NOVEO	PRODUCT SPECIFICATION	文件编号		
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GANZHOU NOVEL BATTERY TECHNOLOGY CO.LTD
赣州诺威科技有限公司

Approval Sheet
样品承认书

Customer Name客户名称:	汉科
Customer Model客户型号:	
Description产品名称:	聚合物锂离子电池3.7V500mAh
Model Code产品型号:	503035
Sheet Code承认书编号:	GB.S01.503035-HK01

Prepared by 制作	Checked by 审核	Approved by 批准
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Customer Approved 客户承认 (Stamp) (盖章)	Test by测试	Checked by审核	Approved by批准

Revision History

修改记录

Revision 修改	Description 描述	Date 日期	
A	New released	2023/3/23	

Contents目录

1..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 .The specification only applies to GanZhou Novel Battery Technology Co., Ltd.

本标准规定了聚合物锂离子可充电池的基本性能、技术要求、测试方法及注意事项，本标准只适用于赣州诺威科技有限公司所生产的聚合物锂离子电池。

Reference standard 参考标准：

GB/T 18287-2013、GB 31241-2014

2. Product basic information产品基本信息

NO.	Items项 目		Specifications规格		Remark备注
1	Design scheme 设计方案		DW01+8205		/
2	Typical capacity典型容量		500 mAh		0.2C Discharge 0.2C放电
3	**Minimal capacity最小容量**		500 mAh		0.2C Discharge 0.2C放电
4	Nominal voltage标称电压		3.7 V		/
5	Charge voltage充电电压		4.2 ±0.02 V		/
6	Discharge cut-off voltage放电截止电压		3.00 V		/
7	Charge current 充电电流	Standard charge标准充电	100 mA		0℃ ～ +45℃
		Fast. charge 快速充电	250 mA		15℃ ～ +45℃
		Maximum. charge 最大充电	500 mA		15℃ ～ +45℃
8	Discharge current 放电电流	Standard discharge 标准放电	100 mA		-20℃ ～ +60℃
		Fast discharge快速放电	250 mA		-20℃ ～ +60℃
		Maximum discharge 最大放电	500 mA		-20℃ ～ +60℃
9	Battery pack impedance电池内阻		≤ 200 mΩ		交流阻抗 AC 1kHz
10	Voltage of shipment 出货电压		≥3. 85 V		
11	Storage temperature 储存温度	1 months1个月内	-20℃ ~+45℃	The capacity for a long time storage shall be 60~70% range 长期存储容60%~70%	
		6 months6个月内	-20℃ ~+25℃		
		Long Time Storage 长期存储	23℃±5℃		
		Humidity湿度	60%±20%		
12	Connecter definition 接口定义	Pin1	Red wire 红色导线	P+	
		Pin2	Black wire 黑色导线	P-	

3．**Electrical characteristics 电性能**

No.	Items项目	Test Method 测试方法	Criteria标 准
1	Standard Charge 标准充电	Charging the cell initially with constant current at 0.2C and then with constant voltage at 4.2 V till charge current declines to 0.02C. 先以0.2C恒流充电，当电芯电压达到 4.2 V后，改为恒压充电直到充电电流小于或等于0.02C	N.A
2	Full charged definition 充饱定义	With charging voltage 4.2 V, current 100 mA(0.2C) continued to charge the battery pack, when charging current drops to 10 mA(0.02C)charging is terminated shall be full charged. 以充电电压 4.2 V，电流 100 mA(0.2C) 对电池组持续充电，当充电电流下降至 10 mA (0.02C) 时充电被终止，即为充饱。	N.A
3	Full discharged definition 放空定义	Standard discharge current 100 mA(0.2C) for continuous discharge, when the voltage drops to discharge cut-off voltage 3.00 V discharge is terminated, shall be full discharged. 以标准放电电流 100 mA(0.2C) 进行持续放电，当电压降至放电截止电压 3.00 V时放电被终止，即为放空。	N.A
4	Initial impedance 初始内阻	At20 ± 5 ℃ ambient temperature, after standard charged battery pack, AC impedance tester (1KHz)measuring the initial impedance should be ≤ 200 mΩ. 在20±5℃环境温度下，经过标准充电的电池组，使用交流阻抗测试仪（1KHz）测量初始内阻应≤ 200 mΩ	N.A
5	Minimal Capacity 最小容量	The capacity means the discharge capacity of the cell, which is measured with current of 0.2C with 3.00 V cut-off voltage after the standard charge. 电芯满充电后，以0.2C电流连续放电至 3.00 V截止电压所放出的容量。	≥ 500mAh
6	Charge/Discharge Cycle 充放电循环	Constant current 0.2C charge to 4.2 V,then constant voltage charge to current declines to 0.01C, rest 1h，constant current 0.2C discharge to 3.00 rest 1h. Repeat above steps till continuously discharging capacity Higher than 60% of the Initial Capacities of the Cells 先用0.2 C恒流充电至 4.2 V ，再恒压 4.2 V电直至充电电流≤0.01C, 搁置1h, 再用0.2C电充流放电至3.0V;又搁置1h,重复以上步骤,直到放电容量是初始容量的80%	300Cycle 300次循环 Capacity≥80% 容量≥80%
7	Retention Capability 荷电保持能力	After full charging, storing the battery 28 days with 20 ± 5°C condition, and then staying 1 hours with discharge current of 0.2C till 3.00 V cut-off voltage. 电芯满充电后，在20±5℃的环境条件下存放28天，然后以0.2C电流连续放电至 3.00 V终止电压。	Capacity≥85% 容量≥85%

※ **Typical capacity典型容量**

The capacity means the average discharge capacity of the cell, which is measured with discharge current of 0.2C with cut-off voltage after the standard charge at 23±5℃ environment temperature, unit：mAh

典型容量指23±5℃温度下，以0.2C电流放电至终止电压时所放出容量对应的容量分布中心值，单位为mAh。

4．Condition adapting characteristics电芯环境适应性（n=1）

No	Items项目	Test Method 测试方法	Criteria标准
1	**Overcharge 过充**	After discharge to limit voltage, charged at constant current of 3C and constant voltage of 4.6V, While voltage reaches to the max ,if charging continued over 7 hours or temperature is 20% less than the top , close the test. 电芯放电至终止电压后，用3C电流和4.6V的极限电压充电，电压达到最大值后，当充电时间大于7h或者温度降至比峰值低20%时终止测试。	No fire, no explosion 不起火、不爆炸
2	**Vibration 振动**	After standard charging, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied from 7HZ to 200HZ ,then return to 7HZ , the excursion of the vibration is 0.8mm. The cell shall be vibrated for 3 hrs. **满充电后的电芯在三个相互垂直的方向按振幅0.8mm的正弦波进行振动, 频率从7HZ增加到200HZ 再降回7HZ，往复振动3小时。**	Voltage is not less than 90% of the primary, no leakage, no venting, no rupture, no fire, no explosion. **开路电压不低于90%的初始电压、不泄漏、不泄气、不破裂、不起火、不爆炸**
3	**Invariableness humid and hot 恒定湿热**	After standard charging, put cell into the chamber that the temperature is 40±2℃ and the humidity ranges between 90and 95% for 48hours,then put it at 23±2℃ for 2hrs,measure0.2C CAP. 满充电后将电芯放入40℃±2℃及相对湿度为90～95%的恒温恒湿箱中48小时后，取出在23±2℃环境下搁置2h，再以0.2C电流放电至3.0V。	No distortion, no rust， no leakage , no venting ,no rupture , no fire ,no explosion, the discharge time is not less than 3hrs 不变形、不锈蚀、不泄漏、不泄气、不破裂、不起火、不爆炸、放电时间不低于3h
4	**High temperature discharge capacity 高温放电能力**	According to the standard, the battery is charged at room temperature, and then placed in a cryogen box with a constant temperature of 55℃±2℃ for 2h, and discharged with a current of 0.2c to the termination voltage. 按照标准在常温下将电池充满电，然后放入55℃±2℃的低温箱中恒温2h，以0.2C电流放电至终止电压。	Discharge time≥4.75h 放电时间≥4.75h
5	**High temperature storage 高温储存**	The electricity was stored at an ambient temperature of 60±5℃ for 7 days. The voltage, internal resistance, thickness, initial capacity and charge retention capacity of the cell were tested before and after the experiment电池充满电放置在环境温度60±5℃的条件下储存7天，测试实验前后电芯电压，内阻，厚度，初始容量和荷电保持容量。	Capacity retention rate Capacity recovery rate Thickness expansion rate 容量保持率≥80%Cini 容量恢复率≥85%Cini 厚度膨胀率≤10%Cini
6	**Drop自由跌落**	Charge end, let the cells or batteries were dropped from a height of 1.0 m to a concrete surface,and each cell is to be dropped one time from each plane total of 6 times 将电芯满充电后, 将电芯从1.0米的高度自由跌落到水泥地面上，每个电芯每个面跌落1次，总共跌6次。	No fire, no explode 不起火，不爆炸

Discharge Temperature（放电温度）	-20℃	0℃	25℃	55℃
Discharge Capacity（0.2 C）（放电容量/0.2 C）	50%	60%	100%	100%

5．Battery Safety performance 安全性能（n=1）

No	Items项目	Test Method 测试方法	Criteria标准
1	**Short protection 短路保护**	After the battery is fully charged, short the positive and negative terminal with 100mΩ wire resistance for 1 hour, then charge with 1C5A for 5s, measure the battery open circuit voltage. 电池满充电后，将正负极用100mΩ电阻短路1H后, 将正负极断开, 电池以1C5A电流瞬时充电5s后, 测量电池开路电压	No explosion, no fire, no smoking. OCV≥3.6*n（V） 无冒烟、起火、爆炸 开路电压≥3.6*n（V）
2	**Overcharge protection 过充保护**	After battery charge finished, then charge the battery for 8 hours with a power which can provide 2 times more than nominal voltage and 2C5A current. 电池充电结束后，用2C5A电流和2倍标称电压输出的电源继续加载8小时.	No smoke, no fire, no explosion 无冒烟、起火、爆炸
3	**Overdischarge protection 过放保护**	After the battery is fully charged, discharge at 20±5℃ conditions with 0.2C5A until the battery voltage drops to the overdischarge voltage, then discharge with a 30Ω resister for 24 hours. 电池满充电后，在20±5℃条件下，以0.2C放电至终止电压后，外接30Ω负载放电24h.	No explosion, no fire, no smoking. The overdischarge protection function should be started. 无冒烟、起火、爆炸.电池应启动过放保护功能.

6. Testing requirements 测试要求

6.1 Battery test environment 电池试验环境

Temperature温度：23±5℃

Relative humidity相对湿度： 60 ± 20% RH

Atmospheric pressure大气压力： 86～106 KPa

6.2 Measuring instrumentation requirements 测量仪表要求

Voltage instrumentation requirements: Measuring the voltage meter accuracy no less than 0.5 magnitude

电压仪表要求：测量电压的仪表的精确度不低于0.5级

Current instrumentation requirements: Measuring the current meter accuracy no less than 0.5 magnitude

电流仪表要求：测量电流的仪表精确度不低于0.5级

Time instrumentation requirements: Measuring the time meter accuracy no less than 0.1%

时间仪表要求：测量时间的仪表精确度不低于0.1%

Temperature instrumentation requirements: Measuring the temperature meter accuracy no less than 0.5 ℃

温度仪表要求：测量温度的仪表准确度不低于0.5℃

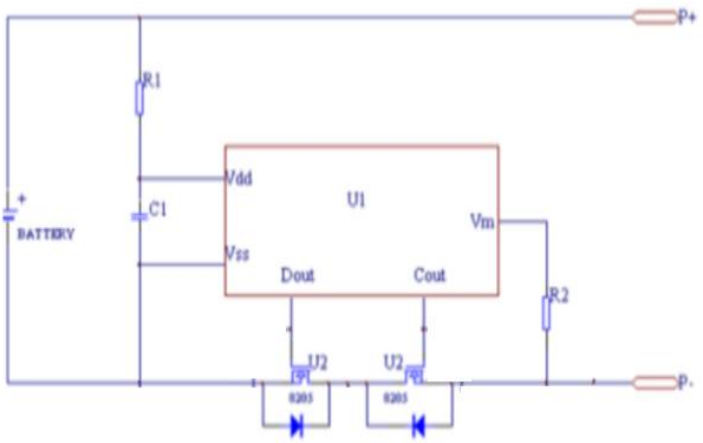
Impedance instrumentation requirements: Measuring impedance should by sinusoidal alternating (1 KHZ) test

内阻仪表要求：测量内阻应由正弦交变(1KHZ)进行测试

7．Battery protection characteristics电池保护板特性(T=23±5℃)

NO.	Item 项目	Symbol 符号	Content 内容	Criterion标准
1	Over charge Protection 过充保护	VDET1	Over charge detection voltage 过充保护电压	4.3±0.05V
		tVDET1	Over charge detection delay time 过充保护延迟时间	110±20%MS
		VREL1	Over charge release voltage 过充恢复电压	4.1±0.05V
2	Over discharge protection 过放保护	VDET2	Over discharge detection voltage 过放保护电压	2.45±0.15V
		tVDET2	Over discharge detection delay time 过放保护延迟时间	120±20%MS
		VREL2	Over discharge release voltage 过放恢复电压	2.95±0.15V
			Release condition保护解除条件	Charging activation 充电激活
3	Over current protection 过流保护	IDP	Over discharge current detection current 过放流保护电流	2.0～5.0A
		tVDET3	Detection delay time 延迟时间	7±20%MS
			Release condition保护解除条件	Cut load 断开负载
4	Short protection 短路保护	TSHORT	Short protection function 短路保护功能	有
			Release condition保护解除条件	Cut short circuit 断开短路电路
5	Current consumption 工作消耗	IDD	Current consume in normal operation 工作消耗电流	6uA
			Current consume in sleep mode 睡眠模式消耗电流	≤2uA

8．Schematic circuit diagram电路原理图



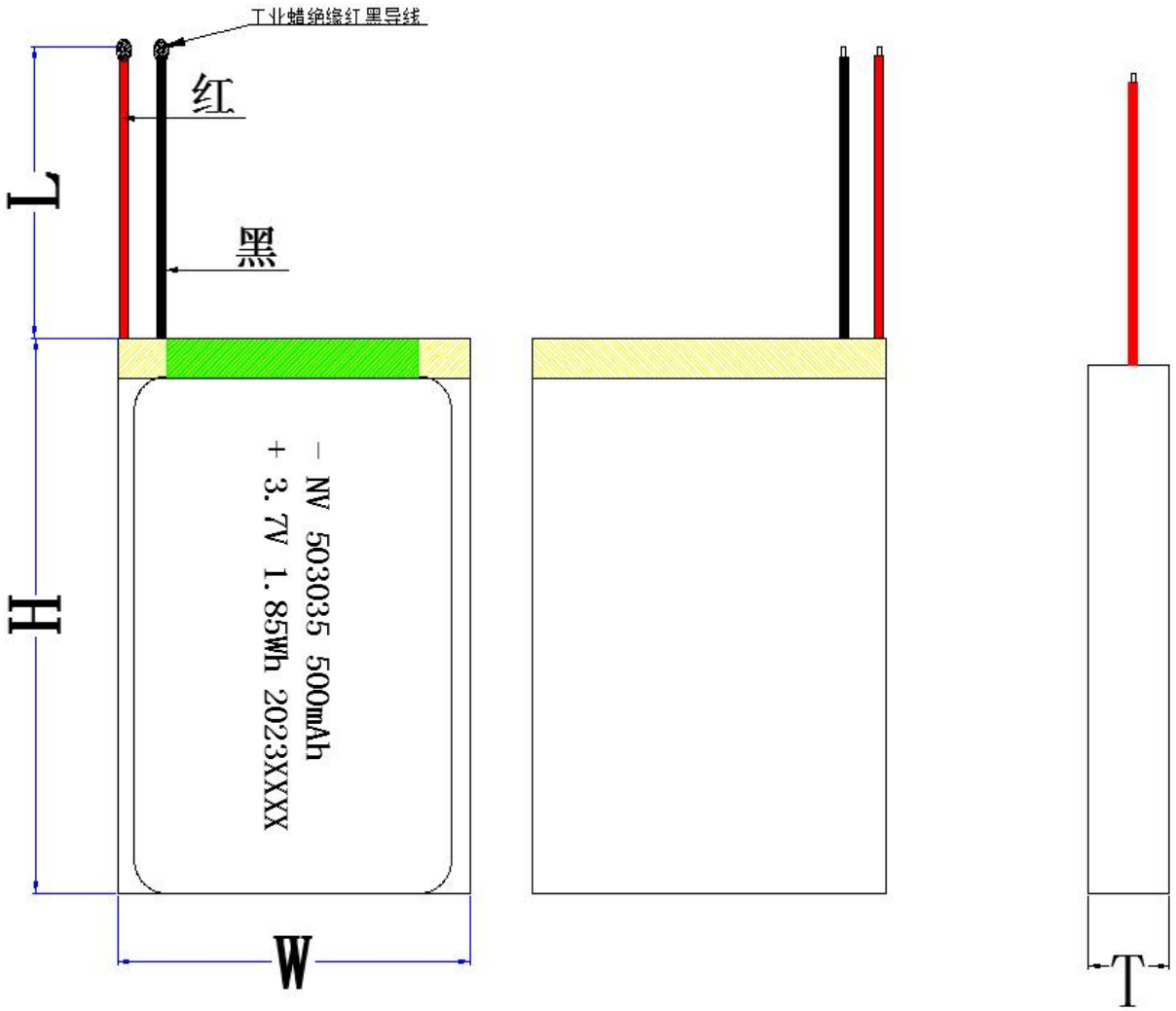
9. PCM Key components 保护板主要元件

PCB 板 物 料 清 单						
序号	物料代码	物料名称	规格	单位	数量	备注
1	U1	IC	DW01/SOT-23-6/ROHS	PCS	1	德普微/灿升
2	U2	MOSFET	8205/TSSOP-8/ROHS	PCS	1	德普微/灿升
3	R1	贴片电阻	100R±5%/ROHS	PCS	1	厚声/国巨/华新
4	R2	贴片电阻	1K±5%/ROHS	PCS	1	厚声/国巨/华新
5	C1	贴片电容	0.1uF±5%/50V/ROHS	PCS	1	国巨/华新
6		PCB	NV-121/ROHS	PCS	1	
7	R3	NTC	/	/	/	/

10．Battery specifications/产品出货标准

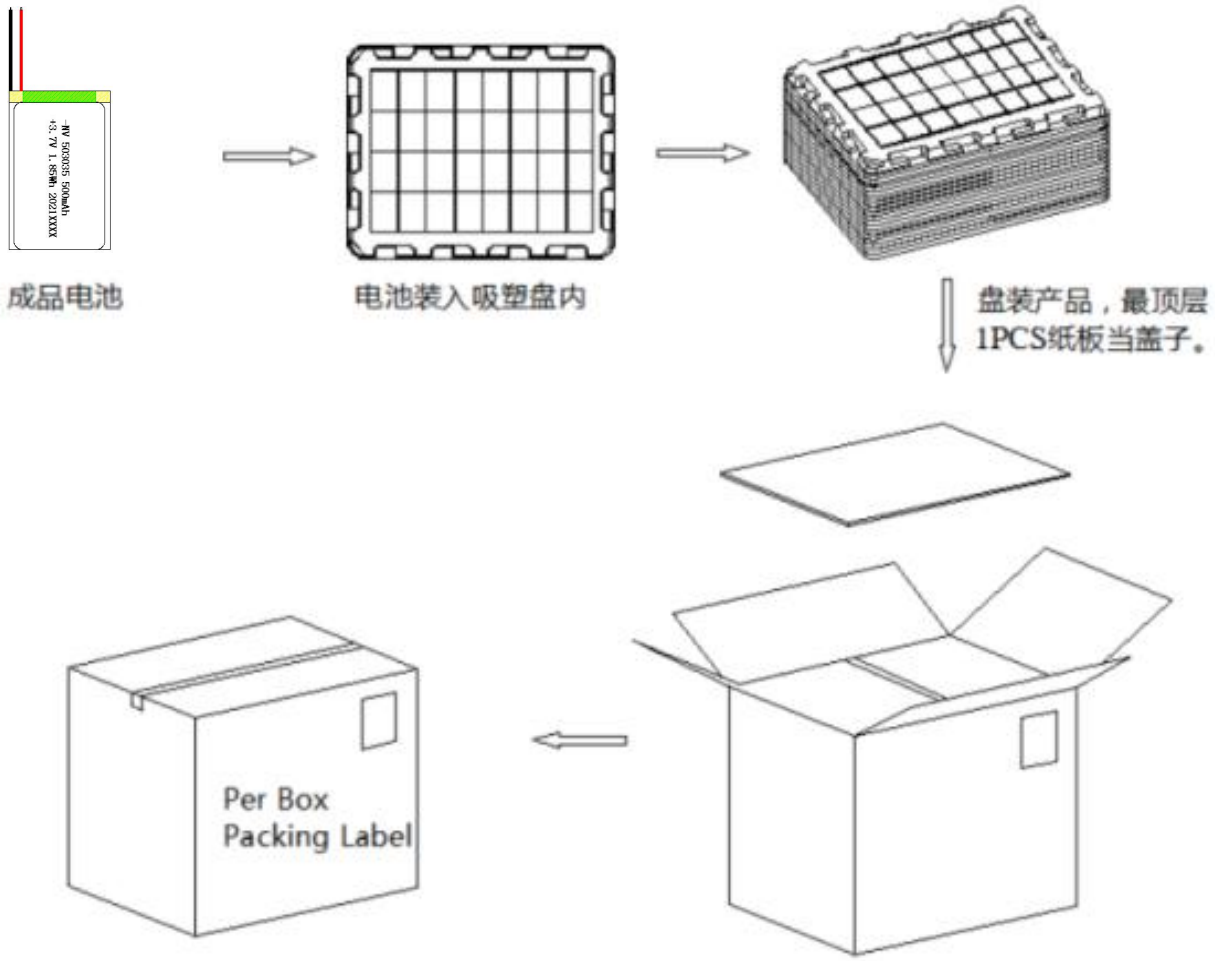
No.	Items/项目	Specifications/规格	Remark/备注
1	Capacity for assembled cell discharging by 0.2C 电芯组装后0.2C 标准放电的容量	≥500mAh	Standard discharging method标准放电方式
2	Battery Voltage电池电压	≥3.85V	Delivery Voltage, Within 10 days from Factory 交货电压，在出厂 10 天内
3	Internal Impedance内阻	Assemblage Impedance装配后内阻≤200mΩ	Measure the Red and black wire of the connector after assembling.装配后测试电池插头红黑线
4	Over discharge current detection current 过放流保护电流	2.0～5.0A	The tested stream must meet this standard range 测试过流必须满足这个标准范围内

11．Battery Outline Drawing 电池外形尺寸图



Units（单位	mm	连接器规格/引线	UL3302-26#红黑	L	50±3
T（厚度）	MAX:5.1	W（宽度）	MAX:30.2	高度（H）	MAX:37.5

12. Pack 包装方式



13．Battery Precautions and Safety Instructions电池组使用注意事项及安全说明

1. Please be sure to take to comply with the specifications and the following precautions to use with batteries, did not follow the specifications for the operation caused any accidents,GanZhou Novel Battery Technology Co., Ltd. will not accept any responsibility.

请您务必需遵守本规格书和以下使用注意事项使用电池，对于没有按照规格书进行操作所造成的任何意外事故，赣州诺威科技有限公司将不承担任何责任.

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

保质期从出货之日算起为1年。如果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。

3. Please use 0.5C current to charge up 60% capacity after the battery placed 3 months. In long-distance transport, the temperature should meet the ambient temperature of the battery

电池每放置三个月,请预先以0.5C充电1次,即让电池具备60%以上的电量. 在长途运输时，温度要满足电池储存的环境温度。

4. Before Use the battery, carefully read the instruction manual and battery labels on the surface.

使用电池前，请仔细阅读使用说明书和电池表面标识.

5. Need to use the original battery charger, and should be placed in a dry ventilated place.

电池需使用原装充电器充电，并应放置在干燥通风场所.

6. Such as long-term when not in use, the battery charger to charge state half full, remove the battery from the device and separated, to avoid metal contact with the battery, causing short-circuit or damage to the phenomenon.

如长期不使用时，请将电池充电至半满电荷状态，把电池从设备中拆除并分开放置，避免金属接触电池，造成短路或损坏现象.

7. In use or during storage, battery found there has been high fever, leakage, odor, distortion and other anomalies, please stop using it immediately and stay away from the battery.

在使用或储存期间，如发现电池有出现高温发热、漏液、散发异味、变形及其它异常现象时，请立即停止使用并远离电池.

8. Do not short-circuit the battery positive and negative, and careful not to allow the battery to moisture, to avoid danger.

切勿将电池正负极短路，并注意不可让电池受潮，以免发生危险.

9. Using，keep away from heat, High pressure place, and do not beat, hit the battery.

使用过程中，应远离热源、高压场所，并勿摔打、撞击电池.

10. Battery end of life should be immediately removed from the equipment, Please properly handle security of spent batteries, do not put into fire or water.

电池寿命终止应立刻从设备中取出,废弃电池请安全妥善处理，切勿投入火中或水中.