

# Specification Approval Sheet

## 产品规格书

Battery Type: GRPA875175-15C-3.7V 16000mAh

电池型号: GRPA875175-15C-3.7V 16000mAh

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Manufacturer reserve the right to alter or amend the design, model and specification without prior notice

## Appendix

附

### Customer's Checking Criterion

( customer required )

客户验收标准 ( 客户必填 ):

- By Grepow's Testing Criterion for Lithium Polymer Battery.

按格瑞普电池有限公司电池检验标准

- By Customer's Testing Request and Criterion ( Customer must supply the checking criterion )

按客户要求检验 ( 需附验货标准 )

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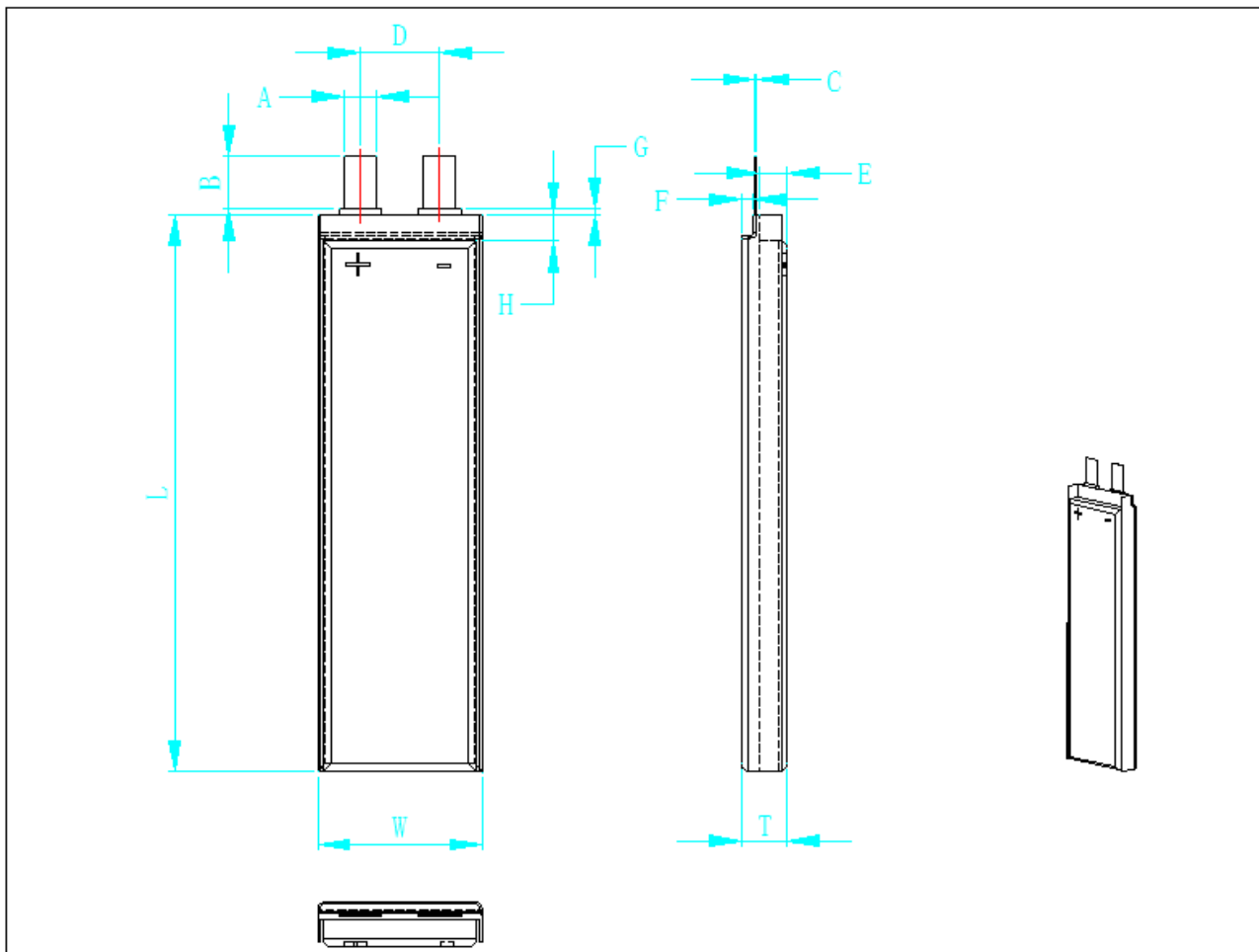
## 1. 序言 PREFACE

此规格书适用于深圳格瑞普电池有限公司的锂聚合物可充电电池产品

The specification is suitable for the performance of Lithium-Polymer (LIP) rechargeable battery produced by the SHENZHEN GREPOW BATTERY CO., LTD.

## 2. 产品规格 SPECIFICATION

单颗电池规格 Specifications of single cell



尺寸	厚度 Thickness (T)	10.2±0.3mm
	宽度 Width (W)	75.0±0.5mm
	长度 Length (L)	174.0±1.0mm
	极耳中心距 (D) Distance between 2 tabs	38.0±1.5mm
	极耳宽度 Tab Width (A)	25mm
	极耳厚度 Tab Thickness (C)	0.2mm
	极耳外露长 Tab Length (B)	10mm
	极耳胶外露长 Sealant Length (G)	2.5±1.0mm
	正封宽 Sealing Width (H)	8.3±0.2mm
	槽 1 Deep groove (E)	6.2mm
	槽 2 Deep groove (F)	3.2mm
重量		305.5±5.0 g

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### 3. 电芯性能检查及测试 Performance And Test Conditions

#### 3.1 标准测试环境 Standard environmental test condition

除非特别说明，本标准书中所有测试均在以下环境条件下进行

Unless otherwise specified, all tests stated in this Product Specification are conducted at below condition:

温度：23±5°C

湿度：65±20%RH

Temperature：23±5°C

Humidity: 65±20%RH

#### 3.2 测量器具及设备 Measuring Instrument or Apparatus

##### 3.2.1 尺寸测量器具 Dimension Measuring Instrument

尺寸测量器具的精度等级应不小于 0.01 mm。

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm.

##### 3.2.2 伏特计 Voltmeter

按照国家标准指定规格等级或采用灵敏度更高的，测量电压时内阻不应小于 10kΩ/V。

Standard class specified in the national standard or more sensitive class having inner impedance more than 10kΩ/V

##### 3.2.3 安培计 Ammeter

按照国家标准指定规格等级或采用灵敏度更高的，包括电流表及电线在内的总外阻应小于 0.01Ω。

Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01Ω.

##### 3.2.4 电阻计 Impedance Meter

内阻测试仪测量原理应为交流阻抗法 ( 1kHz LCR )。

Impedance shall be measured by a sinusoidal alternating current method(1kHz LCR meter).

#### 3.3 外观检查 Visual inspection

不允许有任何影响电池性能的外观缺陷，诸如裂纹、裂缝、泄漏等。

There shall be no such defect as scratch, flaw, crack, and leakage, which may adversely affect commercial value of the cell.

#### 3.4 标准充放电 Standard Charge\Discharge

##### 3.4.1 充电 Charge: 以 0.5C 电流恒流充电至限制电压 4.2V 时,改为恒压充电,直到截止电流为 0.02C 时停止充电;

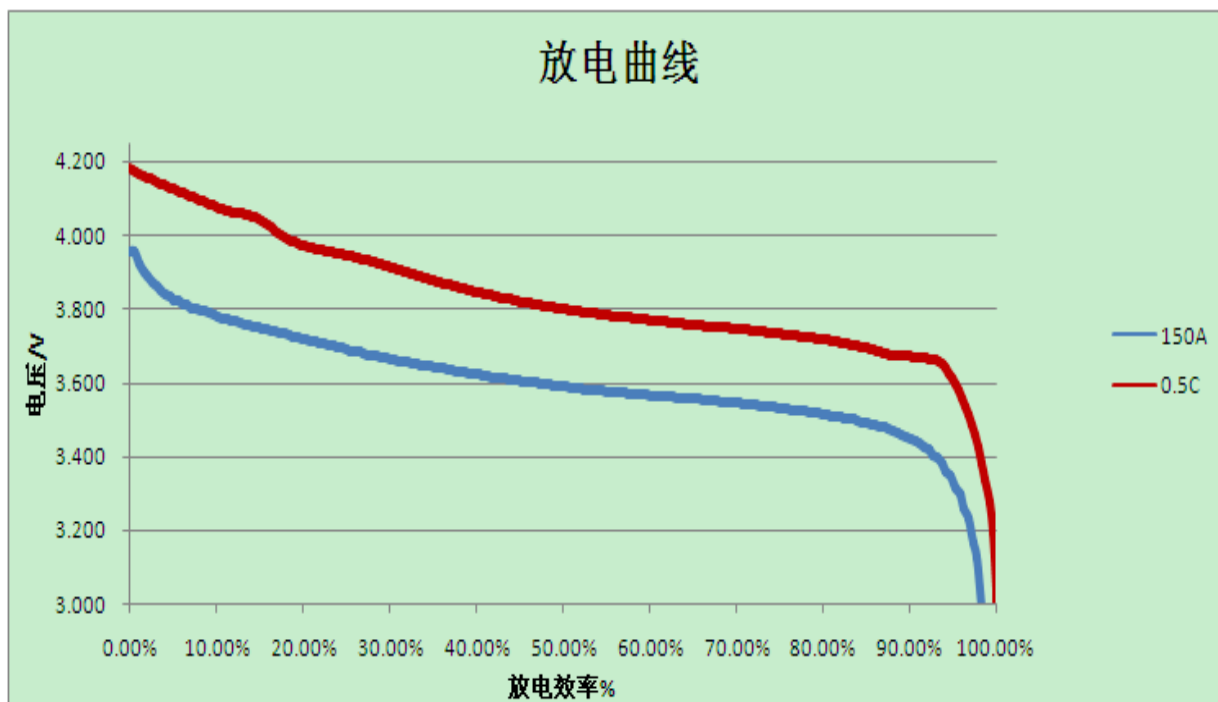
The battery will be charged to 4.2V with 0.5C from constant current to constant voltage, when the current is 0.02C, stop to charge.;

##### 3.4.2 放电 Discharge : 0.5C to 3.0V

4. 电池常规性能检查及测试

Routine Inspection And Testing Of Battery Performance

标称容量 Typical Capacity①	16000mAh	
最小容量 Minimum capacity	14900mAh	
标称电压 Nominal Voltage	3.7V	
开路电压 Open-Circuit Voltage	4.15V-4.20V	
出货电压 Voltage of shipment	3.8V-3.9V	
交流内阻 AC Impedance	≤ 1.5mΩ	
充电条件 Charge Condition	标准充电电流 Standard Charge current	8000mA
	快速充电电流 Rapid Charge current	10000mA
	温度 Temperature	10°C-45°C
充电时间 Charging time	标准充电：3.0 小时 (参考值) Standard Charging : 3.0 hours(Ref.)	
	快速充电：2.5 小时 (参考值) Rapid charge : 2.5 hours(Ref.)	
放电条件 Discharge Condition	持续放电电流 Constant discharge current	150000mA
	瞬间放电电流 Peak discharge current	240000mA ( ≤ 3S )
	温度 Temperature	-20°C~60°C
①标称容量：0.5C,4.2V~3.0V@23°C±2°C Typical Capacity:0.5C,4.2V~3.0V@23°C±2°C		



注：此放电曲线测试温度范围为 23°C±2°C。

测试项目 Items	单位 Unit	规格 Specification	条 件 Condition	备 注 Remarks
高倍率放电 High Rate Discharge(150A )	min	≥ 5.4	标准充电/休息 5 分钟 用 150A 放电至 3.0V Standard Charge/rest 5min discharge at 150A to 3.0V	
寿命测试 Cycle Life Test	Cycle	≥ 150	测试条件： 1) 恒流恒压充电 0.5C 充电至 4.2V，限流 0.02C 2) 静置：10min 3) 恒流放电：150A 放电至 3.0V 4) 静置：10min 5) 循环 1) 至 4) 工步 当以放电容量连续两次小于初始容量 80% 时，所完成的循环次数定义为该电芯的循环寿命 Test condition： Step1：Charge: 0.5C to 4.2V，end current 0.02C Step2：Rest :10min Step3：Discharge: 150A to 3.0V Step4：Rest：10min Step5：cycle from step1 to step 4 Less than 80% of first capacity two times	
不同温度下放电特性 Discharge Performance at different temperature	min	≥ 110	高温：标准充电后储存在 60±2℃ 的环境中，2 小时后用 0.5C 放电 High Temperature：Storage 2hrs at 60±2℃ after standard charge, 0.5C discharge at 60±2℃	3.0V/cell Cut-off
	min	≥ 210	低温：标准充电后储存在 -20±2℃ 的环境中，4 小时后用 0.2C 放电 Low Temperature：Storage 4hrs at -20±2℃ after standard charge, 0.2C discharge at -20±2℃	



自放电 Charge Reserve	N/A	≥ 85% ( 初始容量 First Capacity )	标准充满电后常温贮藏 28 天 , 标准 0.5C 放电 Standard charge, Storage 28days at room temperature Standard discharge (0.5C)	
		恢复容量 ≥ 95% 初始容量 Recovery Capacity ≥ 95% ( First Capacity )	按标准充放电制式循环 2 次 , 取最大值为恢复容 量 Standard charge/discharge for 2 cycles , to test recovery capacity	
高温储存特性 High Temperature storage	N/A	恢复容量 ≥ 95% 初始容量 Recovery Capacity ≥ 95% ( First Capacity )	标准充满电后 60°C 储存 4 小时 , 标准 0.5C 放电 Standard charge Storage at 60 degree: 4h Standard discharge (0.5C)	3.0V/cell Cut-off

安全性能测试 Safety Test

测试项目 Items	单位 Unit	规格 Specification	条 件 Condition	备 注 Remarks
短路测试 External Short Circuit	N/A	不着火不爆炸 No Fire and No Explosion	常温：标准充电后，在 20°C±5°C 环境中用电阻为 80 ±20 mΩ 的回路连接电池的正负极，直至电池 恢复到常温。 Normal Temperature: After standard charge, the cell is to be short-circuit by connecting the positive and negative terminals of the cell with a circuit load having a resistance load of 80 ±20 mΩ at 20°C±5°C until the cell temperature returns to ambient temperature.	*
热冲击 Thermal Shock Test	N/A	不着火不爆炸 No Fire and No Explosion	标准充电后，将电池放进烘箱内，以 5±2°C/min 速 度升高烘箱内温度至 130±2°C 后，恒温 30min。 Standard charging, put the cell in the oven. The temperature of the oven is to be raised at 5±2°C per minute to 130±2°C, and remains 30 minutes.	

挤压 Crush test	N/A	不着火不爆炸 No fire and no explosion	垂直于电池最大面施压。 压力为13 kN，一旦这个最大压力达到马上卸压。电池在最大面上承受一次挤压，然后搁置4h以上。 The pressure is perpendicular to the max surface of cell. the pressure is 13 kN, stop pressing when pressure reaches max . rest more than 4h.	
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环境及机械性能测试 Ambient And Mechanical Character

测试项目 Items	单位 Unit	规格 Specification	条 件 Condition	备 注 Remarks
恒定湿热 Constant temperature and humidity	N/A	不爆炸、不起火、不漏液、 ; No fire, no explosion and no leakage	完全充电后，将电芯放入 60±2℃，相对湿度为 90%~95%的恒温恒湿箱中搁置 3 天 Fully charged, the cell is to be placed in a chamber with a constant 60±2℃, 90%~95% relative humidity for 3 days.	
高空模拟 Altitude simulation Test		不爆炸、不起火、不漏液 No fire, no explosion and no leakage	完全充满电后，电池在绝对压力为 11.6Kpa、室温条件下放置 6 小时 Fully charged, the cells are to be stored for 6 hours at an absolute pressure of 11.6 kPa and a room temperature	
温度循环 Temperature cycling test	N/A	不爆炸、不起火、不漏液 No fire, no explosion and no leakage	完全充电后，将电池放置在温控箱内进行如下步骤： 1) 温度 75±2℃，保温 6 h； 2) 降温至 - 40±2℃，保温 6 h； 3) 温度转换时间≤ 30min； 4) 重复步骤 1)---2)，共循环 10 次 Fully charged, the cells are to be placed in a test chamber and subjected to the following cycles: 1. 75±2℃, maintaining this	

			<p>temperature for 6h</p> <p>2. Raising the chamber temperature to <math>-40\pm 2^{\circ}\text{C}</math> , and maintaining this temperature for 6h</p> <p>3. Time of temperature transformation within 30 min</p> <p>4. 10 cycles</p>	
振动 Vibration Test	N/A	不爆炸、不起火、不漏液 No fire, no explosion and no leakage	<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 1.6 mm，振动频率为 10Hz~55Hz，每分钟变化为 1Hz。After standard charge, 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~ 55Hz, the excursion of the vibration is 1.6mm.The cell shall be vibrated for 30 minutes per axis of XYZ axes.</p>	*
自由跌落测试 Free Falling(drop)	N/A	不爆炸、不起火、不漏液 No fire, no explosion and no leakage	<p>标准充电后，搁置 2 小时。从 1.2M 高任意方向自由跌落 30MM 厚木板 3 次 Standard Charge ,and then leave for 2hrs,check battery before / after drop Height: 1.2m Thickness of wooden board: 30mm Direction is not specified Test for 3 times</p>	

## 5. 贮存及其它事项 STORAGE AND OTHERS

5.1.环境温度 Ambient temperature:  $23^{\circ}\text{C}\pm 5^{\circ}\text{C}$

相对湿度 Relative Humidity:  $65\pm 20\%\text{RH}$

5.2.请每隔 3 个月按下面方法激活电池一次:

please activate the battery once every 3 months according to the following method:

0.2C 充电至 4.2V, 休息 5 分钟, 然后用 0.2C 放电至每颗电池 3.0V, 休息 5 分钟, 0.2C 充电 3.9V。

Charge at 0.2C to 4.2V, rest 5 min, then discharge with 0.2C to 3.0V/cell, rest 5 min, then charge at 0.2C to 3.9V.

## 6. 聚合物锂离子充电电芯操作指示及注意事项 HANDLING PRECAUTIONS AND GUIDLINE

声明一：

客户若需要将电芯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芯,应事先联系格瑞普,因为需要进行特定的实验测试以核实电芯在该使用条件下的性能及安全性。

Note(1):

The customer is requested to contact GREPOW in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

声明二：

对于在超出文件规定以外的条件下使用电芯而造成的任何意外事故,格瑞普概不负责

Note(2):

GREPOW will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

声明三：

如有必要,格瑞普会以书面形式告之客户有关正确操作使用电芯的改进措施。

Note(3):

GREPOW will inform, in a written form, the customer of improvement(s) regarding proper use and handing of the cell, if it is deemed necessary.

### 6.1.充电 Charging

6.1.1.充电电流 Charging current:

充电电流不得超过本标准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.

6.1.2.充电电压 Charging voltage:

充电电压不得超过本标准书中规定的额定电压(4.2V/电芯)。4.2V 为充电电压最高极限,充电器的设计应满足此条件;电芯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 (4.2V/cell). Charging beyond 4.2V, 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.

### 6.1.3. 充电温度 Charging temperature:

电芯必须在 10°C~45°C的环境温度范围内进行充电

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

### 6.1.4. 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.

## 6.2. 放电 Discharging

### 6.2.1. 放电电流 Discharging current

放电电流不得超过本标准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.

### 6.2.2. 放电温度 Discharging temperature

电芯必须在-20°C~60°C的环境温度范围内进行放电。

The cell shall be discharged within -20°C~60°C range specified in the Product Specification.

### 6.2.3. 过放电 Over-discharging:

需要注意的是，在电芯长期未使用期间，它可能会用其它自放电特性而处于某种过放电状态。为防止放电的发生，电芯应定期充电，将其电压维持在 3.6V 至 3.9V 之间。

过放电会导致电芯性能、电池功能的丧失。

充电器应有装置来防止电池放电至低于本标准书规定的截止电压。此外，充电器还应有装置以防止重复充电，步骤如下：

电池在快速充电之前，应先以一小电流（0.01C）预充电 15~30 分钟，以使（每个）电芯的电压达到 3.0V 以上，再进行快速充电。可用一计时器来实现该预充电步骤。如果在预充电规定时间内，（个别）电芯的电压仍未升到 3.0V 以上，充电器应能够停止下一步快速充电，并显示该电芯/电池正处于非正常状态。

It should be noted that the cell would be at 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 3.6V and 3.9V.

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

The charger shall be equipped with a device to prevent further discharging exceeding a cut-off voyage specified in the Product Specification. Also the charger shall be equipped with a device to control the recharging procedures as follows:

The cell battery pack shall start with a low current (0.01C) for 15-30 minutes, i.e.-charging, before rapid charging starts. The rapid charging shall be started after the (individual) cell voltage has been reached above 3.0V within 15-30 minutes that can be determined with the use of an appropriate timer for pre-charging. In case the (individual) cell voltage does not rise to 3.0V within the pre-charging time, then the charger shall have functions to stop further charging and display the cell/pack is at abnormal state.

### 6.3. 贮存 Storage:

电芯储存温度必须在 $-10^{\circ}\text{C}\sim 40^{\circ}\text{C}$ 的范围内,长期存储电池(超过1个月)须置于温度为 $23^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 、湿度为 $65\pm 20\%\text{RH}$ 的环境中,贮存电压为 $3.6\text{V}\sim 3.9\text{V}$

The cell shall be storied within  $-10^{\circ}\text{C}\sim 40^{\circ}\text{C}$  range environmental condition, If the cell has to be storied for a long time (Over 1 months), the environmental condition should be; Temperature:  $23^{\circ}\text{C}\pm 5^{\circ}\text{C}$

Humidity:  $65\pm 20\%\text{RH}$ , The voltage for a long time storage shall be  $3.6\text{V}\sim 3.9\text{V}$  range.

### 6.4. 电芯操作注意事项 Handling of Cells:

由于电芯属于软包装,为保证电芯的性能不受损害,必须小心对电芯进行操作。

Since the battery is packed in soft package, to ensure its better performance, it's very important to carefully handle the battery;

#### 6.4.1. 铝箔包装材料易被尖锐部件损伤, 诸如镍片, 尖针。

The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs, pins and needles.

·禁止用尖锐部件碰撞电池;

Don't strike battery with any sharp edge parts;

·取放电芯时, 请修短指甲或戴上手套;

Trim your nail or wear glove before taking battery ;

·应清洁工作环境, 避免有尖锐物体存在;

Clean worktable to make sure no any sharp particle;

#### 6.4.2. 禁止弯折顶封边;

Don't bend or fold sealing edge;

#### 6.4.3. 禁止打开或破坏折边;

Don't open or deform folding edge;

#### 6.4.4. 禁止弯折极片;

Don't bend tab ;

#### 6.4.5. 禁止坠落、冲击、弯折电芯;

Don't Fall, hit, bend battery body;

#### 6.4.6. 任何时候禁止短路电芯, 它会导致电芯严重损坏;

Short terminals of battery is strictly prohibited, it may damage battery;

### 6.5. 电池外壳设计 Notice Designing Battery Pack;

·电池外壳应有足够的机械强度以保证其内部电芯免受机械撞击;

Battery pack should have sufficient strength and battery should be protected from mechanical shock;

·外壳内安装电芯的部位不应有锋利的边角;

No Sharp edge components should be inside the pack containing the battery;

### 6.6. 电芯与外壳组装注意事项 Notice for Assembling Battery Pack

#### 6.6.1. 电芯的连接 Tab connection·

建议使用超声波焊接或点焊技术来连接电芯与保护电路模块或其它部分。如使用手工锡焊, 须注意以下事项, 以保证电芯的功能:

Ultrasonic welding or spot welding is recommended to connect battery with PCM or other parts. If apply manual solder method to connect tab with PCM, below notice is very important

to ensure battery performance.

a) 烙铁的温度可控能防静电；

The solder iron should be temperature controlled and ESD safe

b) 烙铁温度不能超过 350°C

Soldering temperature should not exceed 350°C

c) 锡焊时间不能超过 3 秒；

Soldering time should not be longer than 3s

d) 锡焊次数不能超过 5 次；

Soldering time should not exceed 5 times Keep battery tab cold down before next time soldering

e) 必须在极片冷却后再进行二次焊接；禁止直接加热电芯，高于 100°C会导致电芯损坏。

Directly heat cell body is strictly prohibited, Battery may be damaged by heat above approx.100°C

#### 6.6.2. 电芯的安装 Cell fixing

·应将电芯的宽面安装在外壳内；

The battery should be fixed to the battery pack by its large surface area

·电芯不得在壳内活动。

No cell movement in the battery pack should be allowed

### 7.其它事项 OTHERS

#### 7.1. 防止电池内短路 Prevention of short circuit within a battery pack

使用足够的绝缘材料对线路进行保护

Enough insulation layers between wiring and the cells shall be used to maintain extra safety protection.

#### 7.2. 严禁拆卸电芯 Prohibition of disassembly

##### 7.2.1. 拆卸电芯可能会导致内部短路，进而引起鼓气、着火及其它问题

The disassembling may generate internal short circuit in the cell, which may cause gassing, firing, or other problems.

##### 7.2.2. 聚合物锂电池理论上不存在流动的电解液，但万一有电解液泄漏而接触到皮肤、眼睛或身体其它部位，应立即用清水冲洗电解液并就医

LIP battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.

#### 7.3. 在任何情况下，不得燃烧电芯或将电芯投入火中，否则会引起电芯燃烧，这是非常危险的，应绝对禁止

Never incinerate nor dispose the cells in fire. These may cause firing of the cells, which is very dangerous and is prohibited.

#### 7.4. 不得将电芯浸泡液体，如淡水、海水、饮料(果汁、咖啡)等

The cells shall never be soaked with liquids such as water, seawater drinks such as soft drinks, juices coffee or others.

#### 7.5. 更换电芯应由电芯供应商或设备供应商完成，用户不得自行更换

The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user.

7.6. 禁止使用已损坏的电芯 Prohibition of use of damaged cells

电芯在运输过程中可能因撞击等原因而损坏，若发现电芯有任何异常特征，如电芯塑料封边损坏，外壳破损，闻到电解液气体，电解液泄漏等，该电芯不得使用。

有电解液泄漏或散发电解液气味的电池应远离火源以避免着火。

The cells might be damaged during shipping by shock. If any abnormal features of the cells are found such as damages in a plastic envelop of the cell, deformation of the cell package, smelling of electrolyte, electrolyte leakage and others, the cells shall never be used any more.

The cells with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing.