Specification Approval Sheet

产品规格承认书

Customer **客户名称：河南恒一锂能科技有限公司**

Type **电池类型：**Li- ion-18650

Model **产品型号：**IMR18650-1200mAh 3.7V 4.44Wh

Specification **产品规格：**3.7V/1200mAh

Prepared 编制	Checked 审核	Approved 批准
客户确认 CUSTOMER APPROVAL	签章 STAMP：	日期

Add: Building 3, Xinhua Industrial Park, longmen Avenue, Xinhua District, Pingdingshan, Henan, China

Tel：0375-3382755

E-mail: hengyilinenghr@163.com

Product Modified Record List

产品变更履历表

Revision 版本	Date(YY-MM-DD) 日期(年-月-日)	Mark 标记	Modified content 变更内容	Prepared by 制定人
A1	2023-07-19		First issue 首版发行	**赵鑫鸿**

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1.适用范围　Scope

仅适用于河南恒一锂能科技有限公司生产的可充电锂离子电池或电池组，包括锂离子电池电芯和保护组件。本产品符合国标 GB31241-2014《便携式电子产品用锂离子电池和电池组安全要求》。

This document describes the product specification of lithium ion polymer battery or module which includes cell and protection devices supplied by Henan Hengyi Lithium Energy Technology Co.,Ltd. This product is according with the national standard of PRC. 'GB31241-2014' <Lithium ion cells and battery used in electronic equipments safety requirements>.

2. 电池组成　Battery Constitution

序号 No.	名称 Name	型号 Model	备注 Remark
1	1 支锂离子电芯 One piece of cell	HW-18650 3.7V 1200mAh	Better Power Polymer Lithium Ion Battery
2	1 个电池保护板 One piece of protection board	无	
3	导线(ZH-2P 正向) Lead wire	线型　UL1571-22# Wire　UL1571-22#	外露线长　30±5mm Lead wire length　30±5mm

3.主要技术参数 Specification

序号 NO.	项目 Items	标准 Criteria	备注 Remarks
1	典型容量 Typical capacity	1200mAh	完全充电后 1 小时内,用 0.2C 放电至 2.8V，测量其放电电量（25±3 ℃） Discharge with 0.2C to 2.8V after Complete charge within 1h, measuring the discharge power（25 ± 3 ℃）
	最小容量 Minimum Capacity	1195mAh	
2	能量 Energy	4.44Wh	
3	标称电压 Nominal Voltage	3.7V	
4	出货电压 Shipment voltage	3.85-3.95V	

5	内阻 Internal Impedance	cell≤60mΩ pack≤80mΩ	标准充电后 AC 1KHz 测试（25±3 ℃） AC 1KHz after standard charge（25±3 ℃）
6	充电方法 Charging Method	恒流恒压充电 CC&CV	
7	Overcharge Detection Voltage 过充保护电压	4.20V	Single cell Voltage 单节保护电压
8	Over discharge protection voltage 过放保护电压	2.8V	Single cell Voltage 单节保护电压
9	标准充电电流 Standard charge current	240mA	在 25°C±5 °C 下，以 240mA 恒流充电至 4.2V,然后恒压充电到充电电流减小到 20mA，即充满电。 240mA(CC) charge to 4.2V, when 4.2V (CV) is reached, charge rate will reduce to 20(mA)for full charge
10	最大充电电流 Max charge current	1200mA	1C 2.8V
11	标准放电电流 Standard discharge current	240mA	0.2C 2.8V
12	最大持续放电电流 Max Continuous discharging current	1200mA	1.0C
13	成品重量 battery weight	48g	
14	Cycle life 循环寿命	200 times	标准充放电 standard charge & discharge capacity≥85 % 容量≥85 %

15	工作温度 Operating Temperature	20℃~+45℃		最大充电 0.5C Max Charging 0.5C
		-10℃~+45℃		最大放电 1C Discharging
16	贮存温度 Storage Temperature	1≤ Month ≤一个月	-20℃ / +45℃	贮存时应充电至容量的 40%~50% Charge to 40%~50% of capacity when storage
		1>Month ≤一个月	-10℃ / +35℃	
17	贮存湿度 Storage humidity	≤75%		
18	Appearance 外观	Without scratch, distortion, contamination and leakage (无划痕、变形、污迹、电解液泄露)		

4.产品常规性能和可靠性能 Regular performance and unfailing performance

4.1 产品的常规性能 Product General Performance

序号 No.	项目 Items	测试条件 Test Method and Condition	标准 Criteria
1	标准充电模式 Standard Charge	0.2C 恒流充电至 4.2V，然后恒压充电至 0.02C Charge to 4.2V at constant current 0.2C, then constant voltage charge to taper current 0.02C	总充电时间不超过 6.5 小时，其中在 25±2℃环境下充电； Constant voltage 4.2V for 6.5hours in all at25±2℃.
2	0.2ItA 放电性能 0.2ItA discharging Performance	将电池或电池组按标准充电模式充好电后，搁置 0.5~1h，再以标准放电模式进行放电。 The cell or battery charged with standard charge mode, deposit 0.5~1h, then discharged with standard discharge mode.	The discharge time is required≥5h. The above test cycle can be repeated five times, Once is qualified to meet the requirements.放电时间应≥5h。上述测试可以重复循环 5 次，当有一次符合要求即为合格。

序号 No.	项目 Items	测试条件 Test Method and Condition	标准 Criteria
3	循环寿命 Cycle Life	先用 0.2 C 恒流充电至 4.2V，再恒压 4.2V 充电直至充电电流≤0.01C,搁置 10 分钟,再用 0.2C 电流放电至 2.8V;又搁置 10 分钟,重复以上步骤,直到放电容量是初始容量的 80% Constant current 0.2C charge to 4.2V, then constant voltage charge to current declines to 0.01C, rest 10min，constant current 0.2C discharge to 2.8V，rest 10min. Repeat above steps till continuously discharging capacity Higher than 80% of the Initial Capacities of the Cells	200 次循环后放电容量大于等于第一次放电容量的 80%,厚度膨胀≤8% Residual capacity≥80% after 500 cycles vs. Discharge capacity of first cycle Cell. The thickness expansion is less than or equal the first thickness,8%
4	荷电保持能力 Charged Storage Characteristics	将电池或电池组按标准充电模式充电后， 开路放置在 20±5℃环境温度下 28 天后。The cell or battery charged with standard charge mode, Open circuit stored in 20±5℃ for 28 days. Discharged with standard discharge mode.	以标准放电模式进行放电， 放电时间应不低于 4.25 小时,再次以标准充电模式充电后以标准放电模式放电，放电时间应不低于 4.5 小时。 Discharge time should not be less than 4.25h. Then charged with Standard Charge mode, Discharged with standard discharge mode again. Discharge time should not be less than4.5h.

4.2 安全性能测试 Safety Performance Testing

序号 No.	项目 Items	测试条件 Testing condition	标准 Criteria

1	过充电测试 Overcharge testing	标准充电后，恒流恒压源设定为 10V 以 1C 的电流持续充电 2.5h 或者当电池温度下降一峰值低约 20℃时,停止实验. Battery charged at 1.0C current with a voltage limit of 5.0V.charging is continued for 2 hours.or Stop test till cells temperature 10℃ lower than max temperature.	不起火,不爆炸,不冒烟或漏液 No fire, no explode, no smoke or no leakage
2	过放电测试 Overdischarge testing	在 23±2℃状态下, 按标准 0.2C 放电的要求放电至终止电压后,外接 30Ω负载放电 24 小时.At 23±5℃, According to the requirements of standard discharge 0.2C, the cells will be discharge to cut-off voltage, then connect with external load of 30 ohm for 24 hours.	不起火，不爆炸，不冒烟 No fire, no explode, no smoke
	Short-circuit testing 短路测试	在 23±2℃状态下,标准充电后,将电池的正负极用一根小于 80±20mΩ的导线连接,放置 24 小时.或者当电池温度下降到比峰值低约 10℃时，结束试验。 At 23±2℃, After standard charging, connect cells anode and cathode by wire which impedance less than 80±20mΩ, keep 24h,or its temperature has fallen by 20℃ from the peak point ,the test is over	No smoke or fire 不起火,不冒烟

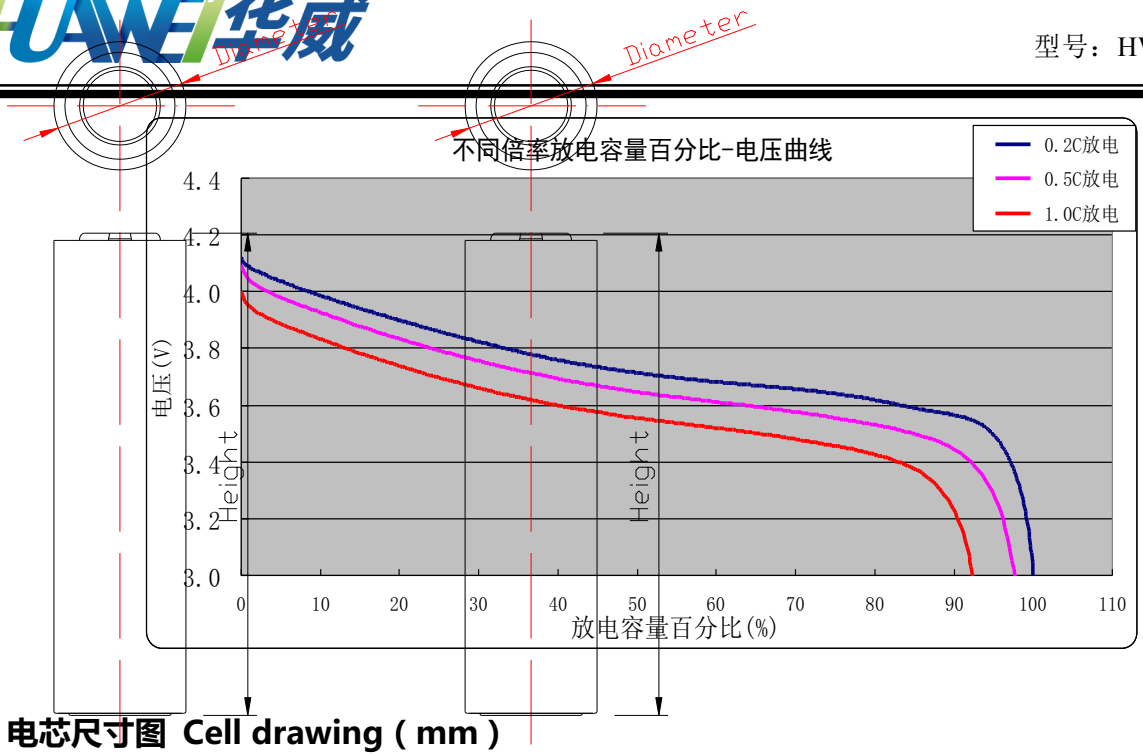
4.3 环境性能测试 Environment Performance Testing

序号 No.	项目 Items	测试条件 Testing condition	标准 Criteria

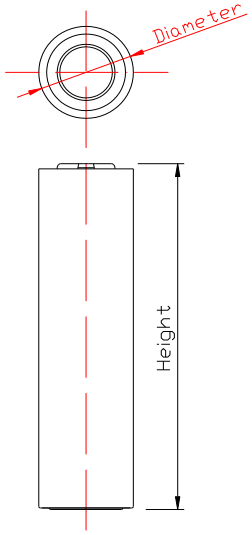
1	低温放电 Discharge at low temperature	标准充电后，在-10±2℃条件下贮存 16-24h，然后用 0.2C 放电至 3.0V,所记录放电时间.After standard charging, rest the cells for 16h at -10±2℃, then discharging at 0.2C to voltage 3.0V, recording the discharging time.	≥210min
2	高温放电 Discharge at high temperature	标准充电后，在 55±2℃条件下贮存 4h，然后用 1C 放电至 3.0V,所记录放电时间.After standard charging, rest the cells 4h at 55±2℃, then discharging at 1C to voltage 3.0V, recording the discharging time.	≥54min 电芯外观无变形,无爆裂. No distortion,No rupture.
3	振动测试 Vibration test	电池在振幅为 0.8 mm （1.6mm）的简谐振动，振动频率为：10～55 Hz,扫频速率为:1 Hz/min, X、Y、Z 三个方向各振动一次，振动时间为 30min. Let the battery subjected simple harmonic motion with an amplitude of 0.8 mm (1.6mm) total maximum excursion].The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz, The battery is to be tested for 30 min in each mutually perpendicular directions.	不爆炸、不起火 No Explosion, No Fire
4	热冲击测试 Heating Test	将满电电池置于高温箱中、温度以（5±2）℃/min 升到 130±2℃并保温 30 分钟 The temperature of the oven is to be raised at a rate of 5±2℃/min. to a temperature of 130±2℃, and remains for 30 minutes at this temperature.	不爆炸、不起火 No Explosion, No Fire

	重物冲击 Heavy goods Shock	Tester will use a 10KG hammer to impact the fixed battery of the shock stage from 0.5M height free-fall.(The max square of battery should be vertical with shock stage.) 电池置于冲击台上,将 10KG 重锤自 0.5M 高度自由下落冲击已固定在夹具中的电池(电池的面积最大的面应与台面垂直),	不起火, 不爆炸, 电池允许变形 No fire, No explosion Batteries allowed deformation
5	自由跌落测试 Free falling(drop) Test	标准充电后，搁置 2 小时,从 1m 高处自由跌落到 30mm 厚的木板上,各方向一次。 Fully charge , lay for 2 hours , drop the battery from a height of 1m to a wooden board with the thickness of 30mm. Each side for one time.	不爆炸、不起火（▵V<0.20V/Set ▵R<5%/Set) No Explosion, No Fire
6	温度循环测试 Temperature Cycling Test	70±3℃条件下搁置 4 小时；在 20±3℃条件下搁置 2 小时；在-10±3℃条件下搁置 4 小时；在 20±3℃条件下搁置 2 小时；按以上的步骤循环 10 次，并且每次温度变换时间不得超过 30min 。 70 ±3°C maintaining for 4 hours.20±3°C maintaining for 2 hours.-10 ±3°C maintaining this temperature for 4 hours.20±3°C for 2 hours. Repeating the sequence for a further 9 cycles. And the temperature change should be finished within 30 min	不着火、不爆炸；不漏气、不漏液 No Explosion, No Fire and Not vent or leak

4.4 电芯放电曲线图 Batteries discharge curve



5. 电芯尺寸图 Cell drawing (mm)



标识 Item	描述 Description	尺寸规格 Dimension and specification
T	厚度 Thickness	最大 18 毫米 180mm Max
W	宽度 Width	最大 18 毫米 180mm Max
L	高度 Length	最大 65 毫米 65mm Max

6．电池尺寸　Battery Drawing



HW 18650 3.7V 1200mAh 19C
端子型号：2.0　线号：24AWG　出线长度：30mm(除端子)

项目 Items	标准 Criteria
电池尺寸（L x W x H）	最大 R18*66 毫米 R18*66mm Max
导线（ZH-2P 正向） Lead wire	线型 UL1571-24#　外露长度(L2)：30±5mm Wire UL1571-24#　length (L2)：30±5mm

7．保护板规格书　PCM specification

7.1 保护板原理图　Protection board principle diagram

无

7.2 保护板电气性能　Protection board electrical properties

7.3 保护板元器件　Protection board component

8. 贮存及其它事项　Storage and Others

8.1 长期贮存　Long Time Storage

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 3.75～3.95V。 储存温度（-10-35℃）和湿度（45%-75%RH）。

If stored for a long time(exceed six months), the cell should be stored in drying and cooling place.

The cell’s storage voltage should be 3.75~3.95V .Storage temperature （-10-35℃) and moisture （45%-75%RH）

电池的贮存电压需保持在 3.8V~4.0V，请每隔 3 个月激活电池一次，具体方法如下:标准充放电后，搁置 5 分钟，0.2C 充电至 4.0V

Voltage during storage needs to me maintained between 3.8V~4.0V .

Please charge & discharge the battery once every 3 months according to the following method: Standard charge/discharge, lay for 5 min, then charge at 3.8mA to 4.0V.

8.2 其它事项　Others

任何本说明书中未提及的事项，须经双方协商确定

Any matters that this specification does not cover should be conferred between the customer and Hangzhou HuaWei

8.3 产品运输 Product Transportation

电池在运输中为半电状态，应避免剧烈震动、挤压、日晒及浸湿。

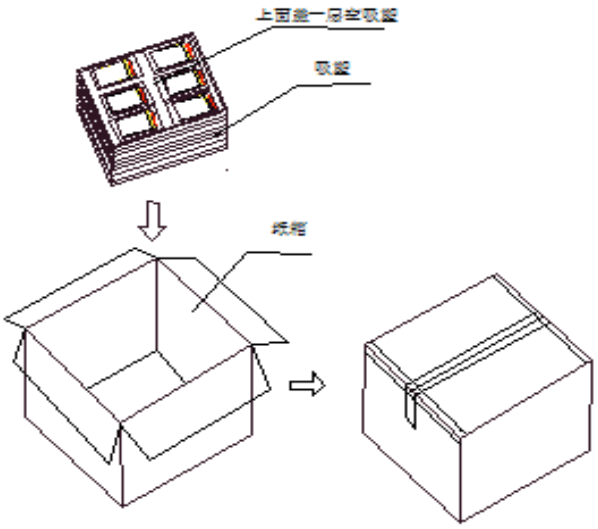
During transportation the battery is approximately at a state of 50% charged, the battery should avoid from acute vibration, crushed, solarization, soaked.

8.4 保质期限　Warranty

保质期自出厂日期(喷码)开始起 1 年。如果证明电池的缺陷是在制造过程中形成的而不是由于用户滥用及错误使用造成，本公司负责退换电池。

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

9. 包装示意图 Packaging schematic diagram



序号 No	项目 Item	描述 Description	备注 Remark
1	包装方式 Packing style	外箱+吸塑盒 Carton& Plastic tray	
2	包装箱外尺寸 Outside size of the box	290*235*190	
3	重量 Weight	≤10Kg	
4	封箱方式 Carton Sealing method	透明封箱胶带 Transparent adhesive tape	

附录 Appendix

聚合物锂离子充电电池操作指示及注意事项
Handling Precautions and Guideline

前言　Preface

为了使电池安全的使用及处理请在使用前认真的阅读操作说明

To ensure proper use of the battery please read the manual carefully before using it. Handling

声明一：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，应事先联系华威电子，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。

Note(1):If the battery is used to other equipments , or used condition is not accord to the condition in this Specification they should contact With Warwick electronics in advance, Additional experimentation may be required to verify the performance and safety under the conditions.

声明二： 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华威电子概不负责

Note(2): Warwick electronics will take no responsibility for any accident when the battery is used under other conditions beyond those described in this Document.

声明三： 如有必要，我们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。

Note(3): We will inform the customer of improvements regarding proper use and handing of the battery in a written form, if it is necessary.

1.充电 Charging

1.1 充电电流 Charging current

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芯的充放电性能、机械性能和安全性能的问题，并可能会导致发热或泄漏。

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.

1.2 充电电压 Charging voltage

充电电压不得超过本规格书中规定的额定电压。充电器的设 计应满足此条件。电池电压高于额定 电压值时，将可能引起电芯的充放电性能、机械性能和安全性能的问题，可能会导致发热或泄漏。

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

1.3 充电温度 Charging temperature

电池必须在 10℃~45℃的环境温度范围内进行充电。

The cell shall be charged within 10℃~45℃ range in the Product Specification.

1.4 禁止反向充电 Prohibition of reverse charging

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

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.

2.放电 Discharging

2.1 放电电流 Discharging current

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。

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.

2.2 放电温度 Discharging temperature

电池必须在-10℃~45℃的环境温度范围内进行放电。

The cell shall be discharged within -10℃~45℃ range specified in the Product Specification.

2.3 过放电 Over-discharging

需要注意的是，在电池长期未使用期间，它可能会用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 3.75V 至 3.95V 之间。

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 3.75V and3.95V.

过放电会导致电芯性能、电池功能的丧失。

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

3. 保护电路模块 Protection Circuit Module

电芯/电池包装应配有 PCM 以正确保护电芯/电池。PCM 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

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

4.电池的注意事项 Handling Instructions

认真阅读下面的注意事项，确保正确使用聚合物锂离子电池，河南恒一锂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。

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

危险！

Danger!

安全警示及使用说明 Caution and Guideline

使用前应先阅读产品规格书以及安全警示，确保正确使用电池和确保电池使用过程中的安全。

Before using battery, please read specification and safety caution, insure proper application and safety.

安全警示 Caution

下面的操作可能导致电池泄漏，发热甚至燃烧：

Failing in following items can cause leakage, heat even fire：

禁止反向充电！

Prohibition of reverse charge of battery.

禁止过充电！

Prohibition of over charge of battery.

禁止过放电！

Prohibition of over discharge of battery.
禁止正负极短路！
Prohibition of short circuit of positive and negative of battery.
请使用指定的充电器充电！
Please charge by specified charger.
不要将电池直接连接在交流电源上！
Do not direct-connected the battery to alternating current power supply,
请不要撞击，敲打，钉刺或拆卸电池！
Don’ t knock, beat, nail or disassemble battery.
请保持电芯远离热源，禁止将电芯扔入火中！
Please keep away from fire or other heating sources and prohibition of dumping of battery into fire.
不要将电池放入微波炉,压力柜子和高温消毒柜里！
Do not put battery in microwave ovens or pressure cabinets、High-temperature disinfectio cabinet.
不得将电池浸泡于液体中，如淡水、海水、饮料等！
The battery should never be soaked in liquids such as freshwater, seawater and drinks.
禁止使用已损坏的电池！
Prohibit to use damaged battery

使用说明 Guideline

电池内有安全装置,为了保证其固有的安全功能,请不要将电池分解开或改变任何的部份。
As installed safety device in the battery, please do not resolve or change any other sections of the battery to protect the inherent safety functions;
请不要在规定的范围外使用或储存电池，否则将削弱电池的性能，缩短电池的寿命，甚至导致电池发热，起火或爆炸！
Don’ t use or storage battery under the circumstance beyond specified, unless will weaken battery performance and shorten battery life-span, even will cause heating, fire or explosion.
不要将电池与其它化学电池(像干电池)或不同容量、牌子的电池合用。
Do not use the battery with some chemical batteries (like dry battery) or different capacities and brands battery together,
若电发出气味、发热、变色、变形或者在使用充电、存储过程中,出现任何的不正常请立即从装置或充电器取出,停止使用。
If the battery emits the smell, heat , changes color, be out of shape or appears any other abnormal phenomena during the charging or stored procedures, please get out the battery from the device or charger and stop using;
使用前请确保电池在质量保证期内。
Please insure battery in quality guarantee duration before using.

请不要使电池的封口边缘与金属直接接触。
Please don't make the battery side edge of direct contact with the metal.
不要将电池放于高温处(如阳光直射或热天下汽车里)否则,会过热着火,性能降低和寿命缩短。
Do not put the battery under the high temperature places (like sunshine irradiation or car in the hot weather), or it will catch fire for the heat, reduce the performance and loss the life;
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。
To insure the safety, the battery should install the safety device, please not use when the static electricity is more than we need when produce, or the safety device will lose efficacy and lead the overheating ,fracture, exploding and catching fire;
为了不装错或损耗电池,请认真阅读使用说明书进行安装与拆卸(从装置上)。
To insure not install the battery wrong or wastage of the battery, please read the instruction carefully to install and dismounting;
若电池长时间不用时,请把电池从设备中拿出并存放于干燥阴凉的地方。
If the battery will not be used for a long time ,please take out of the battery from the device and store in dry and shady places;
若电池接触面有污迹,请在使用之前用干布擦干净,否则将导致与装置接触不良。
If there are splurge on the surface of the battery, please wipe up clean before using, or it will lead bad contact with the device.
若电池漏液,电解质粘于皮肤或衣服上,用水冲洗掉或用流水洗衣服。
If the batteries weep, the electrolytes stick on the skin or cloth, use the water to wash or running water to wash
如果电解液接触到皮肤或眼睛,切勿揉眼睛,请立刻用清水冲洗接触的区域并寻求医生的建议！
If electrolyte comes into contact with the skin or eyes where shall flush the electrolyte immediately with fresh water and physicians' advice is to be sought.
电池放于小孩不能触摸的地方,若小孩咽下电池,请立即就医。
Put the battery to where the kids can not touch, if the kids swallow the battery, please Seeing the doctor soon;

其它化学反应 Other The Chemical Reaction

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.

由于电池是利用化学反应的原理，所以随时间的增加电池的性能会降低，即使是存放很长一段时间而不使用。如果使用条件如充电、放电及周围环境温度等情形不在指定的使用范围内，也会缩短电池的使用寿命，或者产生漏液导致设备损坏。如果电池长周期不能充电，即使充电方法正确，这样需要更换电池了

备注 Remarks

若发现此规格书有任何问题，需经双方同意后方可修改。

If any matters concerning the specifications of the battery, it must be mutually agreed before any revision of the specifications are made.

本规格书未尽事宜应由双方协议确定。

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