

深圳市力飞科技有限公司
FLY POWER INDUSTRIES LIMITED

聚合物锂离子电池
Polymer Li-ion battery

产品承认书(Pack)
Product Specification

型号 Model: FLP-603042

样品数量 NO. OF SAMPLES: _____

容量 Cap. : 680mAh

送样日期 DATE OF SENDING SAMPLE: _____

版本 REV: _____

客户代码 CUSTOMER CODE: _____

承认书编号 NO. OF CONFIRMATION: _____

批准 Approved by	审核 Checked by	拟定 Prepared by

客户名 CUSTOMER NAME: _____

客户确认 CUSTOMER APPROVAL	签章 STAMP

版本履历表

Revision History

版本号 Revision No.	内容描述 Description.	修改人 Modify.	审批人 Approval.	日期 Date.

目 录

Content

1.范围 Scope	3
2.依据标准 Performance	3
3.电池基本参数 Parameter	3
4.放电曲线图 Characteristic Curves	3
5.使用环境 Operating Temperature	4
6.技术指标 Battery Characteristics	4
6.1 电池常规性能 Electrochemical performance characteristics	4
6.2 电池环境适应性能 Environment Characteristics	5
6.3 电池安全性能 Safety Performance	5-6
7.保护板规格与特性 PCM Specification and Characteristic	6
7.1 保护板元件图 PCM Diagram	6
7.2 保护板性能参数 PCM Electrical Characteristics	6
7.3 保护板原理图 PCM Schematic diagram	7
7.4 保护板物料清单 PCM BOM	7
8. 电池尺寸结构 Assembly configuration	8
9.包装说明 Packing Instruction	9
10.安全警示 Cautions	9
安全警示 Warnings And Cautions In Using The Battery	9- 10

1. 目的 Scope

本规格书描述本公司设计开发的电池，它是产品设计、生产和检验的依据。其作用是让顾客了解产品的质量及正确使用方法。

This specification shall be applied to Li-ion polymer battery manufactured by FLY POWER INDUSTRIES LIMITED.

2. 依据标准 Performance

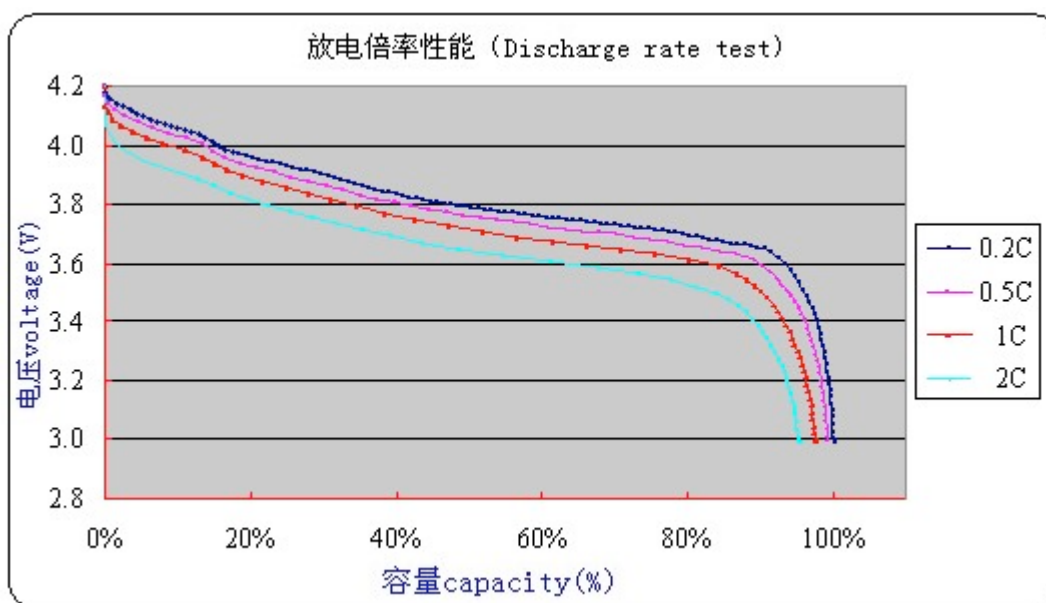
中华人民共和国国家标准 ‘GB/T18287-2000’ 《蜂窝电话用锂离子电池总规范》

Issued by ‘GB/T18287-2000’ national standard of the People's Republic of China 《Li-ion battery general principle》

3. 电池基本参数 Parameter

序号 NO.	项目 Description.	规格 Specification	备注 Remark
1	电芯型号 Battery Model	FLP-603042	
2	最小容量 Minimal Capacity	680mAh	0.2C
3	典型容量 Rated Capacity	680mAh	0.2C
4	标称电压 Nominal Voltage	3.7V	
5	过充保护电压 Overcharge protect voltage	4.28±0.05V	
6	过放保护电压 Overdischarge protect voltage	3.0±0.05V	
7	过电流保护 Overcurrent protection	1.2A~2.0A	
8	短路保护功能 Short circuit protection	有 Yes	
9	短路保护恢复方式 SCP Release condition	自恢复或瞬间充电 Instantly after the short circuit is cut off	
10	贮存温度 Storage Temperature	-5~35℃	1 年 one year
11	内阻 Inner Impedance	≤200mΩ	
12	成品重量 pack weight		
13	最大持续放电电流 Max continue discharge current	680mA	
14	最大充电电流 Max charge current	680mA	

4. 电池放电曲线图 Cell discharge curves



5. 工作温度 Operating Temperature

序号 NO.	Unit 单位	Min 最小	Type 标准	Max 最大	Remark
充电 Charge	℃	0	25	45	
放电 Discharge	℃	-20	25	45	
储存 Storage	℃	-20	25	45	1 month
	℃	-20	25	35	6 months

备注：电池存放前，需要将电池充 40%-65%的容量

Remark: Before storage, should charge the battery to 40%~65% of its full capacity.

6. 技术指标 Characteristics

6.1 电池常规性能 Electro chemical performance characteristics

序号 No.	内容 content	测试方法 Testing method	达到要求 Requirements
1	充电截止电压 Charge cut-off voltage	4.20±0.05V	
2	放电终止电压 Discharge cut-off voltage	3.00±0.05V	
3	标准充电模式 Standard charge	1. 以0.2C电流恒流充电至4.2V, 转4.2V恒压充电, 直到充电电流≤0.01C 电流。Charge the battery at constant current of 0.2C to reach 4.2V. Then charge the battery at constant 4.2V voltage until the charging current decreasing to 0.01C. 2. 以0.5C电流恒流充电至4.2V, 转4.2V恒压充电, 直到充电电流≤0.01C 电流。Charge the battery at constant current of 0.5C to reach 4.2V. Then charge the battery at constant 4.2V voltage until the charging current decreasing to 0.01C.	充电时间≤8 小时 Charge time≤8 hours
4	标准放电性 Standard discharge	以标准充电模式满充后, 搁置1小时, 以0.2C电流恒流放电至3.0V。After the standard charging, rest for 1 hour then discharge to 3.0V@0.2C.	放电时间≥300Min Discharging time≥300Min
5	倍率放电性能 Rate discharge	以标准充电模式满充后, 搁置1小时, 以1C 电流恒流放电至3.0V。After the standard charging, rest for 1 hour then discharge to 3.0V@1C.	放电时间≥51Min Discharging time≥51Min
6	高温性能 High temperature characteristics	电池满充后在 60℃±2℃度的环境下搁置2小时, 然后以1C 电流放电至3.0V。Fully charging, store them at (60±2)℃ for 2 hours, then discharge to 3.0V @1C	放电时间≥51Min, 电池外观无变形、无爆裂。 Discharging time≥51Min No transform No explosion, No fire, No leakage.
7	低温性能 Low temperature Characteristics	以标准模式充电, 将电池放入(-10±2)℃的低温箱中恒温16~24h后, 0.5C 电流恒流放电至3.0V。Full charging, store them at (-10±2)℃ for 16~24 hours, then discharge to 3.0V @0.2C.	放电时间≥210Min, 电池外观无变形、无爆裂。 Discharging time≥210 Min No transform , No explosion, No fire, No leakage.
8	荷电保持能力 Capacity retention	以标准模式充电后, 在环境温度 20℃±5℃的条件下, 将电池开路搁置28d, 再以0.5C 电流进行放电至3.0V。Fully charging, store them at (20±2)℃ for 28 days, then discharge to 3.0V @0.2C.	放电时间≥255Min Discharging time≥255Min
9	常温循环寿命 Cycle Life @25℃	以0.5C 电流恒流放电至3.0V, 再以0.5C 电流恒流充电至4.2V, 然后恒压4.2V 充至电流≤0.01C, 静止10Min, 以0.5C 电流恒流放电至3.0V, 放电结束后, 静止10Min, 再进行下一充放循环, 直至连续三次放电容量小于80%的0.5C的首次放电容量。Discharge to 3.0V @0.5C, then Charge the battery @0.5C to reach 4.2V. Then charge the battery at constant 4.2V voltage until the charging current decreasing to 0.01C. Rest for 10 min. discharge to 3.0V@ 0.5C and rest for 10 min. Continue the charge/discharge cycles until discharge capacity lower than 80% of rated capacity.	循环次数≥300 次 Cycle life ≥300

10	贮存 storage	以标准模式充电给电池充入 40%~65%的容量，然后在环境温度 20℃±5℃，相对湿度 45%~85%的环境中贮存。贮存 12 个月以 0.5C 电流放电至终止电压。 进行贮存试验的电池应选自生产日期到试验日期不足 3 个月的电池 Charge the battery to 40%~65% of its rated capacity using standard charging mode, then keep it in an 20℃±5℃, humidity 45%~85% room for 12 months. Discharge it @0.2C until voltage down to 3.0V. (The testing sample should be within 3 months dated from production date)	放电时间≥240Min Discharge time≥240Min
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6.2 电池环境适应性能 Environment Characteristics

序号 No.	内容 content	测试方法 Testing method	达到要求 Requirements
1	恒定湿热性能 Hot&Humidity test	电池按标准充电模式充电后，将电池放入40℃±2℃，相对湿度为90%~95%的恒温恒湿箱中搁置48h后，将电池取出在环境温度20℃±5℃的条件下搁置2h，再以1C电流放电至终止电压。 Full charging, store it at 40±2℃ with 90%~95RH% for 48 hours. Then put the battery at room temperature 20±2℃ for 2 hours. Then discharge to 3.0V @1C	放电时间≥36Min, 电池无明显变形、锈蚀、冒烟或爆炸。 Discharging time≥36Min No explosion, No transform, No erosion No fire, No leakage.
2	振动实验 Vibration Test	电池按标准充电模式充电后，将电池直接安装或通过夹具安装在振动台的台面上，按下面的振动频率和对应的振幅调整好试验设备，X、Y、Z三个方向上从10Hz~55Hz循环扫频振动30min，扫频频率为1oct/min； 振动频率：10Hz~30Hz 位移幅值(单振幅)：0.38mm 振动频率：30Hz~55Hz 位移幅值(单振幅)：0.19mm。 After Standard Charging, fixed the battery to vibration table, then subjected to vibration test for 30 minutes per axis of XYZ axes Frequency rate :1 oct/min Vibration frequency : 10Hz-30Hz Excursion(single amplitude): 0.38mm Vibration frequency : 30Hz-55Hz Excursion(single amplitude): 0.19mm	电芯无明显损伤、漏液、冒烟或爆炸。 电池电压≥3.7V No leaking, No fire, No explosion Voltage≥3.7V
3	碰撞试验 Shock test	电池按标准充电模式充电后，将电池平均按X、Y、Z三个互相垂直轴向直接或通过夹具坚固在台面上，按下述要求调整好加速度、脉冲持续时间，进行碰撞试验。 脉冲峰值加速度 100m/s ² 每分钟碰撞次数 40~80 脉冲持续时间 16ms 碰撞次数 1000±10。 After Standard Charging, test condition: Acceleration :100m/s ² Crash time per min: 40~80 times Pulse lasting time : 16ms Shock times : 1000±10times	电芯无明显损伤、漏液、冒烟或爆炸。 电池电压≥3.7V No leaking, No fire, No explosion Voltage≥3.7V
4	自由跌落试验 Drop Test	电池按标准充电模式充电后，将电池样品从高度(最低点高度)为1m的位置自由跌落到置于水泥地面上的18mm~20mm厚的硬木版上，从X、Y、Z正负方向(六个方向)每个方向自由跌落1次。 自由跌落结束后，将电池以1C电流放电至终止电压。然后按0.5C电流进行充放电循环，充放电循环次数应不多于3次。三次循环中有一次达到即可。 After standard charging, drop the battery from 100cm height onto a 18mm~20mm thick hardwood. Two sides of X,Y,Z directions each (total 6 times) After the drop test, discharge the battery @1C to 3.0V. Then charge it @1C to full capacity. Continue the test, within 3 times the battery should reach the target once.	电池不漏液、不冒烟、不爆炸；放电时间≥255min。 No leaking, No fire, No explosion Discharging≥51min

6.3 电池安全性能

序号 No.	内容 content	测试方法 Testing method	达到要求 Requirements
1	过充保护性能 Overcharge protection test	电池按标准充电模式充电后，用恒流恒压源持续给电池加载8h，恒流恒压源电压设定为2倍标称电压，电流设定为0.5C电流的外接电流。 After standard charging. Apply a 7.4V stable Voltage and 1C stable current to the battery for 8 hours.	电池不爆炸、不起火、不冒烟或漏液。 No fire No explosion No leaking
2	过放保护性能 Over discharge protection test	电池按标准充电模式充电后，以0.5C放电至终止电压后，外接30Ω负载放电24h。fter discharged to the cut-off voltage, the battery shall be subjected to a short-circuit condition with a load of resistance less than 30Ω for 24 hours	电池不爆炸、不起火、不冒烟或漏液 No fire No explosion N0 leaking

3	短路保护性能 Short circuiting protection test	电池按标准充电模式充电后，将正负极用0.1Ω电阻器短路1h。将正负极断开，电池以0.5C电流瞬间充电5s后用电压表测量电池电压。After standard charging, the battery shall be subjected to a short-circuit condition with a wire of resistance less than 100mΩ for 1 hour. Cut off the circuit, Charge the battery with constant current at 1.0C for 5s	电池不爆炸、不起火、不冒烟或漏液;瞬时充电后， 电池电压≥3.7 V No fire 、 No explosion Voltage≥3.7V
4	重物冲击 Impact Test	电池按标准充电模式充电后，电池放置于冲击台上，将9.1kg重物自1m高度自由落下，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)，电池允许发生变形 After standard charge, Place the battery on a flat surface. A 9.1 kg article is to be dropped from a height of 100cm onto the sample. The battery is allowed to transform.	电池不起火、不爆炸 No fire No explosion
5	热冲击 Heating Test	电池按标准充电模式充电后，电池放置于热箱中，温度以(5℃±2℃)/min的速率升到130℃±2℃并保持30min。After standard charging, a battery is to be heated in an oven convection or circulating air oven. The temperature of the oven is to be raised at a rate of 5±2℃/min to a temperature of 130±2℃ and last for 30 minutes.	电池不起火、不爆炸 No fire No explosion
6	过充电 Over Charge	电池按标准充电模式充电后，接有热电偶的电池置于通风橱中，连接正负极于一恒流恒压电源，调节电流至3C，为4.8V，然后对电池以3C电流充电，直到电池电压为4.8V，电流将到接近0A。试验过程中监视电池温度变化，当电池温度下降到比峰值低约10℃，结束试验。 本实验是在无电池外保护线路的情况下进行的。After standard charging, put the battery in fume hood. Add constant voltage & current 4.8V 3C to the battery. Charging it until the battery reaches 4.8V, charging current decreases to almost 0A. Record the temperature curve of the battery. When the battery temperature decreases to about 10℃ lower after reaching the peak temperature. End the test. This test is performed without PCM	电池不起火、不爆炸 No fire No explosion
7	短路 Short Circuiting Test	将接有热电偶的电池置于通风橱中，短路其正负极(线路总电阻不大于50mΩ)。试验过程中监视电池温度变化，当电池温度下降到比峰值低约10℃，结束试验。 本实验是在无电池外保护线路的情况下进行的。After standard charging, put the battery in fume hood. Connect the Negative Pole and Positive pole directly. (the wire's resistance should below 50mΩ. Record the battery's temperature curve during the test. When the battery temperature decreases to about 10℃ lower after reaching the peak temperature. End the test. This test is performed without PCM	电池不起火、不爆炸，电 池的外部温度<150℃ No fire No explosion Cell temperature<150℃

备注：以上技术性能标准测试环境 Remark: Standard environmental test condition

温度：25±2℃ 相对湿度：45±20% （除非另外要求）

Temperature: 25±2℃; Humidity: 45±20%RH unless otherwise specified

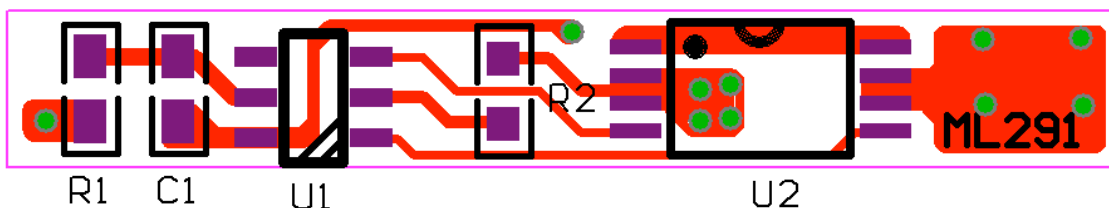
测试条件：1. 对于带保护装置的电池，除电池安全性能中的6和7两项为不带保护装置的情况下，其他测试是在带保护装置的情况下进行的。2. 对于不带保护装置的电池，所有测试均是在不带保护装置的情况下进行的。

Test condition: 1. for battery with PCM, all tests are tested with PCM except 6 and 7.

2. for battery without protect PCM, all tests without PCM.

7.保护板规格与特性 PCM Specification and Characteristic

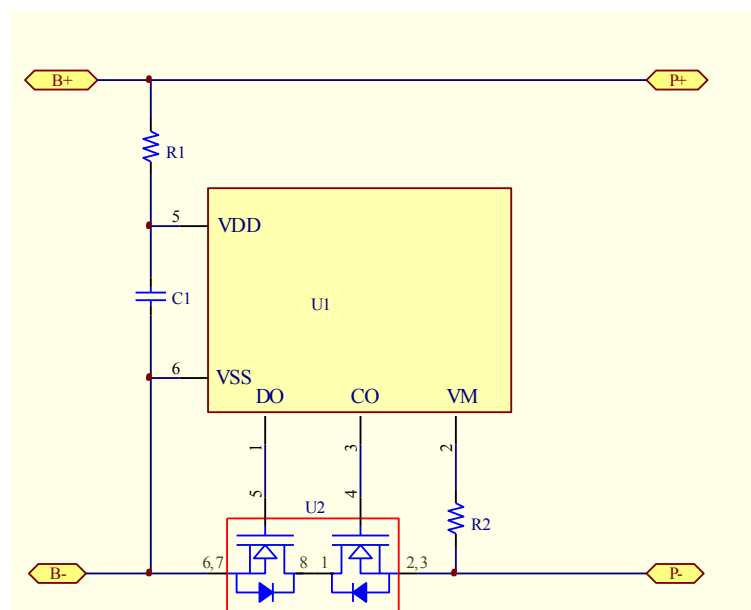
7.1 保护板元件图 PCM Diagram



7.2 保护板性能参数 PCM Electrical Characteristics

序号 No.	项目 Item	参数 Specifications	单位 Unit
1	控制 IC 工作电压 IC Operation voltage	1.5~8	V
2	过充检测电压 Over charge Protection voltage	4.28±0.05	V
3	过充复位电压 Over charge release voltage	4.08±0.05	V
4	过充延迟时间 Over charge detection delay time	1.2(typ.)	S
5	过放检测电压 Over discharge detection voltage	3.0±0.05	V
6	过放延迟时间 Over discharge detection delay time	144(typ.)	ms
7	过流检测电压 Over current detection voltage	0.08±0.015	V
8	过流延迟时间 Over current detection delay time	4.5~18	ms
9	短路保护条件 Short circuit Detection condition	外部电路短路 Exterior short circuit	
10	短路保护延迟时间 Short circuit protection delay time	320 Max	us
11	自耗电流 Current consumption (Operation)	7.0 Max	uA

7.3 保护板原理图 PCM Schematic diagram

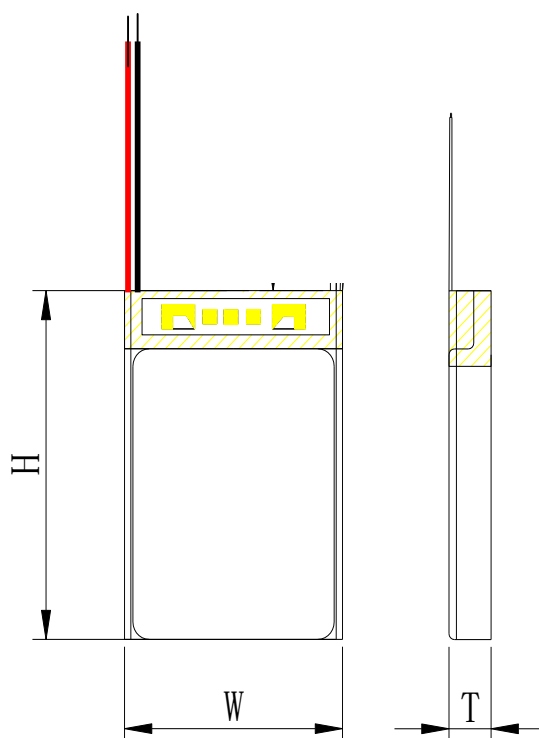


7.4 保护物料清单 PCM BOM

序号 NO.	物料名称 Title	规格型号 Specifications	单位 Unit	数量 Quantity	备注 Remark
1	PCB		PCS	1	
2	U1	G3J	PCS	1	SEIKO
3	U2U3	8205	PCS	2	
4	R1	470R $\pm 5\%$ 1/16W 0603	PCS	1	
5	R2	2K $\pm 5\%$ 1/16W 0603	PCS	1	
6	C1	0.1uF $\pm 20\%$ 25V 0603	PCS	1	

8. 电池尺寸结构 Assembly configuration

8.1 电池尺寸示意图 Battery Dimension Drawing



项目 Item	描述 Description	规格 Dimension and specification
T	厚度 thickness	6.1mm(max)
W	宽度 width	30.5mm(max)
H	长度 length	44mm(max)
L1	外露线长 Cable length	50.0 \pm 2mm

8.2 电池物料清单 Battery BOM

序号 NO.	物料名称 Title	规格型号 Specifications	数量 Quantity	单位 Unit	备注 Remark
1	Polymer battery	FLP-603042	1	PCS	Polymer battery
2	导线 Cable	UL1007 26AWG	2	PCS	黑、红 Black、Red
3	保护板 PCM		1	PCS	

9、包装说明 Packing Instruction

标志的图形、尺寸、颜色符合 GP/T 191-2000 的要求。The photo, size and color of the mark are all comply with the requirement of GP/T 191-2000.

10. 安全警示 Cautions

10.1 危险 Danger Warning

为了防止电池泄漏、发热、爆炸，请遵守以下防范事项：To prevent the battery from leaking, heating or explosion, please observe the following precautions:

- 10.1.1 请不要将电池浸入水或海水中，注意防潮。Do not immerse the battery in water or seawater, and keep the battery in a cool and dry enviroment if it stands by.
- 10.1.2 请不要将电池接近热源，如火或发热器。Do not use or leave the battery near a heat source as fire or heater.
- 10.1.3 在充电时，请用特定的充电器。Use the Lithium-ion battery charger specifically for that purpose when recharging.
- 10.1.4 请不要颠倒电池的正（+）负（-）极。Do not reverse the position and negative terminals.
- 10.1.5 请不要将电池连接在电源的出口、车辆自动点灯处。Do not connect battery to the plug socket or car-cigarette-plug
- 10.1.6 请不要将电池弃置于火里或热的物体上。Do not use or leave battery nearby fire, stove or heated place.
- 10.1.7 请不要将电池的正（+）负（-）极用导体短路 Do not short-circuit the battery by directly connecting the positive and negative terminals with metal objects.
- 10.1.8 请不要敲打或丢抛电池。Do not strike, trample or throw the battery.
- 10.1.9 请不要用针或其它锋利物刺穿电池，不要用锤击打或者踩在上面。Do not drive a nail into the battery. Strike it by hammer, or tread it.
- 10.1.10 请不要直接焊接电池。Do not make the direct soldering on battery.
- 10.1.11 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。Do not disassemble or reconstruct battery.
- 10.1.12 请不要在接近火源或在酷热的环境中充电。Do not charge battery nearby the fire or under the blazing sun.
- 10.1.13 禁止将电池与金属，如发夹、项链等一起运输或贮存 Do not transport or store the battery together with metal objects such as hairpins, necklaces, etc.
- 10.1.14 禁止长期在高温下（炙热的阳光下或很热的汽车中）使用或放置电池，否则可能会引起电池过热、起火或功能失效、寿命减短。Do not use or leave the battery under the blazing sun(or heated car by sunshine). The battery may smoke, heat or flame. And also, it might cause the deterioration of battery's characteristics or cycle life.
- 10.1.15 禁止在强静电和强磁场的地方使用，否则易破坏电池安全保护装置，带来不安全的隐患。Do not use the battery in a location where static electricity and magnetic field is great, otherwise, the safety devices may be damaged, causing hidden trouble of safety
- 10.1.16 如电池泄露，电解液进入眼睛，请不要揉擦，用清水冲洗眼睛，立即送医治疗，否则会伤害眼睛。If the battery leaks, and the electrolyte get into the eyes, do not rub the eyes, instead, rinse the eyes with clean water, and immediately seek medical attention. Otherwise, it may injure eyes.
- 10.1.17 如果电池发出异味、发热、变色、变形或使用、贮存，充电过程中出现任何异常，立即将电池从装置或充电器中移离并停用。If the battery gives 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 charger and stop using it.
- 10.1.18 如果电极弄脏，使用前应用干布抹净，否则可能会导致接触不良功能失效。In case the battery terminals are dirty, clean the terminals with a dry cloth before using.
- 10.1.19 废弃之电池应用绝缘纸包住电极，以防起火、爆炸。Be aware discarded batteries may cause fire or explosion, tape the battery terminals to insulate them

10.2 注意事项 warning

10.2.1 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。In order to ensure the safe, battery should be installed safety device, in static than manufacturing request when electrostatic when do not use, otherwise, safety device would failure, battery overheat, rupture, explosion and fire.

10.2.2 请在下列条件下正常使用，否则会过热、着火、性能降低及缩短寿命 In the normal use of the following conditions, otherwise they will overheat and catch fire, performance and shorten the life

环境条件 Ambient condition: (T 温度 temperature)

充电 charging: 0~+65°C

放电 discharging: -20~+65°C

30 天内保存 storage within 30 days: -20~+60°C

180 天内保存 storage within 180 days: -20~+45°C

10.2.3 如果儿童使用电池，应指定他们按使用说明书进行使用，且保证电池在任何时候都必须是正常使用；If children use the battery, you should specify them by using the instructions for use, and ensure the battery at any time must be in normal use;

10.2.4 若电池泄露，电解质粘于皮肤或衣服上，请用水冲洗掉或用流水洗衣服，否则将会腐蚀皮肤。If the battery leaks, electrolytes stick to the skin or clothing, wash off with water or fluid washing clothes or skin corrosion will die.

10.2.5 为了不装错或损耗电池，请认真阅读使用说明书，并按照指导进行安装与拆卸(从装置上) In order to not install error or loss of the battery, please carefully read the operating instructions, and follow the instructions for installation and removal (from device)

10.2.6 若电池不长期使用，请把电池拿出并放于干燥的地方，否则电器将会被腐蚀电池降低性能和减少寿命。If the battery is not used, please take the battery out and placed in a dry place or electrical appliances will be corrosion of battery performance and reduce life.

10.2.7 若被污染了电池终端，请在使用之前用干布擦干净，否则将导致与装置接触不良，功率不足或充电失败。If it is polluted battery terminal, please before you use it with a dry cloth to wipe clean, otherwise will result in poor contact with the device, power shortage or charge failure.

10.2.8 保质期 warranty period

保质期是从出厂日期(喷码)开始起 12 个月。Warranty period of this product is 12 months from manufacturing code

10.2.9 产品责任 Product responsibility

您必须严格遵守我司规格书和文件后面的注释使用电池，由于误用会引起电池过热，发生火灾或爆炸。对于没有按照规格书进行操作所造成的任何以外事故，我司不负担任何责任。You must strictly adhere to our specifications and documentation comment later, due to the misuse of batteries can cause the battery to overheat, fire or explosion. For the specification for any accidental, I Secretary does not bear any responsibility.

如果规格书、原材料、生产过程或生产控制系统发生改变，改变的信息将会随质量和可靠性数据以书面形式通知消费者。If the specification, raw materials, production processes or production control system is changed, the change of information will vary depending on the quality and reliability data to inform consumers in writing.

10.2.10 储存 Storage

电池若长期储存，要保持在 50%放电状态或 50%充电状态 Battery if long-term storage, should be charge the battery to 50% of its full capacity.

电池应保存在低温干燥的环境中 Batteries should be saved in low temperature dry environment.

电池储存时，应每三个月补充电一次，充电至 50%充电状态。Battery storage should be added every three months, the electric charge to a 50% charge status.

10.2.11 包装电池上的标示 Packaging label on the battery.

10.2.12 以下警告应注明在包装后的电池上；The following warnings should be indicated on the packaging of battery.

使用规定的充电器；Use a specified charger.

不要将电池投入火中或加热；Do not place the battery into a fire or heating.

不要将电池两端短路；Do not short-circuit the battery at both ends.

不要将电池分解拆散。Do not disassemble the battery.