

锂离子电池组技术要求

Lithium-ion Battery Pack Specification

电池组型号(MODEL)	48V100AH
电池组标称电压(Voltage)	48V
电池组标称容量(Capacity)	100Ah
电芯类型 (Battery Model)	锂电池 The lithium battery
日期(DATE)	2022.8

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1 · Scope 适用范围

This specification describes the battery nominal parameters, electrical characteristics, safety performance, environmental adaptability, experiments and determination, use instructions and safety procedures, quality assessment, packaging, marking, storage, transportation, etc.

本规格书描述电池之标称参数、电气特性、安全性能、环境适应性及其实验和判定、使用说明和安全规程、质量评定及包装、标志、贮存、运输等。

2 · Adopted Standard 引用标准

National Standard of the People's Republic of China GB 31241-2014 " Safety Requirements for Lithium-Ion Battery and Battery Pack for Portable Electronics.

中华人民共和国国家标准 GB 31241-2014 《便携式电子产品用锂离子电池和电池组安全要求》

3 · Electrical Characteristics 电气特性

No 序号	Item 内容	Parameter 参数	Remark 备注
1	Rating Voltage 标称电压	48V	
2	Capacity 标称容量	100Ah	0.2C discharge after full charge 完全充电后用 0.2C 放电至截止电压的容量
3	minimum capacity 最小容量	$\geq 100\text{Ah}$	0.2C discharge after full charge 完全充电后用 0.2C 放电至截止电压的容量
4	communication mode 通讯方式	RS232、CAN、RS485	
5	Charge Voltage 充电电压	54.75V	
6	Charge current 充电电流	$\leq 100\text{A}$	
7	Impedance 内阻	$\leq 30\text{m}\Omega$ (Max)	
8	Charging Mode 充电方式	CC/CV 恒流/恒压方式	Constant Current /Constant Voltage 恒流/恒压 视电池电压转换
9	Charging Method 充电方法	Standard Charging 0.2C 标准充电 0.2C	Charging Current:20A 充电电流:20A
		Fast Charging 0.5C 快速充电 0.5C	Charging Current :50A 充电电流:50A
10	Charging Time 充电时间	About 6 Hours 大约 6 小时	Standard Charging 标准充电
		About 3 Hours 大约 3 小时	Fast Charging 快速充电
11	Overcharge Voltage 过充电保护电压	3.65V /Cell	Single string voltage 单串电压 (adjustable)

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12	Over Discharge Cut Off Voltage 过放电保护电压	2.8V /Cell	Single string voltage 单串电压 (adjustable)
13	Rated discharge current 额定放电电流	≤100A	Maximum discharge current 最大放电电流: 120A
14	Over Current 过流保护	130A	
15	Short Circuit 输出短路保护	Recover after removing the short circuit load 保护后撤销短路负载回复	
16	Operating Consumption Current 工作消耗电流	50mA (Max)	
17	Operating Temperature 工作温度	+10~+45℃	Charging 充电
		-20~+60℃	Discharging 放电
18	Storage Temperature 贮存温度	-20℃-50℃ Recommend 推荐 (25±5℃)	Storage capacity should be 60±25%R.H full charge capacity 贮存时应充电至相对容量的 60±25%
19	Cycle Life 循环寿命	6000 cycle 6000 次	Percentage of recoverable capacity 80% 可恢复能量的 80%
20	Dimensions 尺寸 (mm)	590*410*155mm	External dimensions of the chassis, without wiring terminals (机箱外尺寸, 不接线端子)
21	Weight 重量 (KG)	≥ 47 kg	以实际产品重量为准 Subject to actual product weight
22	Shipped product charge 出货产品带电量	50%-60% battery volume delivery 50%-60%电量发货	
23	Package material 包装材质	Carton + wooden fumigation tray 纸箱+木质免熏蒸托盘	

4.test condition 测试条件

除特殊指出外，所有测试都在以下条件进行（标准测试条件）：

环境温度：25±5℃(若周边环境温度低于 20℃，电池组需在≥20℃条件下静置 5 小时以上，再进行测试)

环境湿度：30%~80%

大气压力：86kpa~106kpa

成组标准充放电

标准充电：将电池组以 20A 电流恒流恒压充电至截止电压 54.75V，截止电流 0.02C（0.4A）；

标准放电：将电池组以 50A 电流恒流放电至截止电压 42V；

合格容量：100Ah。

All tests, except as specified, were performed under the following conditions (standard test conditions):

Ambient temperature: 25 ± 5°C (if the ambient temperature is below 20°C, the battery pack should be set for more than 5 hours at 20°C before testing)

Environmental humidity: 30%~80%

Atmospheric pressure: 86kpa~106kpa

Set of standard charge and discharge

Standard charging: Charge the battery pack at 20A current constant current constant voltage to the cut-off voltage 54.75V, cut-off current 0.02C(0.4A);

Standard discharge: discharge battery pack at 50A current to cut-off voltage 42V;

Qualified capacity: 100Ah.

4.1.Electrical performance, safety performance, mechanical performance test

电性能、安全性能、机械性能测试

测试项目 Test item	测试方法 Test method	技术要求 Technical requirement
放电容量 Discharge capacity	在标准测试条件下，对电池组进行标准充电，以 0.1C 电流放电，记录放电容量。 Under the standard test condition,the pack is charged to the standard,and discharged at 0.1C,and recorded the capacity.	≥100%标称容量 ≥100% standard capacity
-20℃低温放电容量 Discharge capacity at -20℃	电池组标准充电后，在-20±2℃低温环境中储存 8H 后，以 0.1C 电流放电至终止电压，记录放电容量。 After standard charging of the battery pack,storage for 8H at -20±2℃, discharge at 0.1C to the end voltage,and record the discharge capacity.	≥65%标称容量 (不带 BMS) ≥65% standard capacity (Without BMS)
55℃高温放电容量 Discharge capacity at 55℃	电池组标准充电后，在 55±2℃高温环境中储存 4H 后，以 0.1C 电流放电至终止电压，记录放电容量。 After standard charging of the battery pack,storage for 8H at 55±2℃, discharge at 0.1C to the end voltage,and record the discharge capacity.	≥97%标称容量 ≥97% standard capacity

荷电保持能力（残余容量） 和容量恢复能力 Charge retention(residual capacity)and capacity recovery	电池组标准充放电后，记录初始容量；电池标准充电后，在 15~35℃的条件下搁置 28d，然后放电记录残余容量；在将电池进行标准充放电，记录恢复容量。 After standard charging and discharging of the battery pack,record the initial capacity,then storage for 28 days at 15~35℃,then discharge and record the residual capacity;then record recovery capacity after standard charge and discharge.	残余容量（荷电保持率）≥95% 恢复容量≥97% Residual capacity(charge retention rate)≥95%; Recovery capacity≥97%
循环寿命 Cycle life	将电池组标准充电后，以 0.5C 放电，当放电容量小于起始容量的 80%时终止循环寿命测试。 Discharge the battery pack at 0.5C after standard charge,terminate the cycle life test when the discharge capacity is less than 80% of initial capacity.	≥3000 次 ≥3000n times
55℃7 天储存 Storage at 55℃ for 7 days	电池组标准充放电后，记录初始容量；电池标准充电后，在 55±2℃高温环境中储存 7 天，然后放电记录残余容量；在将电池进行标准充放电，记录恢复容量。 After standard charging and discharging of the battery pack,record the initial capacity;after standard charging of the battery pack,storage for 7days at 55±2℃,then discharge and record the residual capacity;then record recovery capacity after standard charge and discharge;	残余容量≥92% Residual capacity≥92% 恢复容量≥95% Recovery capacity ≥95%

4.2. Safety performance 安全性能

测试项目 Test item	测试方法 Test method	技术要求 Technical requirement
短路 Short circuit	将电池组标准充电后，放置在防爆箱中，用内阻小于 100mΩ 的导线短路于电池组外部的正负极，试验过程中记录电池表面温度，短路持续时间 10min，即完成测试。或以单体电芯进行短路安全评估测试。 After standard charge and discharge the battery pack,placed it in the explosion-proof box,then short-circuit to the positive and negative electrodes outside the battery with internal resistance less than 100100mΩ,record the surface temperature of the battery during the test,short circuit duration 10min,that is the completion of the test.Or short circuit safety evaluation test with single cell.	不起火，不爆炸 （不带保护线路及壳体试验） No fire,no explosion. (Test without protect circuit and shell)
过充电 Over-charge	将电池组标准充电后，用恒流恒压源对电池组某一单节进行 0.2C 充电，恒流充电至 5V 后转为恒压充电，直到截止电流到 0A 或表面温度小于环境温度	不起火，不爆炸 （不带保护线路及壳体试验）

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	+10℃以下时，结束试验。 After standard charge and discharge of the battery pack,charge a single cell of the pack at 0.2C with a constant current and voltage to 5V,change to constant voltage charging,then complete the test until the cut-off current to 0A or the surface temperature is less than +10℃.	No fire,no explosion. (Test without protect circuit and shell)
过放电 Over-discharge	将电池组标准充电后,用负载仪对电池组进行 0.5C 持续放电,直至某一单节电池电压到达 0~0.5V 时,结束试验。 After standard charge of the battery pack,and continuously discharge it at 0.5C with a load meter,then complete the test until the voltage of a single cell to 0~0.5V.	不起火,不爆炸 (不带保护线路及壳体试验) No fire,no explosion. (Test without protect circuit and shell)

5 · Storage 贮存

5.1.The battery storage shall be in the clean and dry ventilation room at the Temperature 20℃±5℃、Relative humidity 60±20%、Atmosphere pressure 86~106Kpa and shall keep out of fire or heat and avoid touching corrosion elements. The batteries shall be charged every 3 months during storage. Both the stored cells in the process of the battery pack and the batteries in delivery shall be “first come, first use”. The battery storage period is 12 months when into the warehouse. Batteries expired must have a thorough check.

电池应贮存在温度 20±5℃、相对湿度 60±20%、大气压强 86~106Kpa 的清洁、干燥通风的室内,应避免与蚀性物质接触,应远离火源及热源。电池贮存过程中每 3 个月充电一次。电池的加工过程中使用库存电芯和电池交货出库时,均应该遵循“先进先出”的原则;电池从入库之日起,保存期限为 12 个月,超过贮存期限的产品必须重新进行逐批检查。

5.2.When the battery is stored under the above circumstances, it should be charged every three months to avoid over-charge. To extend battery life, when battery once fully or not fully discharged, it should be charged to 40-60% as soon as possible to avoid deep discharge.

电池在上述环境下储存时,应当每 3 个月充一次电,防止过度耗电。为延长电池使用寿命,当电池进行一次完全或未完全放电后,尽快充电至 40-60%的电量,尽量避免深度放电。

6 · Package and Marking 包装与标志

6.1 Package 包装

According to the attached.

包装箱外应标明产品名称、型号、数量、毛重、制造厂商及联络地址、出厂日期,还应有“小心轻放”、“怕湿”、“向上”等必要标志;其包装储运的标志应符合 GB 31241-2014 的规定。

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6.2 Marking 标志

Every battery shall have the following characters: Product、type、rating voltage、rating capacity、contacts plus or minus and warnings、produce date、lot No、manufacturer.

每个电池上应有下列标志：产品名称、型号、标称电压、标称容量、正负极性商标和警示说明、以及制造日期、批号、制造厂名。

7 · BMS 电池管理系统

7.1. 电池管理系统说明

BMS 为 15 串磷酸铁锂电池组设计。

BMS is designed for a 15-string lithium iron phosphate battery pack.

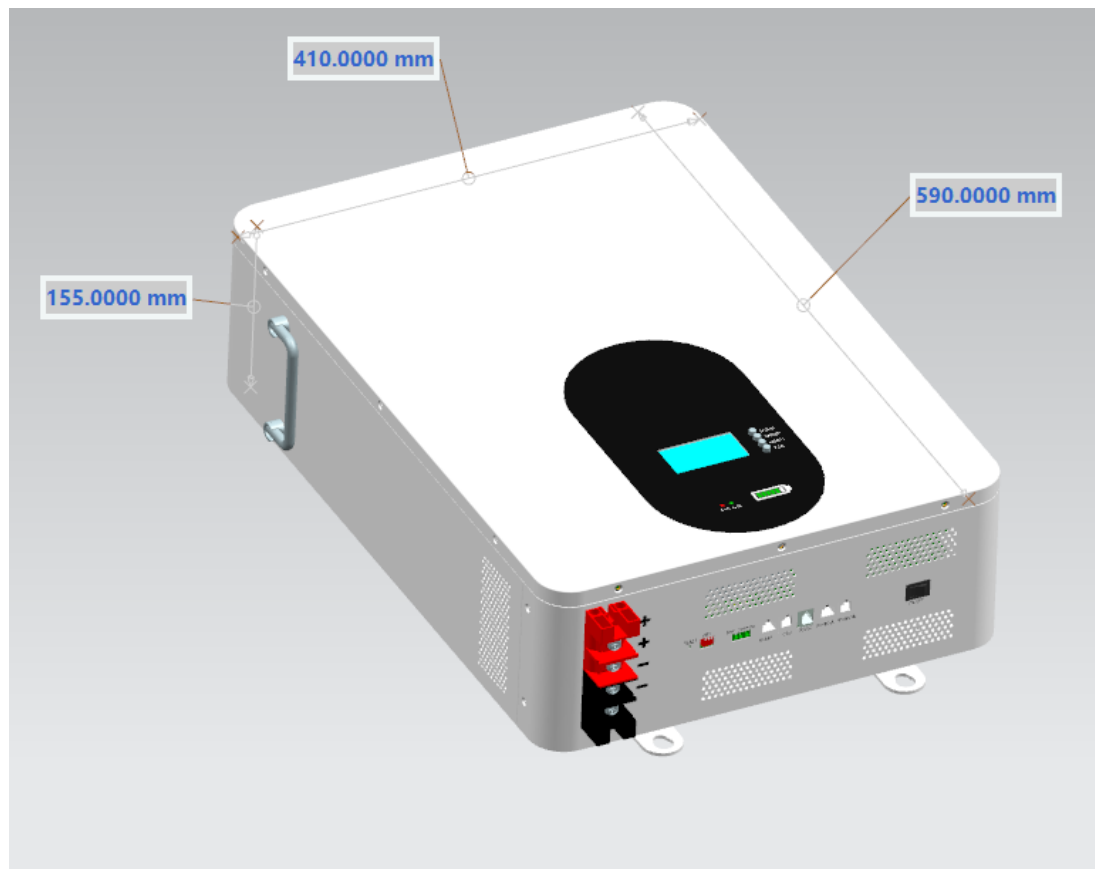
7.2. 该 BMS 系统具有以下一些功能：The BMS system has the following features:

具备 120A 的持续过流能力，具备通讯功能（RS232 和双 RS485 通讯）以及 CAN，过充电保护功能，过放电保护功能，过电流保护功能，短路保护功能，均衡功能，告警功能；

With 120A continuous overcurrent capacity, with communication functions (RS232 and dual RS485 communication) and CAN, over charge protection, over discharge protection, over current protection, short circuit protection, balancing function, alarm function;

8 · Outline Drawing 外形图纸

尺寸 Dimensions: 590*410*155mm



9 · Appendix 附录

10. Instructions and Safety Requirement 使用说明和安全规程

9.1 Recommending Usage 推荐使用事项

9.1.1 Please read the battery instructions and the label on its surface before use.

使用电池前，请仔细阅读使用说明书和电池表面标识。

9.1.2 Use the battery indoors under normal condition, temperature: $(20 \pm 5) ^\circ\text{C}$, absolute humidity: $65 \pm 20\%$.

请在正常的室内环境中使用电池，温度： $(20 \pm 5) ^\circ\text{C}$ ，相对湿度： $65 \pm 20\%$ 。

9.1.3 When in use, the battery shall be kept out of heat, high voltage and avoided children's touching. Do not drop the battery.

在使用过程中，应远离热源、高压，避免儿童玩弄电池，切勿摔打电池。

9.1.4 Use the compatible charger. Do not put the battery into the charger over 24hours.

本电池只能使用配套充电器充电，不要将电池放在充电器超过 24 小时。

9.1.5 Do not touch contacts together. Do not demolish or assembly the battery by yourself. Do not put the battery in the damp place to avoid danger.

切勿将电池正负极短路，切勿自己拆装电池，也勿让电池放在受潮处，以免发生危险。

9.1.6 When the battery was stored for a long period, put it well in its half capacity. Do not wrap it with conduct material to avoid the damage caused by the direct contact between the metal and battery. Keep the battery in day

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places.

长期不用时，请将电池储存完好，让电池处于半荷电状态。请用不导电材料包裹电池，以避免金属直接接触电池，造成电池损坏，将电池保存阴凉干燥处。

9.1.7 Well disposed the disused battery. Do not put it into fire or water.

废弃电池请安全妥当处理，不要投入火中或水中。

9.2 Hazard Warning 危险警告

9.2.1 Forbid Disassemble Batteries 禁止拆装电池

The battery has protective component and circuit internally to avoid danger. Mishandling such as improper disassembly will destroy its protective function and make it heat, smoke, distort or burning.

电池内部具有保护机构和保护电路可以避免发生危险。不合适的拆装会损坏保护功能，将会造成让电池发热、冒烟、变形或燃烧。

9.2.2 Forbid Short-circuit Batteries 禁止让电池短路

Do not touch the plus and minus contacts with metals. Do not put the battery with metal element together in either storage or movement. If the battery is short-circuit, it carries magnified current, which will cause damage and make the battery heat, smoke, distort or burning.

不要将电池的正负极用金属连接，也不要将电池与金属片放在一起存储和移动。如果电池被短路，将会有超大电流流过，将会损坏电池，造成电池发热、冒烟、变形或燃烧。

9.2.3 Forbid heat and burn the battery 严禁加热和焚烧电池

If heating or burning the battery, it will caused the isolated element in the battery dissolved, protection function stopped or the electrode burning, over heated, which will make the battery heat, smoke, distort or burning.

加热和焚烧电池将会造成电池隔离物的溶化、安全功能丧失或电解质燃烧，过热就会使电池发热、冒烟、变形或燃烧。

9.2.4 To avoid use the battery near the heat 避免在热源附近使用电池

Do not use the battery near the fire and stove, or over 80°C, and over heating will cause the battery internal short-circuit and make it heat, smoke, distort or burning.

不要在火源、烤炉附近或超过 80°C 的环境中使用电池，过热将会导致电池内部短路，使电池发热、冒烟、变形或燃烧。

9.2.5 Forbid bathing the battery 禁止弄湿电池

Do not dampen the battery, or even immerse it in the water, which will cause internal protection circuit and its function lost or abnormal chemical reactions, which will lead to heating, smoking, distortion or burning.

不要弄湿电池，更不能将电池投入水中，否则会造成电池内部保护电路和功能丧失及发生不正常的化学反应，电池有可能发热、冒烟、变形或燃烧。

9.2.6 Avoid charging near fire or in the sunlight 避免在火源附近或阳光直射下充电

Otherwise, it will cause internal protection circuit and its function lost or abnormal chemical reactions, which will lead to heating, smoking, distortion or burning.

否则会造成电池内部保护电路和功能丧失和发生不正常的化学反应，电池有可能发热、冒烟、变形或燃烧。

9.2.7 Danger in using non-indicated chargers in 使用非专用充电器给电池充电，会发生危险

Charging in abnormal condition, the battery will cause internal protection circuit and its function lost or abnormal chemical reactions, which will lead to heating, smoking, distortion or burning.

在非正常的条件下充电会造成电池内部保护电路功能丧失和发生不正常的化学反应，电池有可能发热、冒烟、变形或燃烧。

9.2.8 Forbid Damage Battery 禁止破坏电池

Do not allow damage the battery with the metals gouged, forged or dropped etc., otherwise, it will cause over-heated,

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distort, smoke or burning, even in danger.

禁止用金属凿入电池、锤打或摔打电池或其他方法破坏电池，否则会造成电池发热、冒烟、变形或燃烧，甚至会发生危险。

9.2.9 Forbid directly welding on the battery 禁止在电池主体上直接焊

Over-heated will cause the isolated element dissolved in the battery and losing protective function its cycle life, even will cause over-heated, distort, smoke or burning.

过热将会造成电池隔离物的溶化、安全保护功能丧失，使电池发热、冒烟、变形或燃烧。

9.2.10 Forbid directly charging on the power socket or car kit cigarette 严禁将电池直接在电源插座上或车载点烟器上充电

High voltage and amplified current will damage the battery and reduce its cycle life, even will cause over-heated, distort, smoke or burning.

高压、大电流将会过电池而使其损坏，或使电池发热、冒烟、变形或燃烧。

9.2.11 Do not use this battery for other equipment 不可将电池用于其他设备

Improprate usage will damage the battery and reduce its cycle life, even will cause over-heated, distort, smoke or burning.

不恰当使用会损坏电池的性能、降低寿命，甚至会使电池发热、冒烟、变形或燃烧。

9.2.12 Do not touch the leak-out battery 不要直接触及漏液电池

The leak-out electrolyte will cause the skin uncomfortable. If it drops into eyes, do not rob the eyes but wash in time, and go to hospital for treatment.

渗漏的电解液会造成皮肤不适，万一电解液进入眼睛，尽快用清水冲洗，不可揉眼，并迅速送医院处理。

9.3 Warning 警告

9.3.1 This battery cannot mix with deposal or twice- recycled batteries in use. Otherwise, for its abnormal charge and discharge, it will cause over-heated, distort, smoke or burning.

电池不可与其它类型的一次或二次电池混用，否则因为不正常的充、放电造成电池发热、冒烟、变形或燃烧。

9.3.2 Keep the battery out of children's reach and prevent them biting or swallowing the battery.

将电池远离孩童不能得到的地方，以避免孩童噬咬或吞咽电池，如果吞咽了电池，应迅速送医院处理。

9.3.3 Do not insert the battery onto the charger for a long time If charging beyond the normal time, the battery is still in the charger, please stop charging. The abnormal charging will cause battery over-heated, distort, smoke or burning.

如果超过正常充电时间很长时间充电器仍在充电，应停止充电，不正常的充电有可能会使电池发热、冒烟变形或燃烧。

9.3.4 Do not put into microwave stove or any other pressure apparatus. Take the battery away from the cellular phone or the charger if it is instant heated or leak-out (or odors) and depose it. The bad battery will causes over-heated, smoke or burning.

不可置于微波炉或其他压力容器中，瞬间加热或结构漏液(或有异味)，应让电池离开手机或充电器并弃用。使用不正常的电池会发热、冒烟、变形或燃烧。

9.4 Cautions 注意事项

9.4.1 Notice 注意

The battery shall be prevented to be exposed in effulgence so as not to cause over-heated, distort, smoke and weaken its performance and cycle life.

避免在强光曝晒环境下使用电池，以免发热、变形、冒烟.至少避免电池性能下降、降低寿命。

9.4.2 Electro Static-free 防静电

There is a protective circuit inside the battery to prevent contingency. Do not use the battery in the Electro static

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circumstances, (above 1000V), for it is easily destroyed the circuit board so that the battery does not work and causes over-heated, distort, smoke or burning.

电池中装有保护电路以避免各种意外情况发生。不要在产生静电的场所使用电池，因为静电（1000V 以上）容易损坏保护板，而导致电池工作不正常，发热、变形、冒烟或起火燃烧。

9.4.3 Discharging Temperature Range 充电温度范围

Recommended discharging temperature range is 0-40°C, beyond which it will result in decadence of the battery performance and shortness of its life.

推荐的充电温度范围是 0-40°C。在超出此范围的环境中充电会造成电池性能下降、减少寿命。

9.4.4 Read carefully the manual before use or whenever in need. 在使用电池之前，请仔细阅读使用手册并经常在需要时阅读。

9.4.5 Charging Method 充电方式

Use the special chargers in the recommended charging method to charge the battery.

请使用专用充电器和推荐的充电方式，在推荐的环境条件下给电池充电。

9.4.6 First Usage 第一次使用

When you use the battery for its first time, do not put it into the cellular phone or any other equipment once you find it in unusual conditions such as unclearness or odors. The battery should be returned to the vendor.

在第一次使用电池时，若发现电池不整洁或有异味等不正常现象，不可继续将电池用于手机或其他它设备，应将电池返回销售商。

9.4.7 Children Use 儿童使用

When Children use the battery, they should be under their parents' instructions and superintend in use.

儿童使用电池前，应受父母指导，并在使用中受监督是否正确。

9.4.8 Avoid Children's Touch 避免孩童接触电池

Battery should keep out of the place where children in reach. Prevent children taking the battery out of the charger or the cellular phone to play.

电池应放在孩童不易拿到的位置，应避免孩童将电池从充电器或手机中取出、玩弄。

9.4.9 To avoid the leak-out liquid be exposed to the skin or clothes. If touched, please wash by clean water so as not to cause the skin uncomfortable

注意避免电池漏液接触皮肤或衣物，若已接触请用清水冲洗，以免造成皮肤不适。

9.4.10 Consultation 咨询

When you buy the battery, please note how to contact with the vendors, so that you may get intouch with vendors for consultation whenever in need.

购买电池时，请注意销售商联络方法，以便需要时及进与销售商取得联系，得到咨询。

9.4.11 Guarantee period 保用期

Life: 3000 cycles of charge and discharge. However, it belongs to improper use rather than quality problem. Even in the warranty period, the manufacturer will not replace the new battery for free.

寿命为：充放电循环 3000 次。但是属于使用不当而非质量问题，即使在保用期内，生产厂家也不会无偿更换新电池。

9.4.12 Safety Usage Guarantee 安全使用保障

If the battery is used on other instruments, please contact with your manufacturer for how to get the best performance, at least consult its maximum current, fast charge and special application.

如果将电池用于其他设备，请与供应商讨保护功能的完善性。至少应该咨询电池的大电流、快速充电、特殊应用的问题。

10. Quality Evaluation Programme 质量评定

Quality evaluation composes of authoritative check and quality consistence check. Authoritative check is carried out

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on design decision, emended design and production decision. It should be confirmed by both Purchaser and Vendor on sampling proposal, check project, sequence and judgment etc., which in principle, should be all included. Quality consistence check should be divided into lot by lot check-up and periodical check-up, as to test the quality steadiness during the products in production (refer to GB2828—1987 standard). The detailed check-ups compose of appearance, internal resistance, rating capacity or 1C5A discharging capacity etc.

质量检验分为鉴定检验和质量一致性检验。鉴定检验一般在设计定型、更改设计和生产定型时进行，抽样方案、检验项目、顺序以及判定规则等事宜由供需双方协商确定。原则上应包括以上各项性能试验。质量一致性检验分为逐批检查和周期检查，用以判定产品生产过程中能否合格保证产品质量的持续稳定。可以参照 GB2828—1987，标准执行。具体检查的检验项目应包括外观、内阻、额定容量或 1C5A 放电容量等。

11.Environment Protection 环保要求

This product accord with ROHS requirement.

此产品符合 ROHS 环保要求。

12.Others 其他事项

All the above are the agreed the battery descriptions and test regulation between Purchaser and Vendor. It can be carried out if there is no any new written agreement or modification notice occurred.

以上述，可以作为供需双方对于电池产品性能和检验规则的约定框架。如果没有新的书面约定或更改通知，即可按此执行。

The company has the final interpretation of the specification!

本公司拥有对本产品规格书的最终解释权！

If you have questions, please contact us.

如有疑问，请与我公司联系。