  
电池应当在室温下存放，应充到 20%至 40%的电量。为防止电池过放，建议每 3 个月按标准充放电方式进

行一次充放电,然后按标准充电方式进行充电至 20%~40%的电量。

## 8.2 Transportation 运输

- 8.2.1 Do not mix the battery products with other cargos.  
请勿与其他货物混合。
- 8.2.2 Do not immerse the battery products in water or allow it to get wet.  
请勿将电池浸入水中或使其受潮。
- 8.2.3 Do not stack battery cartons over 7 high or stack upside down.  
请勿叠放超过 7 层或倒置。
- 8.2.4 The highest temperature in transportation is lower than 65°C.  
最高运输温度不超过 65°C。

## 9 Warning 注意事项

- 9.1 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。

Use proper Electrostatic Discharge (ESD) handling methods to avoid damaging the battery. Exposure to ESD may damage the battery protection devices which may lead to overheating, rupture, explosion and fire.

- 9.2 请在下列条件下正常使用, 否则会过热、着火、性能降低及缩短寿命。

In the normal use of the following conditions, otherwise they will overheat and catch fire, performance and shorten the life.

环境条件 Ambient condition: (T 温度 temperature)

充电 charging: 5~+45°C

放电 discharging: -15~+60°C

- 9.3 为避免人员受伤或财产损坏, 电池应由合适的人员使用。电池应远离婴幼儿和宠物。

Batteries should be handled by qualified personnel only to avoid injuries or property damage. Keep the battery away from children and pets.

- 9.4 若电池泄露, 电解质粘于皮肤或衣服上, 请用水冲洗掉或用流水洗衣服, 否则将会腐蚀皮肤。

Avoid contact with leaking batteries as electrolytes may cause burns to skin and damage to clothing. In the event electrolytes make contact, wash effected areas with water and seek medical attention if necessary.

- 9.5 为了不装错或损耗电池, 请认真阅读使用说明书, 并按照指导进行安装与拆卸(从装置上)。

In order to avoid damage to the battery and devices, carefully read and understand the operating instructions for proper installation, use and removal of the battery in the device.

- 9.6 若电池不长期使用, 请把电池拿出并放于干燥的地方, 否则电器将会被腐蚀电池降低性能和减少寿命。

If the battery is not intended to be used for an extended period of time, remove the battery and store it in a cool dry place per the manufacturer's specifications. This will prevent damage to the appliance while preserving the battery life and performance.

- 9.7 为防止损坏电池或设备, 应保持电池接头触点清洁, 没有任何污染物。请使用合适的清洁产品清洁电池表面和触点, 如干布。

Ensure the battery connector contacts are clean and free of any contaminants to prevent damage to the battery and device. Use only approved cleaning products, such as a dry cloth, to clean surface and contacts.

- 9.8 远离儿童, 不要让儿童在没有成人监督的情况下更换电池。

Keep out of the reach of children, Do not allow children to replace batteries without adult supervision.

## 10 保质期 Quality Guarantee Period

保修期自出厂之日起使用寿命 1500 次或 5 年。如因使用不当造成损坏, 不是由产品质量问题造成的, 即使在保修期内, 生产厂家也不提供免费服务。

The warranty period is 300 times or 1 year from the date of delivery. If the damage caused by improper use is not caused by product quality problems, the manufacturer will not provide free services even within the warranty period.

## 11 Product responsibility 产品责任

您必须严格遵守我司规格书和文件后面的注释使用电池, 由于误用会引起电池过热, 发生火灾或爆炸。对于没有按照规格书进行操作所造成的任何以外事故, 我司不负担任何责任。

You must strictly adhere to our specifications and documentation comment later, due to the misuse of batteries can

cause the battery to overheat, fire or explosion. For the specification for any accidental, I Secretary does not bear any responsibility.

如果规格书、原材料、生产过程或生产控制系统发生改变，改变的信息将会随质量和可靠性数据以书面形式通知消费者。

If the specification, raw materials, production processes or production control system is changed, the change of information will vary depending on the quality and reliability data to inform consumers in writing.

## 12 Others 其他

因为电池是利用化学反应，电池的性能会随时间恶化，即使存放很长一段时间没有被使用。此外，如果使用条件如充电，放电，温度，等不在指定的范围内的电池的寿命可能会缩短或设备中的电池使用的电解质渗漏损坏的可能。如果电池无法保持长时间的充电，即使充电正确，这可能表明是时候更换电池。

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.

## 13 Note 备注

其他项目不包括在本规范应经双方同意。

Any other items which are not covered in this specification shall be agreed by both parties.

## 14 Label 标贴

TBD

## 15 Packaging drawings 包装图纸

TBD