



Li-ion Polymer Battery

Specification (Temporary)

锂离子聚合物电池规格书 (临时)

Pack Type	CELL+PCM+ Connector
组合类型:	电芯+PCM+插头
Cell Model	
电芯型号:	933845
Capacity (mAh)	
容量(mAh):	1700
Customer Code	
客户代码:	LE832
Total Page	
档页数:	12

Registered 编制	Checked 审核	Approved 批准
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Customer Approve 客户确认		
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1. MODIFIED LIST

修订履历

Product Modified Record List

产品变更履历表

Revision 版本	Date 日期	Mark 标记	Modified content 变更内容	Approved by 批准
A0	2014-12-15	/	NEW RELEASE	/
	2015-5-8	/	增加NTC线焊接位置打黄胶	
	2015-7-2	/	1、电池加贴双面胶和 PORON; 2、增加曲线图。	
	2015-11-25	/	增加垃圾桶标识贴纸	
	2016-1-6	/	1、电芯喷码改到背面; 2、海绵垫改规格。	
	2016-06-07	/	更新垃圾桶喷码	
	2016-09-21	阴影	更新充放电信息	

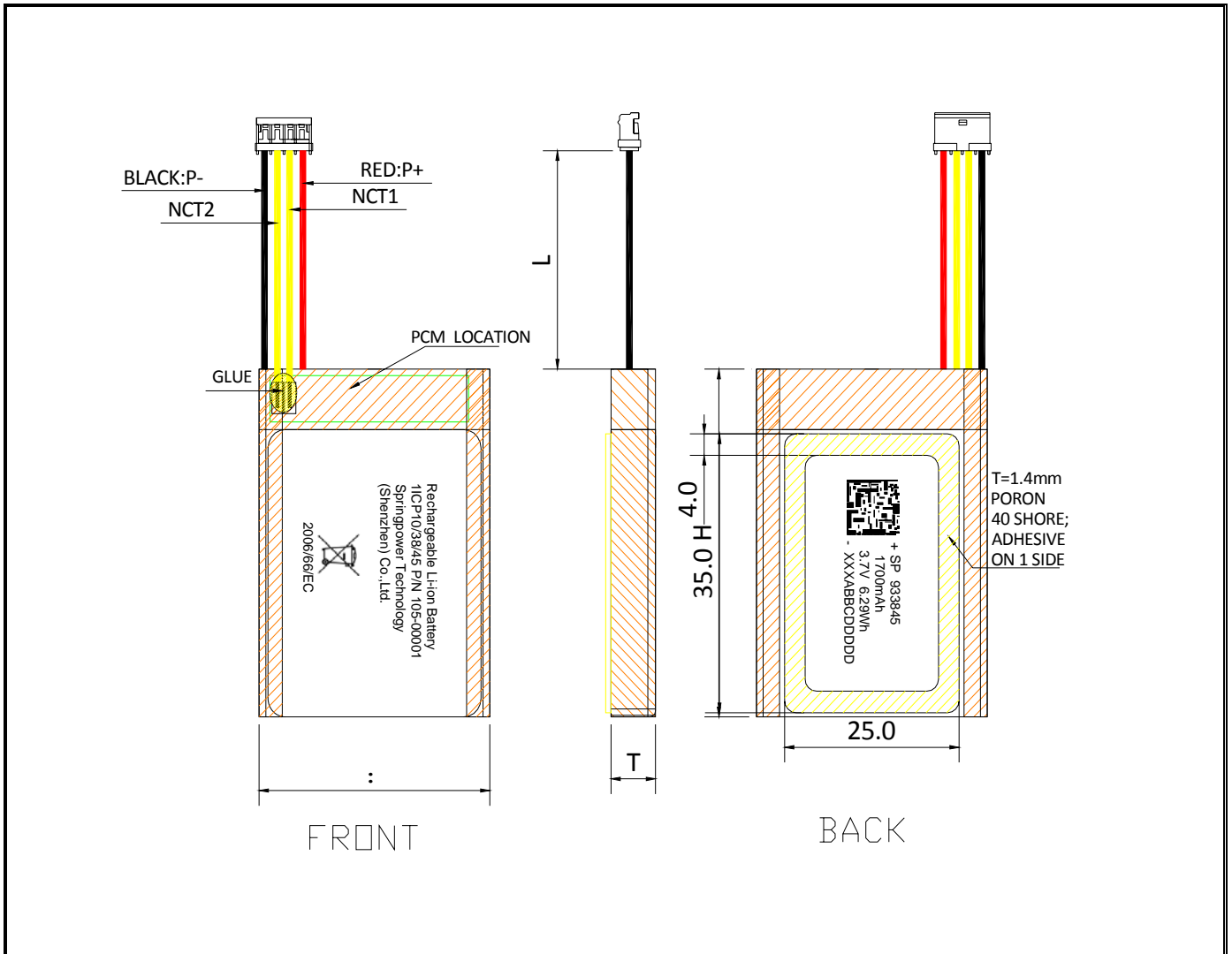


2. Scope 适用范围

This specification describes the basic performance, technical requirement, testing method ,warning and caution of the Li-ion Polymer rechargeable battery pack, the pack defined in this documentation is an assembly which include battery, PCM and wire, the specification only applies to Shenzhen SpringPower battery Co Ltd.

本标准规定了锂聚合物可充电电池的基本性能、技术要求、测试方法及注意事项，电池组合定义的是包括电芯，保护板和连接线的组合，本标准只适用于曙鹏科技（深圳）有限公司所生产的锂聚合物电池。

3. Initial Dimension 初始尺寸



Unit 单位 (mm)					
T (厚度) Max	9.4	W (宽度) Max	38.0	H (高度) Max	47.5
T (厚度, 循环 300 次 后)Max	10.0	L(线长)	20±3	Wire 线材:UL3302/26#	Connector 插头: molex87439-0400
PCM(保护板)	MM3511C46YRE/ WNMD2162				



4.Specification 产品规格

NO.	Item 项目	Specifications 规格要求
4.1	Typical Capacity 典型容量 Min. Capacity 最小容量	1780 mAh 0.2C Discharge (0.2C 放电) 1700mAh 0.2C Discharge (0.2C 放电)
4.2	Initial impedance 初始内阻	≤150mΩ
4.3	Weight 重量	Approx(约): 34g
4.4	Nominal voltage 标称电压 Fully charge voltage(FC) 满充电电压 FC Fully discharge voltage(FD) 满放电压 FD	3.7V 4.20 V Defined in this DOC: FC = 4.20 V 3.0 V Defined in this DOC: FD = 3.0 V
4.5	Standard charge current 标准充电电流	0.5C
4.6	Standard charging method 标准充电方法	0.5C CC (constant current) charge to FC, then CV(constant voltage FC)charge till charge current decline to ≤0.01C 0.5C CC (恒流) 充电至 FC, 再 CV (恒压 FC) 充电直至充电电流≤0.01C
4.7	Charging time 充电时间	Standard charging (标准充电) Approx 3.5hours 大约 3.5 小时
4.8	Standard discharge current 标准放电电流	Constant current 0.2C, end voltage FD 持续电流: 0.2C, 截止电压: FD
4.9	Max. charge current 最大充电电流	0°C~15°C 0.2C (Constant Current 持续电流)
		15°C~45°C 1.2A (Constant Current 持续电流)
		45°C~60°C 0.5C (CC charge to 4.1V end current 0.01C 持续电流充电至 4.1V 截止电流为 0.01C)
4.10	Max. discharge current 最大放电电流	-20°C~15°C 0.2C (Constant Current 持续电流)
		15°C~60°C 2.0A (Peak Current 峰值电流) 1.5A (Constant Current 持续电流)
4.11	Charge upper limit voltage 充电上限电压	Ref. 8.1 VDET1 同过充保护电压
4.12	Discharge lower limit voltage 放电下限电压	Ref. 8.1 VDET2 同过放保护电压
4.13	Storage temperature 储存温度	-20°C~60°C ≤1 month
		-20°C~45°C ≤3 month
		-20°C~30°C ≤1 year
4.14	Recoverable capacity 恢复容量	Percentage of recoverable capacity no less than 80% of the initial capacities 恢复容量不低于初始容量的 80%
4.15	Storage humidity 储存湿度	≤85% RH
4.16	Appearance 外观	Without distortion and leakage 无变形、电解液泄露
4.17	Standard testing condition 标准测试环境	Temperature(温度) : 25±5°C Humidity (湿度) : ≤85%RH Atmospheric pressure (大气压) : 86-106 Kpa

Remark: 1.From 4.1 to 4.12, the testing condition is following 4.17 (standard testing condition)

从 4.1 至 4.12 项目, 测试环境遵从 4.17 (标准测试环境)

2.Operating temperature (使用温度): charging(充电) 0°C~45°C; Discharging (放电): -10°C~60°C

If the working condition is out of 4.17, the performance will be some shift.

如果工作环境超出 4.17 范围, 性能将会有一些偏移。



5 General Performance 常规性能

No.	Item 项目	Test Methods and Condition 测试方法和条件	Criteria 标准
5.1	Rated Capacity 倍率性能	At item 4.17 condition, charge the cell as per Item 4.6, rest for 10min, then discharge at 0.2C, 0.5C or 1C to voltage FD Voltage, record the discharge time. 在 4.17 条件下, 按 4.6 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: ≥54min (90%)
5.2	Temperature Characteristics 温度特性	At item 4.17 condition, charge the cell as per Item 4.6. 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 4.17 条件下, 按 4.6 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 4.17 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 4.17 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 rate: ≤8% 循环 400 次以上, 厚度膨胀率小于 8%
5.4	Store Characteristics 储存特性	At item 4.17 condition, charge the cell as per Item 4.6. No outer loading circuit, store the cell 28days, discharge at 0.2C to FD Voltage, record the discharge time. 在 4.17 条件下, 按 4.6 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 Safe Characteristic 安全性能

No.	Item 项目	Test Methods and Condition 测试方法和条件	Criteria 标准
6.1	Overcharge Test (NO PCM) (无保护板) 过充测试	At item 4.17 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. 在 4.17 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 ≤0.005C, 或者充电时间不小于 8hrs。	No fire, No explosion 不起火, 不爆炸
6.2	Flat Crush Test 平面挤压测试	At item 4.17 condition, charge the cell as per Item 4.6. 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±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±5 °C. 在 4.17 条件下, 按 4.6 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 ±1kN (3000 ±224 lbs), 然后释压, 25±5 °C 下静置观察 1h。	No fire, No explosion 不起火, 不爆炸



6.3	Heating Test 热冲击测试	At item 4.17 condition, charge the cell as per Item 4.6. Put the cells in the oven, the temperature of the oven is to be raised at 5±2°C per minute to a temperature of 130±2°C and remain for 10 minutes. 在 4.17 条件下, 按 4.6 方式满充电芯后, 将电池放进烘箱内, 以 5±2°C/min 速度升高烘箱内温度至 130±2°C 后, 恒温 10min。	No fire, No explosion 不起火, 不爆炸
6.4	Drop Test 跌落测试	At item 4.17 condition, charge the cell as per Item 4.6. 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±5°C. 在 4.17 条件下, 按 4.6 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±5°C 静置观察 1hrs。	No fire, No explosion 不起火, 不爆炸
6.5	Vibration Test 振动测试	At item 4.17 condition, charge the cell as per Item 4.6. 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. 在 4.17 条件下, 按 4.6 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。	No fire, No explosion 不起火, 不爆炸
6.6	Low Pressure Test 高空模拟测试	At item 4.17 condition, charge the cell as per Item 4.6. After standard charge ,store for 6h at a absolute pressure of 11.2KPa, next rest for 2hrs at 25±5°C. 在 4.17 条件下, 按 4.6 方式满充电芯后, 在绝对压强为 11.2KPa 下放置 6h, 然后 25±5°C 搁置观察 2hrs。	No leakage, no fire and no explosion 不漏液, 不起火, 不爆炸

※ Above testing of safe characteristic must be with protective equipment.(安全性能测试应在有保护措施下进行)

7. Battery Protection 电池保护

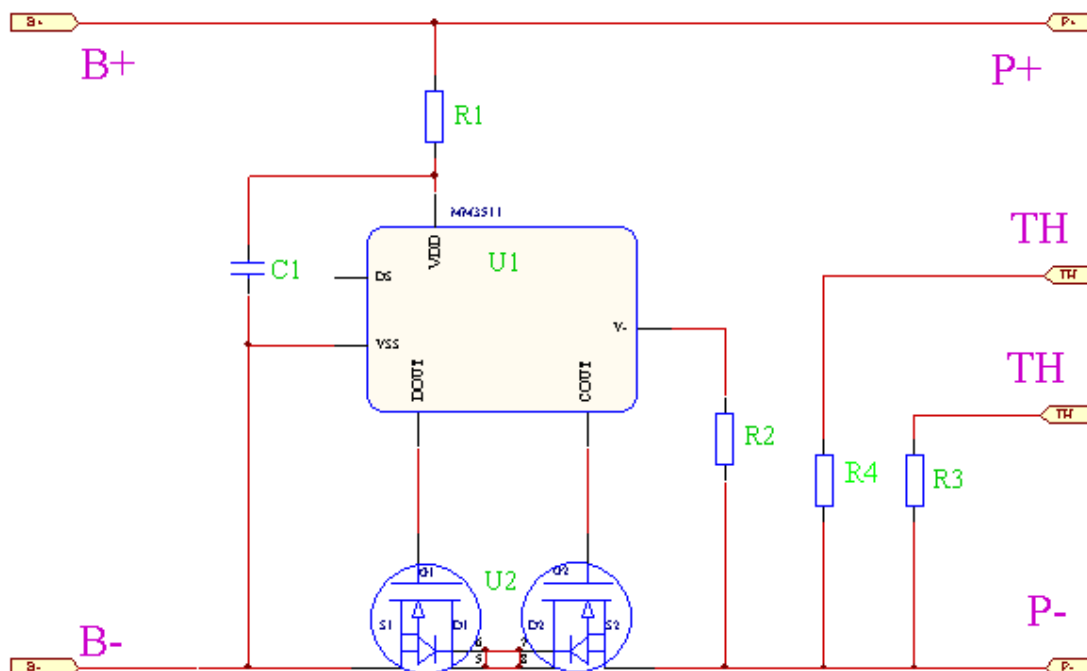
7.1 PCM Standard (保护板标准)

Symbol (符号)	Name (名称)	MIN. (最小值)	Typical. (典型值)	MAX. (最大值)	Unit (单位)
VDET1	Over-Charge detect voltage (过充电保护电压)	4.260	4.280	4.300	V
VDET2	Over-discharge detect voltage (过放电保护电压)	2.765	2.800	2.835	V
ODC	Over-discharge Current protect (放电过流保护值)	3.1	--	5.7	A
IDD	Supply current (自耗电流)	--	--	5.5	μA



RD	Internal resistance in normal operation (导通内阻)	--	--	65	mΩ
----	--	----	----	----	----

7.2. Schematic diagram(原理图)



7.3 Parts list(主要元件清单)

器件编号 Location	描述 Description	规格/part No. Specification	数量 Qty	供应商 Vendor	备注 Remark
U1	贴片保护 IC Protection IC	MM3511C46YRE	1	MITSUMI	
U2	贴片 MOSFET SMD MOSFET	WNMD2162	1	WILL	
R1	贴片电阻 SMD Resistance	330Ω, ±5%	1		
R2	贴片电阻 SMD Resistance	2.2KΩ, ±5%	1		
R3, R4	贴片 NTC SMD NTC	10KΩ, ±1%, B=3435K, ±1%	2		
C1	贴片电容 SMD Capacitance	0.1uF, -20% +80%	1		
B+,B-	Nicel plate 镍片		2		
PCB	Circuit board 线路板		1		



8. Warnings 警告

Load circuit may cause voltage and current, and the voltage or current may add to pack, the voltage or current must be controlled as lower than RWV and RWI, larger voltage or current may damage the PCM of pack.

☆负载可能产生电压和电流,该电压和电流会反加在电池组合(含PCM)上,该电压和电流不能超过保护板自身反向耐压耐流值,过高电压或电流会损坏电池组合中的保护板。

To prevent the possibility of the pack from leaking, heating, fire .please observe the following precautions:

☆为防止电池组合可能发生的泄漏,发热,起火,请注意以下预防措施:

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

☆ 电池组合外包装膜易被镍片,尖针等尖锐部件损伤,禁止用尖锐部件碰伤电池.

Do not immerse the pack in water and seawater

☆ 严禁将电池组合浸入海水或水中.

Do not use and leave the pack near a heat source as fire or heater

☆ 禁止将电池组合在热高温源旁,如火,加热器等使用设备.

When recharging, use the battery charger specifically for that purpose

☆ 充电时请选用锂离子电池专用充电器.

Do not reverse the positive and negative terminals

☆ 禁止颠倒正负极使用电池组合

Do not connect the pack to an electrical outlet

☆ 禁止将电池组合直接接入电源插座

Do not discard the pack in fire or heat it

禁止将电池组合丢入火或加热器中

Do not short-circuit the pack by directly connecting the positive and negative terminal with metal object such as wire

☆ 禁止用金属直接将电池组合的正负极进行短路连接.

Do not transport and store the battery together with metal objects such as necklaces, hairpins etc.

☆ 禁止将电池组合与金属,如发夹,项链等一起运输或贮存.

Do not strike or throw the pack.

☆ 禁止敲击或抛掷,踩踏电池组合等.

Do not directly solder the battery pack or cell(except the cable and tab)and pierce the battery with a nail or other sharp object.

☆ 禁止直接焊接电池组合或电芯(除引线和极耳外),禁止用钉子或其它利器刺穿电池组合或电芯.

9. Cautions 注意

Do not use or leave the pack at very high temperature (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(直热的阳光下或很热的汽车中)使用或放置电池组合,否则可能会引起电池过热,起火或功能失效,从而导致电池组合寿命减短.

Do not use or leave the pack at very high temperature (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(直热的阳光下或很热的汽车中)使用或放置电池组合,否则可能会引起电池过热,起火或功能失效,从而导致电池组合寿命减短.



Do not use it in a location where static electricity is great, otherwise, the safety devices in the pack may be damaged, which will cause hidden trouble of safety.

△ 禁止在强静电和强磁场的地方使用,否则易破坏电池组合的安全保护装置,带来不安全隐患.

If the pack leaks and the electrolyte get into the eyes, do not rub eyes, instead, rinse the eyes, with clean running water, and immediately seek medical attention. Otherwise, eye injury can result.

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

If the pack takes off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charge and stop using it.

△ 如果电池组合在使用或贮存中发出异味,发热,变色,变形,或者是在充电过程中出现任何异常现象,立即将电池从充电器或装置中移开,并停止使用.

In case the pack 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.

△ 如果电池组合的连接点弄脏,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.

Be aware discharged battery may cause fire or smoke, tape the terminals to insulate them.

△ 废弃之电池应用绝缘纸包住电极,以防起火,冒烟.

The pack should be stored at room temperature, charged to about 40% to 60% of capacity. In case of over-discharge, pack should be charged for one time every 3 months while storing and batteries should be discharge and charge after being stored more than a year in order to activate it and restore energy.

△ 电池组合应当在室温下存放,应充到 40%至 60%的电量。为防止电池过放,建议每 3 个月进行一次充电,如储存时间超过一年,建议每年进行一次充、放电以启动电池。

10. Handling of Cells 电池操作注意事项

1 Soft Aluminum foil (铝箔软包装)

Easily damaged by sharp edge parts such as pins and needles, Ni-tabs, comparing with metal-can-cased LIB.

相对于金属壳的方形电池,铝箔软包装比较容易被锐利部件刺损,如针尖、镍带。

△ Don't strike battery with any sharp edge parts 勿用尖锐处撞击电池。

△ Trim your nail or wear glove before taking battery 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。



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

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 pack circuit. It generates very high current which causes heating of the cells and may cause electrolyte leakage, gassing or explosion that are very dangerous. The LIP 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.

避免电池短路。短路会产生很高的电流而使电池发热以及电解液泄漏，产生气体或爆炸是非常危险的。极片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。

4 .Mechanical shock (机械撞击)

△LIP cells have less mechanical endurance than metal-can-cased LIB.

△Falling, hitting, bending, etc. may cause degradation of LIP characteristics.

聚合物电池比金属壳方形电池的机械耐久性更小。

跌落、碰撞、弯曲等等都可能会降低聚合物电池的性能。



11.Period of Warranty 保质期

The period of warranty is one year from the date of shipment. SpringPower guarantees to give a replacement in case of battery with defects proven due to manufacturing process instead of the customer abuse and misuse.

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滥用或错误使用造成，本公司负责退换电池。

12. Others 其它事项

1. The customer is requested to contact SpringPower in advance, if and when the customer needs other applications or operating conditions than 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档规定以外的应用，或在档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核实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 battery is used under other conditions than those described in this Document.

对于在超出档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, in a written form, the customer of improvement(s) regarding proper use and handing of the battery, if it is deemed 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 》

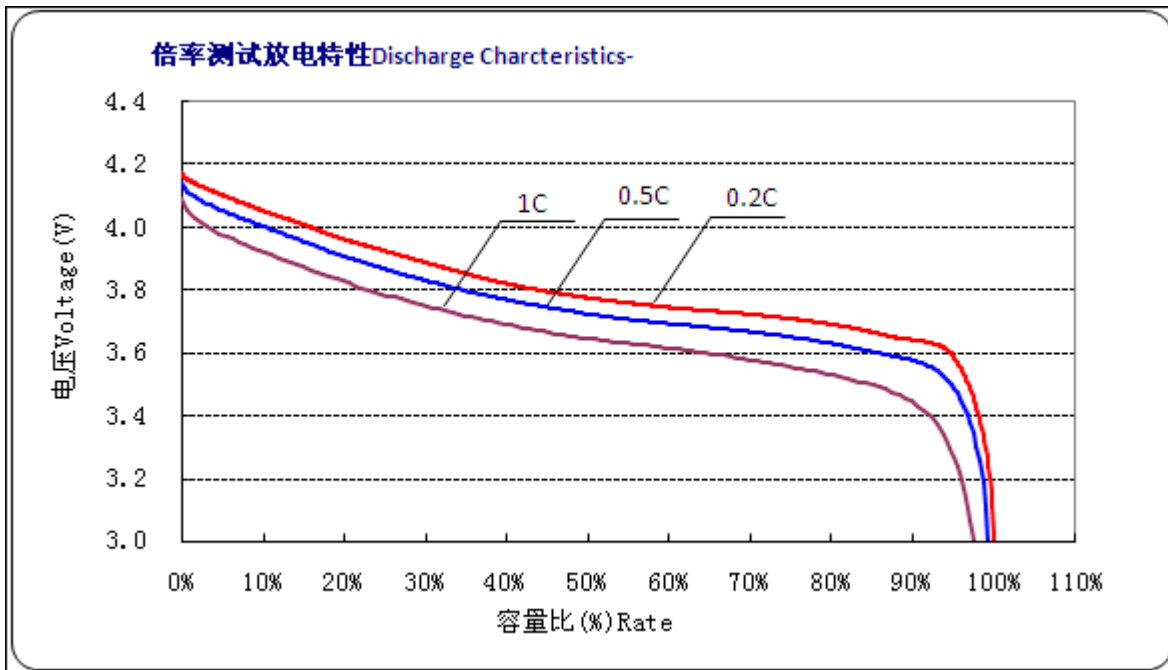
产品符合《豪鹏集团绿色产品有害物质管制标准》



Appendix 附录。

1. Discharge graph 0.2C/0.5C/1C:

0.2C/0.5C/1C 放电曲线



2. life cycle graph in 1C:

1C 循环寿命曲线

