



# PRODUCT SPECIFICATION

Ver: A0

DATE: 2018-06-05

DOC No:  
ER-XGQ-MC-18650-1S1P-  
2000-0001

For Any detail and question, Please Tel Engineer:

GREAT POWER ENERGY&TECHNOLOGY CO., LTD  
广州鹏辉能源科技股份有限公司

Add: No.912, Shiliang Road Shawan, Panyu, Guangzhou, GD, CHINA  
地址:中国广东广州番禺区沙湾镇市良路 912 号

CUSTOMER NO: \_\_\_\_\_

## Specification Approval Sheet 规格确认书

**MODEL/型号: 18650/2000**

**ICR18650-1S1P-2000-PCM-2 WIRES**

(2000mAh 3.7V)

PART NUMBER : ICR3720

PCM: DLX-#18T-1S

Prepared By/Date 编制/日期	Checked By/Date 审核/日期	Approved By/Date 批准/日期

Customer Approval 客户确认	Signature/签字	Date/日期
	Company Name/公司名称	
	Company Stamp/公司印章	



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## Amendment Records/修正记录

Revision 版本	Description/记述	Prepared by 编制	Approved by 批准	Date/日期
A	First Publish			

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### 1 Scope/适用范围

This specification is applies to describe the related Battery product in this Specification and the Battery/cell supplied by Great Power Energy&Technology Co., Ltd only.

本说明书只适用于描述本规格书中相关的产品以及广州鹏辉能源科技股份有限公司提供的电池。

### 2 Model/型号: 18650-2000

### 3 Cell Specification/电芯产品规格

No.	Items/项目	Specifications/规格		Remark 备注
1	Nominal Capacity 标称容量	2050mAh		0.2C Standard discharge 0.2C 标准放电
2	Minimum Capacity 最小容量	2000mAh		
3	Nominal Voltage 标称电压	3.7V		Mean Operation Voltage 即工作电压
4	Delivery voltage 交货电压	3.70~3.9V		Within 10 days from Factory 在出厂 10 天内
5	Charge Voltage 充电电压	4.2V±0.03V		By standard charge method 标准充电方式
6	Standard charging method 标准充电方式	0.2C constant current,4.2V constant voltage charge to 4.2V,continue charging till current decline to ≤0.01C		0.2C 恒流 4.2V 恒压充至电流≤0.01C ,时间约 6h(供参考)
7	Charge current 充电电流	0.5C	1000mA	Standard charge, charge time about 6h(Ref) 标准充电, 时间约 6h(供参考)
		1C	2000mA	Rapid Charge, charge time about: 2.5h(Ref) 快速充电, 时间约 2.5h(供参考)
8	Standard discharging method 标准放电方式	0.2C constant current discharge to 3.0V,		0.2C 恒流放电至 3.0V
9	Cell Internal Impedance 单电芯内阻	≤50mΩ		Internal resistance measured at AC 1KHz after 50% charge 半电态下用交流法测量内阻

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### 3 Cell Specification/产品规格(continuous/续上表)

No.	Items/项目	Specifications/规格		Remark 备注
10	Maximum charge current 最大充电持续电流	0.5C	1A	For continuous charging mod 连续充电模式
11	Maximum discharge current 最大放电持续电流	1C	2A	For continuous discharge mod 连续放电模式
12	Operation Temperature and relative humidity Range 工作温度和湿度范围	Charge/充电	0~45℃ 60±25%R.H.	Charge at a very low temperature such as blew 0℃, will be get a lower capacity and reduce cycle life of the battery 低温充电效率会下降, 会影响电池使用寿命
		Discharge/放电	-20~60℃ 60±25%R.H.	
13	Storage temperature for a long time 长时间储存温度	-20~25℃ 60±25%R.H.		Do not storage exceed half year. Must charge once when storage for half year. must charge the battery which with protect circuit when storage for three months. 不可超过半年, 达到半年须充电一次 带保护板电池 3 个月充电一次

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#### 4 Battery/Cell performance test Criteria/电池性能标准

##### 4.1 Appearance inspection by visual/外观目测

There shall be no such defect as rust, leakage, which may adversely affect commercial value of battery.

电池外观应没有锈渍、污渍、漏液等影响商业价值的缺陷存在。

##### 4.2 Environmental test condition/外界环境条件

Unless otherwise specified, all test stated in this product specification are conduct at below test condition

所有测试应按以下环境条件进行，除非特殊指定外。

Temperature: 20°C~25°C

Relative Humidity:60%±25% R.H.

##### 4.3 Cell Electrical characteristics/电气特性

No	Items/项目	Test Method and Condition/测试方法及条件	Criteria/标准
1	Rated Capacity at 0.2C(Min.) 0.2C 最小额定容量	After standard charge, the capacity shall be measured on 0.2C discharge till the voltage discharge to 3.0V, 标准充电后，放电至 3.0V,截止，测量 0.2C 放电容量	≥97.7%
	Rated Capacity at 0.5C(Min.) 0.5C 最小额定容量	After standard charge, the capacity shall be measured on 0.5C discharge till the voltage discharge to 3.0V, 标准充电后，放电至 3.0V 截止，测量 0.5C 放电容量	≥97.5%
	Rated Capacity at 1C(Min.) 1C 最小额定容量	After standard charge, the capacity shall be measured on 1C discharge till the voltage discharge to 3.0V, 标准充电后，放电至 3.0V 截止，测量 1C 放电容量	≥96%
2	Cycle Life 循环寿命	Charging and discharging battery as blew conditions 0.2C standard charge to 4.2V end-off 0.2C standard discharge to 3.0V cut-off Continuous charge and discharge for 500 cycles ,the capacity will be measure after the500 <sup>th</sup> cycle 充放电按以下条件： 0.2C 标准充电至 4.2V，0.2C 标准放电至 3.0V，连续充放电循环 500 周，在第 500 周结束后测量容量	≥80% of initial capacity
3	Capacity retention 容量保持	The battery to be charge in accordance with standard charge condition at 20~25°C,then storage the battery at an ambient temperature 20~25°C for 28 days. Measure the capacity after 30 days with 0.2C at 20~25°C as retention capacity 将电池在 20~25°C 标准充电后储存在 20~25°C 的环境中 28 天 28 天后，测试电池在 20~25°C 环境下 0.2C 放电容量作为保持容量	Retention capacity 容量保持 ≥85%

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4	Temperature Dependence of discharge capacity (放电温度特性)	<p>Cells shall be charged per 3.3.1 and discharged @0.2 C<sub>5</sub>A to 3.0 volts. Except to be discharged at temperatures per Table 3. Cells shall be stored for 3 hours at the test temperature prior to discharging and then shall be discharged at the test temperature. The capacity of a cell at each temperature shall be compared to the capacity achieved at 23 °C and the percentage shall be calculated.</p> <p>电池按 3.3.1 规定充电。按表 3 的温度中放电，电池必须先在该试验温度中放置 3 个小时。</p>	<p>Each cell shall meet or exceed the requirements of Table 3 温度中的放电容量应不小于表 3 的要求</p>
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Table 3 (表 3)

Discharge Temperature (放电温度)	-20°C	-10°C	0°C	23°C	60°C
Discharge Capacity (0.2 C <sub>5</sub> A) (放电容量/0.2 C <sub>5</sub> A)	40%	50%	80%	100%	95%

4.4 Mechanical characteristics/机械特性

No	Items/项目	Test Method and Condition/测试方法及条件	Criteria/标准
1	Free fall test 自由跌落测试	<p>The battery to be fully charged in accordance with standard charge condition, then drop the battery three times from a height of 1,0 m onto a concrete floor. The batteries are dropped so as to obtain impacts in random orientations.</p> <p>电池按照标准充电条件充满电，然后从1m高度跌落电池到一个水泥地面，随机跌落三次。</p>	<p>No Fire, 不起火，不爆炸</p>
2	Vibration test 振动测试	<p>After standard charging, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz and 55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes.</p> <p>将标准充电后的电芯固定在振动台上，沿 X、Y、Z 三个方向各振动 30 分钟，振幅 1.6mm，振动频率为 10Hz~55Hz，每分钟变化 1Hz。</p>	<p>No explosion ,No leakage, No fire 无泄漏,不起火，不爆炸</p>

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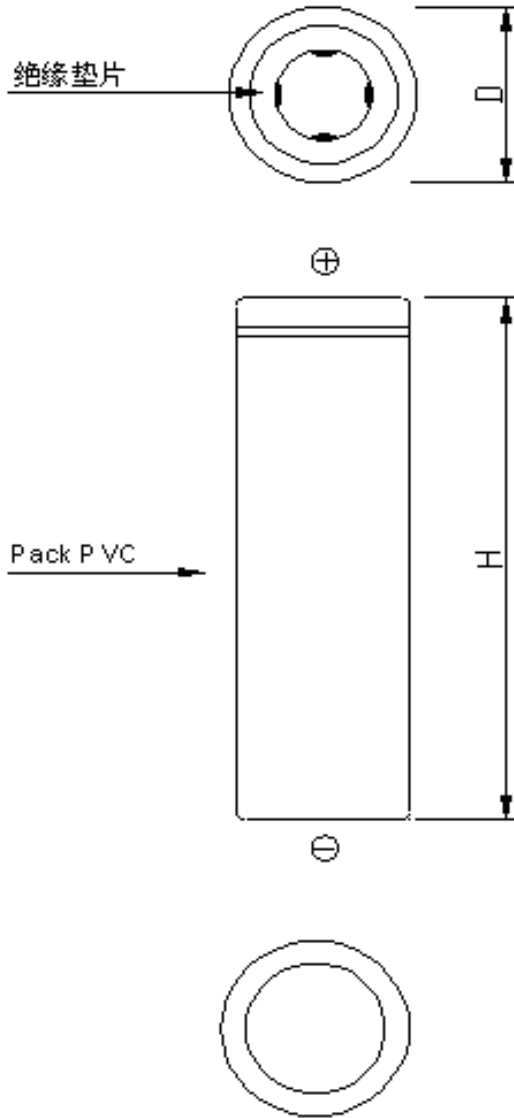
#### 4.5 Safety performance/安全性能

No	Items/项目	Test Method and Condition/测试方法及条件	Criteria/标准
1	Thermal exposure test 高温热冲击测试	Each fully charged cell, stabilized at room temperature, is placed in a circulating air-convection oven. The oven temperature is raised at a rate of 5 °C/min ± 2 °C/min to a temperature of 130 °C ± 2 °C. The cell remains at this temperature for 10 min before the test is discontinued. 充满电的电池温度稳定到常温后, 放置入循环空气烘箱里, 从常温以5 °C/分± 2 °C/分的速率升至130°C后, 在130°C放置10分钟	No explosion, No fire 无起火,无爆炸
2	Short test 短路测试(20°C)	The fully charged battery is to be short-circuited by connecting the positive and negative terminals of the battery with resistance load not exceed 100m Ω. Tests are to be conducted at room temperature 20~25°C. 在室温 20~25°C把充满电的电池的正负极用不超过 100m Ω 的负载连接起来, 连接起来使电池外部短路	No explosion, No fire The Temperature of the Battery surface not exceeded than 150°C 无起火,无爆炸 电池表面温度不超过 150°C
3	Short test 短路测试(60°C)	The fully charged battery is to be short-circuited by connecting the positive and negative terminals of the battery with resistance load not exceed 100m Ω. Tests are to be conducted at room temperature about 60-65°C 在室温约为 60-65°C把充满电的电池的正负极用不超过 100m Ω 的负载连接起来, 连接起来使电池外部短路	No explosion, No fire The Temperature of the Battery surface not exceeded than 150°C 无起火,无爆炸 电池表面温度不超过 150°C
4	Forced discharge test 过放电测试	A discharged cell is subjected to a reverse charge at 1c for 90 min. 将电芯放完电, 再用 1C 反接充电 90 分钟	No explosion, No fire 无起火,无爆炸
5	Over charge test 过充电测试	After standard charge, continue to charge with a constant voltage 3C/4.6V per a cell, holding 8h. 电芯标准充满电后, 以 3C/4.6V 的恒定电压继续充电, 保持 8 小时	No explosion, No fire 无爆炸, 无起火



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## 5 Cell initial Dimensions/电芯初始尺寸



NO	Items	Units: mm
1	diameter/直径(D)	18.3±0.2
3	Height/高度(H)	65.3±0.2

Draw/制图	Checked/审核	Approved/批准

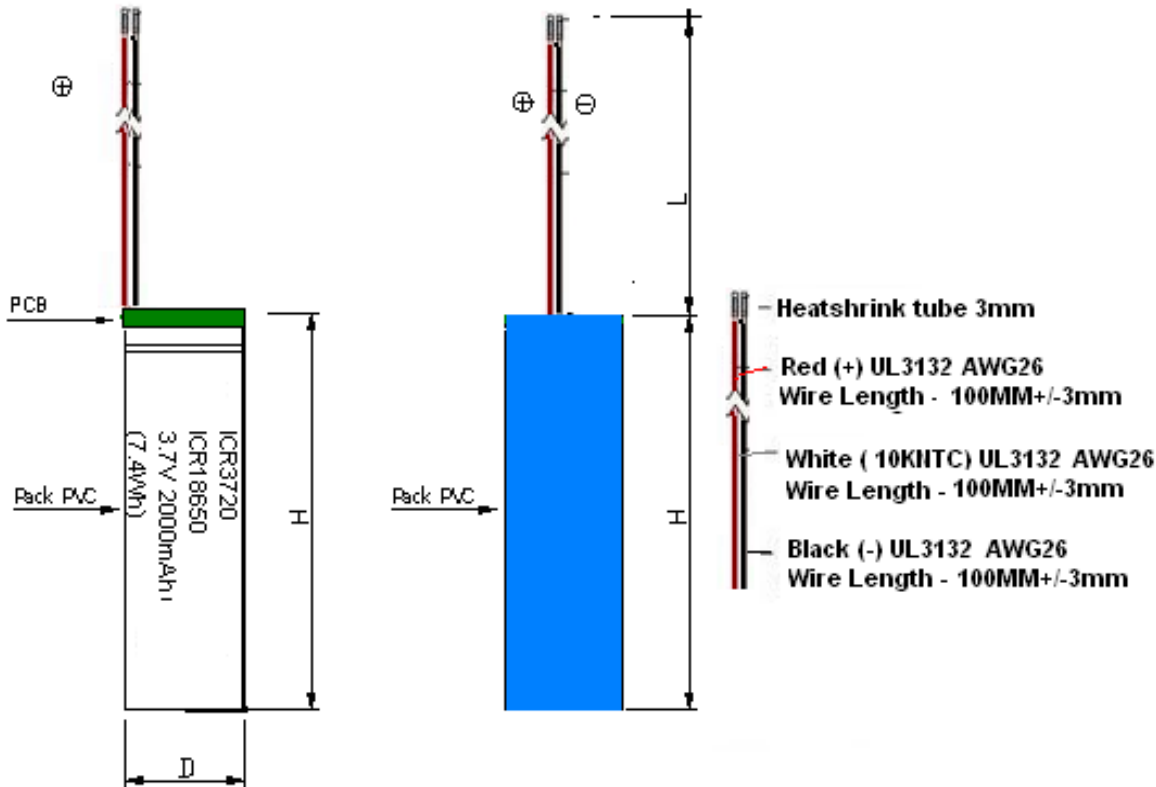
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## 6 Battery specifications/产品规格

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	$\geq 2000\text{mAh}$	Standard discharging method 标准放电方式
2	Battery Voltage 电池电压	3.7-3.9V	Delivery Voltage, Within 10 days from Factory 交货电压, 在出厂 10 天内
3	Standard charge condition 标准充电条件	Charge with 0.2C constant current and 4.2V constant voltage, charge to 4.2V, continue charging till current decline to $\leq 0.01\text{C}$ 充电电流用 0.2C 恒流, 4.2V 恒压充至电流 $\leq$ 0.01C	Charge voltage: $4.2\text{V} \pm 0.02\text{V}$ Charge current: 0.2C 充电电压: $4.2\text{V} \pm 0.02\text{V}$ 流: 0.2C
4	Standard discharging method 标准放电方式	0.2C constant current discharge to 3.0V,	0.2C 恒流放电至 3.0V
5	Internal Impedance 内阻	Assemblage Impedance 装配后内阻 $\leq 160\text{m}\Omega$	Measure the Red and black wire of the connector after assembling. 装配后测试电池插头红黑线

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## 7 Battery Pack Dimensions/电池组尺寸



### BATTERY MARKING



ICR3720  
ICR18650  
3.7V 2000mAh  
(7.4Wh)  
XX-2018

NO	Items	Units: mm		Remark
1	Diameter/直径	D	19	Max.
3	Height/长度	H	70	Max
4	Cable Length/引线长度	L	100±3 (4")	

NO	Part name/名称	Quantity/数量	Unit/单位	Remark
1	Cell/电芯	1	ea	Great Power ICR18650-2000
2	Solder/焊锡	0.04	g	Lead Free
3	PCM	1	Ea	DLX-#18T-1S
4	Wire/导线	3	Ea	UL3132/26AWG

For Any detail and question, Please Tel Engineer:

附页：保护板参数

### 1. 技术规格 specification

- 1 适用范围 using scope: 本规格书适用于由本公司所设计生产的 AO#18T-1S 锂电保护板。
- 2 电池容量 battery capacity: (客户选择)
- 3 环保要求 environment request: ROHS
- 4 功能描述 function description: 过充保护, 过放保护, 过流保护, 短路保护
- 5 技术参数 electric features:

Project	Symbol	Details	标准
Overcharge protection	V <sub>DET1</sub>	Overcharge detection voltage	4. 28V ± 0. 05V
	tV <sub>DET1</sub>	Overcharge detection delay time	300ms (MAX)
	V <sub>REL1</sub>	Overcharge release voltage	4. 08V ± 0. 1V
Deep discharge protection	V <sub>DET2</sub>	Overdischarge detection voltage	3. 0V ± 0. 1V
	tV <sub>DET2</sub>	Overdischarge detection delay time	200ms (MAX)
	V <sub>REL2</sub>	Discharge discharge voltage	3. 0V ± 0. 1V
Over current protection	V <sub>DET3</sub>	Overcurrent detection voltage	150mV ± 30mV
	I <sub>DP</sub>	Overcurrent protection for current (voltage of each battery =3.9V )	MIN: 3A MAX: 7A
	tV <sub>DET3</sub>	Detection delay time	20ms (MAX)
		Protection conditions	断开负载
Short circuit protection		Conditions of protection	外部电路短路
	T <sub>SHORT</sub>	Detection delay time	1ms (MAX)
		Protection conditions	断开短路电路
Internal resistance	R <sub>DS</sub>	The main loop on-State resistance (voltage of each battery =3.9V )	B-至 P- R <sub>DS</sub> ≤ 70m Ω
Current consumption	I <sub>DD</sub>	Working circuit when the internal consumption	MIN: 0. 3 μ A MAX: 10. 0 μ A
Project	Symbol	Details	允许
Charge Rate			
Discharge Rate			

环境温度: 25 °C

### 6 可靠性测试

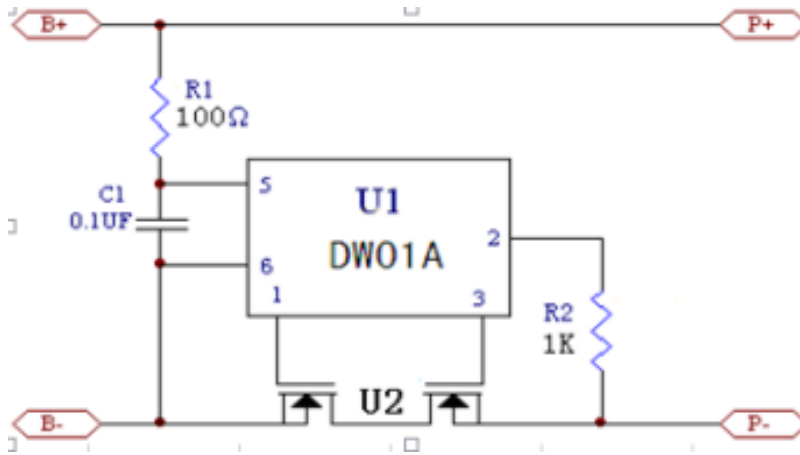
- 恒温恒湿测试 Humidity test : +40±2 °C 90%RH 48Hours 高温测试 High temperature test : +55±2 °C 2Hours
- 低温测试 Low temperature test : -20±2 °C 16Hours

ESD 抗静电测试 ESD test : Normal operation in all parts at ±4KV (contact) ±8KV (AIR) condition

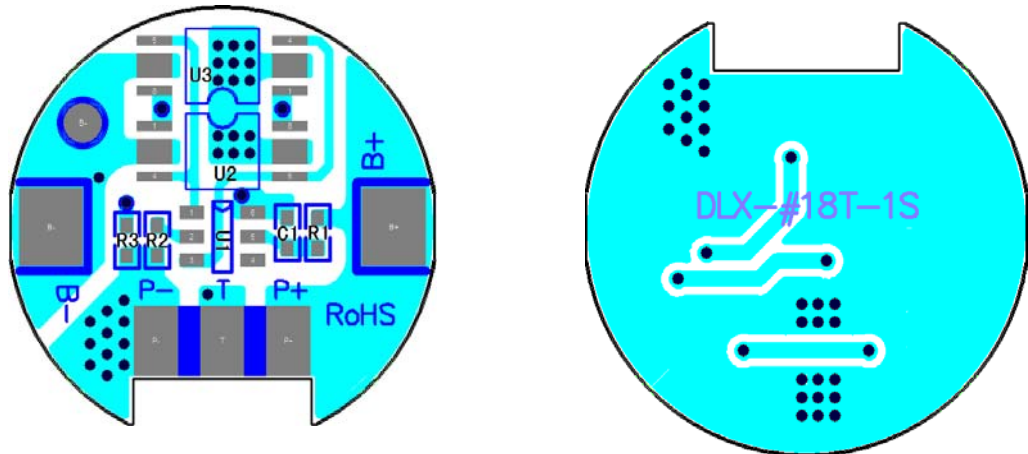
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## 2. 电气原理 Circuit diagram

### 2.1 电气原理图 circuit diagram



### 2.2 PCB 图 PCB layout



## 3. 物料清单 parts list

1	U1	IC	S8261-G3J	SOT-23-6	1	SEIKO
2	U2、U3	MOSFET	EM8205A	TSSOP-8	1	EM
3	R1	电阻	SMD 100 Ω ±5%	0402	1	YAGEO
4	R2	电阻	SMD 1K Ω ±5%	0402	1	YAGEO
5	C1	电容	SMD 0.1 μ F ±20%	0402	1	YAGEO
6	R3	IC	S8261-G3J	SOT-23-6	1	SEIKO
7	PCB	Printed circuit board	DLX-#18T-1S 17.3mm*16.6mm*0.6mm ±0.15mm		1	FR-4/ROHS

For Any detail and question, Please Tel Engineer:

## 8 CAUTIONS IN USE(谨慎使用)

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

(为确保正确使用电池, 使用前请仔细阅读本细则)

### . Handling (电池操作)

- Do not expose to, dispose of the battery in fire. (不要靠近和放置电池于火中)
- Do not put the battery in a charger or equipment with wrong terminals connected.  
(在充电器或设备仪器中不要把电池接错电极)
- Avoid shorting the battery (避免电池短路)
- Avoid excessive physical shock or vibration. (避免电池过多的物理撞击和震动)
- Do not disassemble or deform the battery. (不要解剖和使电池变形)
- Do not immerse in water. (不要把电池浸泡在水中)
- Do not use the battery mixed with other different make, type, or model batteries.  
(不要和其它不同类型的电池混和使用)
- Keep out of the reach of children. (放置电池于儿童不易接触的地方)

### . charge and discharge (充电和放电)。Battery must be charged in appropriate charger only.

(电池必须用适当的充电器充电)

- Never use a modified or damaged charger. (不要使用改装或损坏的充电器)
- Do not leave battery in charger over 24 hours. (不要把电池放置于充电器超过 24h)

### . storage(储存): Store the battery in a cool, dry and well-ventilated area. (应把电池置于凉爽、干燥及通风良好的区域)

### . disposal (电池处理)

- Regulations vary for different countries. Dispose of in accordance with local regulations. (电池处理要符合当地的规定)

## 9 Period of Warranty/保质期

The period of warranty is one 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.

电池的保质期从出货之日算起为一年。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。

## 10 Storage of the Batteries/电池的存放

The batteries should be stored at room temperature, charged to about 30% to 50% of capacity.

We recommend that batteries be charged about once per half a year to prevent over discharge.

电池应当在室温下存放, 应充到 30%至 50%的电量。如长时间储存, 建议每半年充一次电以防止电池过放电。

## 11 Other The Chemical Reaction/其它化学反应

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, 会使缩短电池的使用寿命, 或者会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。

## 12 Note/注释

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

本说明书未包括事项应由双方协议确定。