



PRODUCT SPECIFICATION

产品规格书

Lithium Ion Polymer Battery

锂离子聚合物电池

Cell Model

电芯型号: SP546270-3000mAh

Customer Code:

客户编码: LR932

Pack Mode CELL+PCM+Connector

成品方式: 电芯+保护板+插头

Battery P/N

电池料号: _____

| Prepared 编制 | Checked 审核 | Approved 批准 |
|------------------|------------------|------------------|
| 赵其博 2015-12-8 | 刘盛发 2015-12-8 | 韩晓辉 2015-12-8 |

| Customer Approval 客户确认 | |
|---------------------------|------------|
| Signature 签名 | Date 日期 |
| | |

Add: Chaoshun Industrial Zone, Renmin Road, Fumin, Guanlan, Bao'an, Shen Zhen, Guang Dong, China

地址: 中国, 广东省深圳市宝安区观澜镇福民社区人民路超顺工业区

Tel: 86 (0) 755-28010758

Fax: 86 (0) 755-29522241

Website: www.highpowertech.com

电话: 86 (0) 755-28010758

传真: 86 (0) 755-29522241

网址: www.highpowertech.com



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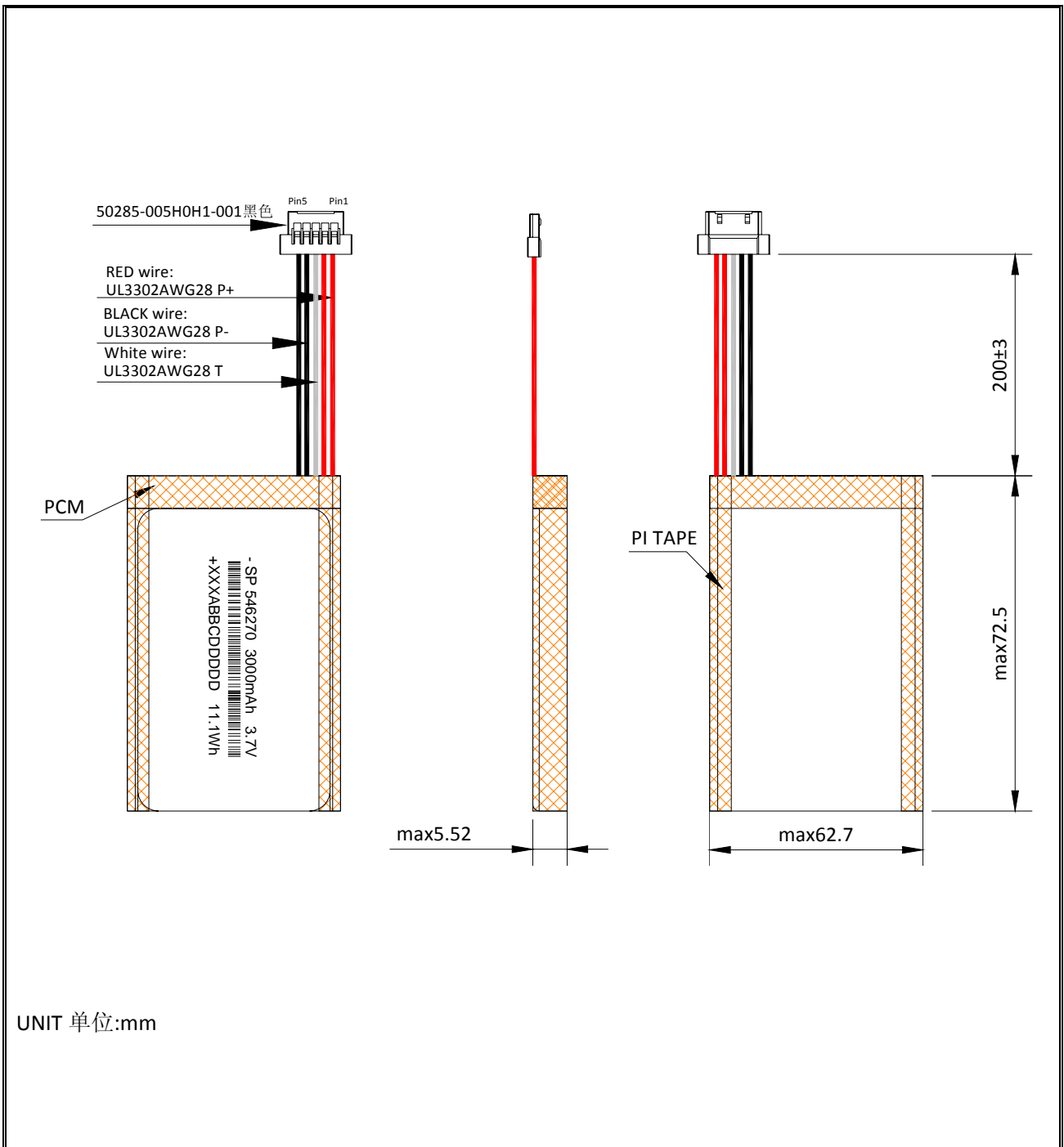


2. Scope 适用范围

This specification is made to describe the product, product characteristics and performance, relevant measurement conditions and methods, and safety Instructions of the Lithium ion polymer cell as specified in following details. The specification only applies to Springpower Technology (Shenzhen) Co., Ltd.

本规格书描述或规定锂离子聚合物电池产品、产品特征、基本性能、相关测试条件和方法、安全使用注意事项等。本标准只适用于曙鹏科技(深圳)有限公司 (简称:曙鹏科技) 所生产的锂离子聚合物电池。

3. Initial Dimension and barcode information 初始尺寸





4. Product Specification 产品规格

| NO. 序号 | Items 项目 | Specifications 规格 | Remark 备注 |
|-----------|--|---|---|
| 4.1 | Capacity 容量 | Typical Capacity 典型容量: 3100mAh Min. Capacity 最小容量: 3000mAh | From 4.2V to 3.0V by discharge current 0.2C. 用0.2C电流从4.2V恒流放电至3.0V。 1.0C=3600mA, nC=n*3600mA. |
| 4.2 | Open Circuit Voltage 开路电压 | 3.7~3.91V | Measure Battery at standard testing condition. 标准测试条件下测量。 |
| 4.3 | Initial Internal Impedance 初始内阻 | ≤200 mΩ | |
| 4.4 | Weight 重量 | Approx 51g 大约 51g | |
| 4.5 | Voltage 电压 | Nominal Voltage 标称电压: 3.7V | |
| | | Fully Charge (FC) Voltage 满充(FC)电压: 4.2V | Defined FC Voltage = 4.2V. 定义 FC 电压= 4.2V. |
| | | Fully Discharge (FD) Voltage 满放(FD)电压: 3.0V | Defined FD Voltage = 3.0V. 定义 FD 电压= 3.0 V. |
| | | Charge Upper Limit Voltage 充电上限电压: 4.25V | |
| | | Discharge Lower Limit Voltage 放电下限电压: 2.8V | |
| 4.6 | Standard Charge Current 标准充电电流 | 0.5C | |
| 4.7 | Standard Charge Method 标准充电方法 | 0.5C CC (constant current) charge to FC Voltage, then CV (constant voltage) charge till charge current decline to 0.01C. 0.5C 恒流充电至 FC 电压, 再以 FC 电压恒压充电至电流降低至 0.01C。 | |
| 4.8 | Charge Time 充电时间 | Approx 3.5 hrs. 大约 3.5 hrs. | With Standard Charge Method. 以标准充电方法充电。 |
| 4.9 | Standard Discharge Method 标准放电方法 | Using 400mA constant current discharge to FD Voltage. 使用 400mA 恒流放电至 FD 电压截止。 | |
| 4.10 | Max. Continuous Charge Current 最大持续充电电流 | 0°C~15°C: 0.2C | |
| | | 15°C~45°C: 0.5C | |



| | | | |
|------|---|---|---|
| 4.11 | Max. Discharge Current 最大放电电流 | -20℃~15℃: 0.2C | |
| | | 15℃~60℃: 0.5C | |
| 4.12 | Storage Temperature 储存温度 | ≤1 month: -20℃~60℃ | The cell should cycle once every 3 months. Recommended storage temperature is 25±2℃ of half charge state . 电芯应该每 3 个月充放电循环一次。储存温度 25±2℃，电芯为半电状态储存。 |
| | | ≤3 months: -20℃~45℃ | |
| | | ≤1 year: -20℃~30℃ | |
| | | The recoverable capacity no less than 80% of the initial capacity. 恢复容量不小于初始容量的 80%。 | |
| 4.13 | Recoverable Capacity Measurement Method 恢复容量测量方法 | Constant current 0.5C charge to FC Voltage, then constant voltage FC Voltage charge to current declines to 0.01C, rest for 10min, constant current 0.5C discharge to FD Voltage, rest for 10min. Repeat above steps 3 times, record the maximum capacity. 先 0.5C 恒流充电至 FC 电压，再以 FC 电压恒压充电至电流下降至 0.01C，搁置 10min，再 0.5C 恒流放电至 FD 电压，搁置 10min。重复以上步骤 3 次，记录最大容量值。 | |
| 4.14 | Storage Humidity 储存湿度 | ≤85% RH | |
| 4.15 | Cosmetic Appearance 外观 | No gas, No rupture, No leakage. 无胀气，无破裂，无漏液 | |
| 4.16 | Standard Testing Condition 标准测试条件 | Temperature 温度: 25±2℃ Humidity 湿度: ≤85%RH Atmospheric Pressure 大气压: 86-106 k Pa | |

Note: (1) From 4.1 to 4.11 and 4.13, the testing condition is following 4.16 (standard testing condition).

(2) If the working condition is out of 4.16, the performance may have some deviation.

备注: (1) 从 4.1 至 4.11, 及 4.13, 测试条件均按照 4.16 (标准测试条件)。

(2) 如果工作条件偏离 4.16, 电池性能可能发生偏移。



5. Electrical Performance 电性能

| No. 序号 | Items 项目 | Test Methods and Condition 测试方法与条件 | Criteria 标准 |
|-----------|-------------------------------------|--|---|
| 5.1 | Rated Capacity 倍率性能 | At item 4.16 condition, charge the cell as per Item 4.7, rest for 10min, then discharge at 0.2C, 0.5C or 1C to voltage FD Voltage, record the discharge time. 在 4.16 条件下, 按 4.7 方式满充电芯后, 搁置 10 分钟, 然后分别用 0.2C、0.5C、1C 电流放电至 FD 电压, 记录放电时间。 | 0.2C: ≥300min (100%) 0.5C: ≥114min (95%) 1.0C: ≥48min (80%) |
| 5.2 | Temperature Characteristics 温度特性 | At item 4.16 condition, charge the cell as per Item 4.7. Stored the recharged cell for 3hrs at 60 ± 2°C, 25±2°C, 0±2°C or -10 ± 2°C, and discharged at 0.2C to FD Voltage at the same temp., record the discharge time. 在 4.16 条件下, 按 4.7 方式满充电芯后, 分别在 60 ± 2°C、25±2°C、0±2°C或-10 ± 2°C下储存电池 3hrs, 然后在相同温度下用 0.2C 将电芯放电至 FD 电压, 记录放电时间。 | 60°C: ≥285min (95%) 25°C: ≥300min(100%) 0°C: ≥ 210min (70%) -10°C: ≥150min (50%) |
| 5.3 | Cycle Life (25°C) 循环性能(25°C) | At item 4.16 condition, constant current 0.5C charge to FC Voltage, then constant voltage FC Voltage charge to current declines to 0.01C, rest for 10min, constant current 0.5C discharge to FD Voltage, rest for 10min. Repeat above steps till continuously discharge capacity higher than 80% of the initial capacity of the cell. 在 4.16 条件下, 先用 0.5 C 将电芯恒流充电至 FC 电压, 再 FC 电压恒压充电直至充电电流下降至≤0.01C; 搁置 10 分钟, 再用 0.5C 电流恒流放电至 FD 电压; 搁置 10 分钟, 重复以上步骤, 直到放电容量降低至初始容量的 80%。 | Cycle times: ≥400 times Thickness swelling rate: ≤8% 循环次数: ≥400 次 循环厚度膨胀率: ≤8% |
| 5.4 | Store Characteristics 储存特性 | At item 4.16 condition, charge the cell as per Item 4.7. No outer loading circuit, store the cell 28days, discharge at 0.2C to FD Voltage, record the discharge time. 在 4.16 条件下, 按 4.7 方式满充电芯后, 无外接负载线路, 电芯搁置 30 天, 然后用 0.2C 恒流放电至 FD 电压, 记录放电时间。 | ≥270min (90%) |

6. Safety Performance 安全性能

| No. 序号 | Item 项目 | Test Methods and Condition 测试方法与条件 | Criteria 标准 |
|-----------|-------------------------|---|-----------------------------------|
| 6.1 | Overcharge Test 过充测试 | At item 4.16 condition, constant current 0.5C discharge to FD Voltage, charge the cell with constant current 3C to voltage 4.6V, then with constant voltage 4.6V till current decline to 0.005C, or the total charge time is over 8hrs. | No fire, No explosion 不起火, 不爆炸 |



| | | | |
|-----|----------------------------|--|----------------------------------|
| | | 在 4.16 条件下，用 0.5C 电流恒流放电至 FD 电压，然后电芯用 3C 电流恒流充电至 4.6V，再用 4.6V 恒压充电至电流下降到 $\leq 0.005C$ ，或者充电时间不小于 8hrs。 | |
| 6.2 | Short-Circuit Test 短路测试 | At item 4.16 condition, charge the cell as per Item 4.7, then connecting the positive and negative terminals of the cell with a circuit load having a resistance load of $80 \pm 20m\Omega$. The temperature of the cell case is to be recorded during the test. Stop the test until the cell surface temperature lower $10^{\circ}C$ than the maximum temperature. 在 4.16 条件下，按 4.7 方式满充电芯后，用内阻为 $80 \pm 20m\Omega$ 的导线连接电芯正负极，测试过程中监测电芯温度，直到电芯表面温度低于峰值温度 $10^{\circ}C$ ，停止实验。 | No fire, No explosion 不起火，不爆炸 |
| 6.3 | Flat Crush Test 平面挤压测试 | At item 4.16 condition, charge the cell as per Item 4.7. Then the cell is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram or similar force mechanism. The flat surfaces are to be brought in contact with the cells' wide sides and the crushing is to be continued until an applied force of $13 \pm 1kN$ (3000 ± 224 lbs) is reached. Once the maximum force has been obtained it is to be released, then rest for 1 hrs at $25 \pm 2^{\circ}C$. 在 4.16 条件下，按 4.7 方式满充电芯后。将电芯放置在两个平行板中间进行挤压。压力通过液压油缸或其它的机械装置实现，平行板表面与电芯的宽面接触，逐渐加压至 $13 \pm 1kN$ (3000 ± 224 lbs)，然后释压， $25 \pm 2^{\circ}C$ 下静置观察 1h。 | No fire, No explosion 不起火，不爆炸 |
| 6.4 | Heating Test 热冲击测试 | At item 4.16 condition, charge the cell as per Item 4.7. Put the cells in the oven, the temperature of the oven is to be raised at $5 \pm 2^{\circ}C$ per minute to a temperature of $130 \pm 2^{\circ}C$ and remain for 10 minutes. 在 4.16 条件下，按 4.7 方式满充电芯后，将电池放进烘箱内，以 $5 \pm 2^{\circ}C/min$ 速度升高烘箱内温度至 $130 \pm 2^{\circ}C$ 后，恒温 10min。 | No fire, No explosion 不起火，不爆炸 |
| 6.5 | Drop Test 跌落测试 | At item 4.16 condition, charge the cell as per Item 4.7. Then cells or batteries were dropped from a height of 1m (3.28ft) to a concrete surface, Each cell is to be dropped once in the positive and negative directions of three mutually perpendicular mounting positions for a total of 6 times, then rest for 1 hrs at $25 \pm 2^{\circ}C$. 在 4.16 条件下，按 4.7 方式满充电芯后，电芯从 1m (3.28 英尺) 的高度自由跌落到水泥地面上；每个电 | No fire, No explosion 不起火，不爆炸 |



| | | | |
|-----|-----------------------------|--|---|
| | | 芯将沿着三个互相垂直轴的正负方向跌落 1 次，总共跌 6 次，然后 25±2℃ 静置观察 1hrs。 | |
| 6.6 | Vibration Test 振动测试 | <p>At item 4.16 condition, charge the cell as per Item 4.7. Cells are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The cell is to be subjected to simple harmonic motion with the amplitude for 0.8 mm (0.03 inch) [1.6 mm (0.06 inch) total maximum excursion]. The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz, and return in not less than 90 no more than 100 minutes. The cell is to be tested in three mutually perpendicular directions. For a cell that has only two axes of symmetry, the sample is to be tested perpendicular to each axis.</p> <p>在 4.16 条件下，按 4.7 方式满充电芯后，将电芯稳固地、有保护地固定在振动平台上，不要扭曲电芯或电池，以便振动能很好的传送。每个电芯或电池经受简单的调谐振动，振幅为 0.8mm(0.03 英寸)[最大双振幅 1.6mm(0.06 英寸)]。振动的频率在 10-55Hz 范围内以 1Hz/min 的速率变化，在 90-100min 内恢复回来，电芯或电池沿 3 个互相垂直的方向振动。对于只有两个对称轴向的电芯或电池，样品应沿垂直于每个轴的方向测试。</p> | No fire, No explosion 不起火，不爆炸 |
| 6.7 | Low Pressure Test 高空模拟测试 | <p>At item 4.16 condition, charge the cell as per Item 4.7. After standard charge ,store for 6h at a absolute pressure of 11.2KPa, next rest for 2hrs at 25±2℃.</p> <p>在 4.16 条件下，按 4.7 方式满充电芯后，在绝对压强为 11.2KPa 下放置 6h, 然后 25±2℃ 搁置观察 2hrs。</p> | No leakage, no fire and no explosion 不漏液，不起火，不爆炸 |

注意：以上安全性能测试应在有保护措施下进行。

7. Protective Circuit 保护电路

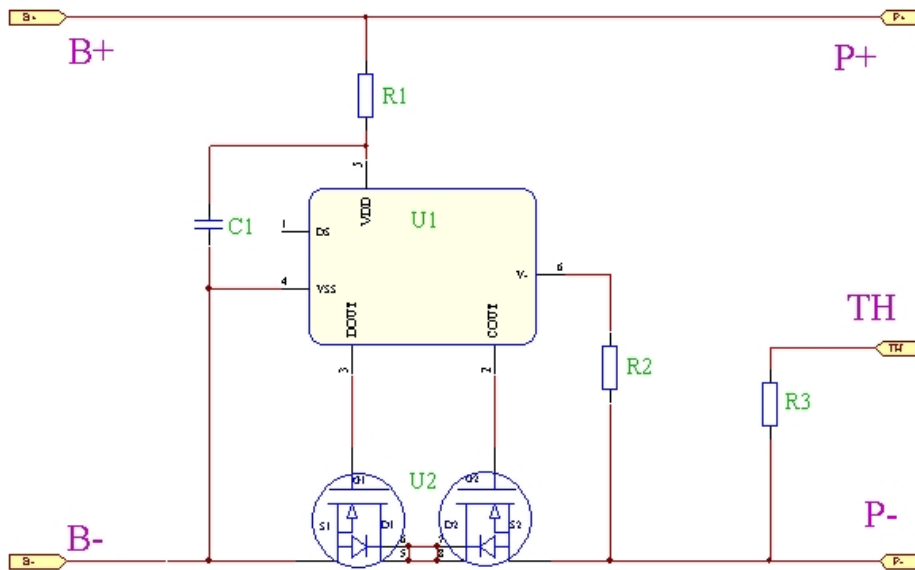
7.1. PCM Parameter PCM 参数

| Item 项目 | MIN.最小值 | Typical 典型值 | MAX.最大值 | Unit 单位 |
|---|---------|-------------|---------|---------|
| Overcharge detection voltage 过充保护电压 | 4.260 | 4.280 | 4.300 | V |
| Overdischarge detection voltage 过放保护电压 | 2.765 | 2.800 | 2.835 | V |
| Charge overcurrent detection current 充电过流保护电流 | 2.6 | | 7.0 | A |
| Discharge overcurrent detection current 放电过流保护电流 | 3.1 | | 6.5 | A |



| | | | | |
|---|------|------|------|----|
| Overcharge detection delay time 过充保护延迟时间 | 0.96 | 1.20 | 1.44 | S |
| Overdischarge detection delay time 过放保护延迟时间 | 120 | 150 | 180 | mS |
| Current consumption during operation 自耗电电流 | -- | -- | 5.5 | uA |
| Internal resistance in normal operation 导通内阻 | -- | -- | 50 | mΩ |

7.2 Schematic diagram 保护板原理图



7.3. Bill of PCB 元件清单

| NO. 序号 | Symbol 符号 | Material Name 物料名称 | Material Specification 物料规格 | Qty 数量 | Manufacturer 制造厂商 |
|-----------|--------------|-----------------------------------|--------------------------------|-----------|----------------------|
| 1 | U1 | Control IC 控制 IC | MM3511C66YRE | 1 | Mitsumi |
| 2 | U2 | MOSFET 场效应管 | STC8697 | 1 | Samhop |
| 3 | R1 | Resistance 电阻 | 330Ω, ±5%, 1/16W | 1 | / |
| 4 | R2 | Resistance 电阻 | 2.2KΩ, ±5%, 1/16W | 1 | / |
| 5 | R3 | SMD NTC 贴片 NTC | ECTH100505 103F 3435FST | 1 | / |
| 6 | C1 | Capacitance 电容 | 0.1uF, -20% +80%, 16V | 1 | / |
| 7 | B+/B- | Nickelated steel plate 镍片 | / | 2 | / |
| 8 | PCB | Printed circuit board 印刷电路板 | / | 1 | / |



8 Danger 危险

- ◇ Do not immerse the battery in liquid such as water, beverages, or other fluids.
禁止将电池浸入如水、饮料或其它液体中。
- ◇ Do not use or place the battery near an fire, heater or high temperature environment (above 80°C).
禁止在靠近火、加热器或高温(>80°C)环境中使用或搁置电池。
- ◇ Do not use unauthorized chargers.
禁止使用未经授权的充电器。
- ◇ Do not attach or insert battery with polarity reversed.
禁止将电池极性反转连接。
- ◇ Do not connect the battery to an AC outlet or DC automotive plug.
禁止将电池连接到 AC 插座或 DC 的汽车充电插座。
- ◇ Do not use the battery in equipment for which it was not intended.
禁止将电池使用在其它装置或设备中。
- ◇ Do not incineration the battery in fire or heat it.
禁止焚烧电池或对其进行加热。
- ◇ Do not short-circuit the battery by directly connecting the positive and negative terminal with metal object such as wire.
禁止使用导线等金属物体直接连接电池正负极短路电池。
- ◇ Do not excessive impact to the battery such as striking, throwing, trampling, etc.
禁止撞击、抛掷、践踏等对电池的过度机械冲击。
- ◇ Do not penetrate the battery with a nail or other sharp object.
禁止使用钉子或其它尖锐物体刺穿电池。
- ◇ Do not disassemble the battery.
禁止拆解电池。
- ◇ Do not charge the battery at high temperature (>45°C) or discharge it at high temperature (>60°C).
禁止在高温下对电池充电(>45°C)、和放电(>60°C)。

9 Warning 警告

- ◇ Keep the battery away from small children. If the battery or any of its component parts is swallowed, seek medical attention immediately.
将电池放在小孩够不到的地方。如果电池或者电池任意部件被小孩吞食，必需立刻就医。
- ◇ Do not place the battery in or near a microwave or other cooking appliances. If subjected to heat or strong electromagnetic radiation, the battery may leak, generate heat, smoke, catch fire, or explode.
禁止将电池放在靠近微波设备或其它烹饪装置附近，如果电池被加热或受到强电磁辐射，可能发生漏液、发热、冒烟、着火等。
- ◇ Do not mix with other batteries. The battery should not be used with other batteries having a different capacity, chemistry, or manufacturer. Doing so could cause the battery to generate heat, smoke, catch fire, or explode.
禁止与其它电池混用。因与其它电池有不同的容量、化学成分、制造工艺等，相互混用可能会发热、冒烟、着火等。
- ◇ Immediately remove it from the device or charger, and stop using it, if there are noticeable abnormalities, such as smell, heat, discoloration, or deformity. The battery may be defective and could generate heat, smoke, catch fire, or explode with continued use.
如果电池在使用或贮存中有明显异常，如发出异味、发热、变色、变形，或者是在充电过程中出现任



何异常现象，立即将电池从使用装置或充电器中移开，并停止使用。电池可能有缺陷，继续使用可能导致发热、冒烟、着火等。

- ◇ Stop charging if the charge process cannot be finished within the specified time.
如果充电不能在规定的时间内完成，停止充电。
- ◇ Do not use a leaking battery near open flame.
禁止将漏液电池靠近火源。
- ◇ Do not touch a leaking battery. If liquid leaking from the battery gets into your eyes, immediately flush your eyes with clean water and seek medical attention. If left untreated, it will cause significant eye damage.
禁止触摸漏液电池。如果电解液不小心进入眼睛，请不要揉擦，应马上用清水冲洗眼睛，并立即送医院治疗，否则会伤害眼睛。
- ◇ To prevent short-circuit or damage during transport or store, securely pack the battery in a case or carton. Do not transport and store the battery together with metal objects such as necklaces, hairpins, etc.
防止在运输和存放过程中短路或损坏电池，必需将电池安全包装在盒子或纸箱中。不要与金属物体如项链、发夹等一起运输和存储。

10 Caution 注意

- ◇ Read the manual before use. Keep for future reference.
电池使用前注意阅读使用手册，并保存手册便于以后查阅。
- ◇ Do not use or leave the battery at very high temperature (>60°C, for example, at strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.
禁止在高温下(>60°C，如直射的阳光下或很热的汽车中)使用或搁置电池，否则可能会引起电池过热、起火或功能失效，或者导致电池寿命减短或损坏电池。
- ◇ Do not use the battery where static electricity in excess of 1000V is generated as it may damage the protection circuit, and cause hidden trouble of safety.
禁止在发电超过 1000V 的静电环境使用电池，否则可能破坏电池保护电路，导致不安全的隐患发生。
- ◇ Only charge the battery between 0°C and 45°C. Charging outside of this temperature range may cause the battery to leak, generate heat, or result in serious damage. It may also cause the battery's performance and life to deteriorate.
电池只能在 0°C~45°C 温度范围充电。超出此温度范围可能导致电池漏液、发热，或导致电池严重的损坏。它也可能导致电池的性能和寿命的恶化。
- ◇ Read the charger's manual before use for proper charge method.
在充电前仔细阅读充电器使用说明，使用正确的充电方法。
- ◇ Please contact the supplier if the battery gives off an unusual odor, generates heat, or shows signs of rust prior to its initial use.
在首次使用前，如果电池发出明显的异味、发热或锈蚀迹象，请联系电池供应商。
- ◇ Parents must explain how to use the system and the battery. Please check back periodically to ensure children are using the system and the battery correctly.
给小孩使用前大人必须讲解清楚如何使用设备和电池，并定期跟踪确认，以确保小孩正确使用。
- ◇ Do not charge or discharge near flammable materials. Doing so could result in fire.
请不要靠近易燃材料充放电电池，否则可能产生起火隐患。
- ◇ If electrolyte leaks from the battery and comes into contact with skin or clothing, immediately flush with water. Otherwise, it may cause skin irritation.
如果电解液从电池漏出并接触到皮肤或衣服，立即用水冲洗，否则导致刺激皮肤。



- ◇ If the battery pack have a system interface consisting of stripped lead wires or exposed contact plates, handle with due care. Temporarily insulate exposed contacts and conductors with an insulator such as polypropylene tape or polyvinylchloride tape. Failure to do so could result in an electrical shock, a short circuit causing the battery to generate heat, smoke, catch fire, or the combustion of other materials.
如果电池组有一个由剥离导线或暴露的接触板组成的系统接口，应谨慎操作。可暂时用聚丙烯胶带或聚氯乙烯胶带隔离暴露接触导体与绝缘体。不这样做可能会导致触电，短路造成电池发热、冒烟、着火，或其它材料的燃烧。
- ◇ When disposing of the battery, be aware discharged battery may cause fire, tape the terminals to insulate them. Recycle it according to local rules and regulations.
处理电池时，注意带电的电池可能会造成火灾，应该用胶带将电路端子隔离。根据当地法规回收。
- ◇ In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.
如果电池电路端子弄脏，使用前应用干布抹净，否则可能会因接触不良而影响性能失效。
- ◇ The batteries should be stored at room temperature, charged to about 40% to 60% of capacity. In case of over-discharge, batteries should be charged to 3.90V with standard charge method for one time every 3 months while storing and batteries should be charge-discharged with standard method for one time after being stored more than one year in order to activate it and restore energy.
电池应当在室温下存放，应充电到 40%~60%的电量。为防止电池过放，建议每 3 个月按标准充电方式进行充电至 3.90V。如储存时间超过一年，建议每年按标准充放电方式进行一次充、放电循环以激活电池。

11 Handling of Cells 电池操作注意事项

1) Soft aluminum packing foil（铝塑膜软包装）

The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs and needles, do not strike battery with any sharp edge parts.

电池外包装铝塑膜易被镍片、尖针等尖锐部件损伤，禁止用尖锐部件碰伤电池。

- ◇ Do not strike cell with any sharp edge parts 勿用尖锐处撞击电池。
- ◇ Trim your nail or wear glove before taking cell 剪掉指甲，或者戴手套。
- ◇ Clean worktable to make sure no any sharp particle 清理工作台，避免尖锐零部件碰伤电池。

(2) Sealed edge may be damaged by heat above 100°C, bend or fold sealed edge.

电池封边被加热到 100°C 以上以及弯折封边都容易使封边受损。

(3) Prohibition short circuit（禁止电池短路）

Never make short circuit cell. It generates very high current which causes heating of the cells, and may cause electrolyte leakage, gassing or explosion that is very dangerous.

避免电池短路。短路会产生很大的电流而使电池发热以及电解液泄漏，产生有毒气体或燃烧，是非常危险的。

The lithium ion polymer cell tabs may be easily short-circuited by putting them on conductive surface. Such outer short circuit may lead to heat generation and damage of the cell. An appropriate circuitry with PCM shall be employed to protect accidental short circuit of the battery pack.

电芯正负极耳连接在导电物体表面很容易短路，外部短路会导致发热及损害电池。选用一个合适的保护电路可以在意外短路时保护电池。

(4) Mechanical shock（机械撞击）

Lithium ion polymer cells have less mechanical endurance than metal-can-cased lithium ion cell.

聚合物电池比金属壳方形电池的机械耐久性更小。



The actions such as Falling, hitting, bending may cause degradation of lithium ion polymer cell characteristics.

跌落、碰撞、弯曲等等都可能会降低聚合物电池的性能。

(5) Handling of Tabs (极耳操作注意事项)

The cell tabs are not so stubborn especially for aluminium tab. Do not bend tabs unnecessarily.

极耳的机械强度并非异常坚固，特别是铝极耳。没有必要时禁止弯折极片。

12 Notice for Designing Battery Pack 电池外壳设计注意事项

((1) Pack Toughness (外壳坚韧度)

Battery pack should have sufficient strength and the lithium ion polymer cell inside should be protected from mechanical shocks.

电池外壳应该有足够的机械强度，避免聚合物电池受机械撞击。

(2) Cell Fixing (电池的固定)

The lithium ion polymer cell should be fixed to the battery pack by its large surface area.

No cell movement in the battery pack should be allowed.

电池最大面积的一面应该固定在外壳上，安装后电池不能有松动。

(3) Inside Design (外壳内部设计)

No sharp edge components should be insides the pack containing the lithium ion polymer cell.

外壳内安装电池的部位不应有锋锐边。

(4) To prevent the cell short circuit avoiding the cell's tabs, components of the PCM and some electrically conductive components to contact the aluminium layer edge of the cell pouch.

避免电池的正负极耳或其它导电物质接触电芯铝塑膜包装切口边缘。

(5) Tab Connection (极耳连接)

Ultrasonic welding or spot welding is recommended for lithium ion polymer cell tab connection method.

Battery pack should be designed that shear force are not applied to the lithium ion polymer cell tabs.

If apply manual solder method to connect tab with PCM, below notice is very important to ensure cell performance:

建议使用超声波或点焊焊接方法；外壳设计应使极耳不受外力。

如果使用人工焊接保护板，下面的注意事项对于确保电池性能非常重要：

◇ The solder iron should be temperature controlled and ESD safe;

焊接烙铁的温度必须可控且可防静电；

◇ Soldering temperature should not exceed 370°C;

焊接时烙铁的温度不能超过 370°C；

◇ Soldering time should not be longer than 3s;

焊锡时间不能超过 3 秒钟；

◇ Re-soldering times should not exceed 5 times, Keep cell tab cold down before next time soldering;

焊锡次数不能超过 5 次，待极片冷却后才能进行下一次焊锡；

◇ Directly heat cell body is strictly prohibited, cell may be damaged by heat above 60°C.

严禁直接加热电芯，高于 60°C 会损害电芯。

13 Guarantee Period of Quality 保质期

Guarantee period of quality is one year from the date of shipment. Springpower guarantees to give a replacement in case of cell with defects proven due to manufacturing process instead of the customer's abuse.

电池的保质期从出货之日算起为一年。如果证明电池的缺陷是在我们公司制造过程中造成的而不是客户



错误使用造成, 本公司负责退换电池。

14 Others 其它事项

(1) The customer is requested to contact Springpower in advance, if the customer needs other applications or operating conditions out of those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

客户若需要将电池用于超出文件规定以外的设备, 或在文件规定以外的使用条件下使用电池, 应事先联系曙鹏科技, 因为需要进行特定的实验测试以验证电池在该使用条件下的性能及安全性。

(2) Springpower will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

对于在超出文件规定以外的条件下使用电池而造成的任何意外事故, 曙鹏科技概不负责。

(3) Springpower will inform the customer in a written form regarding proper use and handing of the cell, if it is necessary.

如有必要, 曙鹏科技会以书面形式告之客户有关正确操作使用电池的改进措施。

(4) Any matters that this specification does not cover should be conferred between the customer and Springpower.

任何本说明书中未提及的事项, 须经双方协商确定。

(5) Product comply with 《Hazardous substances control standards of Highpower Green Product》.

产品符合《豪鹏集团绿色产品有害物质管制标准》。

15. Appendix. 附录

