AMENDMENT RECORDS

（规格变更记录）

Modification Time	Description	Issued Date	Approved By
0	New release	2008-06-30	
1	更换保护板	2008-07-23	

Address:Block2, Haijin Road6, Markyns Industrial Zone, XinZao Town, Panyu District, Guangzhou

P.R.C. TEL:020-84720852 FAX :020-84720936 www.gmbattery.com

Content

目　录

1. Scope:

This document describes the Product Specification of Chargeable Lithium Polymer Battery produced by Guangzhou Markyn Battery Co.,Ltd.

适用范围：

本规格说明书适用于广州基安彼电池有限公司生产的可充聚合物锂离子电芯。

2. Model: 505068

型号：505068

3. Specification

3.1 Assembled cell parameters

No	Item	Spec	Note
1	**Model** **型号**	505068/1800mAh	
2	**Charge Voltage** **充电电压**	4.2V	
3	**Nominal Voltage** **标称电压**	3.7V	The average value of voltage during the discharge period (with standard charge and discharge). When shipping, the voltage without load is between 3.6V to 3.9V. 按标准充电后，按标准放电，放电过程中的平均电压。出货时，电芯空载电压在 3.6V~3.9V 之间。
4	**Minimal Capacity** **额定容量**	1800mAh@ 0.2C Discharge(放电)	Nominal Capacity refer to the capacity of 0.2C discharge with 3.0V cut-off voltage, after charging with standard method. 额定容量指的是用标准方法充电后，用 0.2C 电流放电至 3.0V 的容量。
5	**Cycle Life** **循环寿命**	≥ 300 Times	One cycle refer to one charge period and then one discharge period. Test condition: Charge: 0.2C to 4.2V Discharge: 0.2C to 3.0V The cycle life is the cycle times when the discharge capacity is about 80% of the rated capacity. 一个循环是指一次充放电周期(25°C±0.5°C, 充放电电流为 0.2C, 3.0V 截止电压)。当放电容量（0.2C）直到电池放电容量连续 3 次≤80%的初始容量时，所完成的循环次数定义为该电芯的循环寿命。

6	**Cell Impedance** **电芯内阻**	≤200mΩ	Measure two sides of the drawing line after assembling. (Red B+、Black B-) 装配后测电池引线两端(红 B+、黑 B-) After Standard charging, measure the internal resistance with AC1KHz(while measuring, clip near 2/3 place of the anode and the cathode.) 标准充电后，在 25℃ ± 0.5℃测量其 AC1KHz 下的交流阻抗。(测试夹子夹到电芯正、负极耳 2/3 处)。
7	**Max. Charge Current(continue charge)** **最大充电电流（持续充电）**	0.5C	
8	**Max. Discharge Current(continue discharge)** **最大放电电流（持续放电）**	1.0C	
9	**Discharge Cut-off Voltage** **放电截止电压**	3.0V	
10	**Operating Temperature** **工作温度**	Discharge: -10℃ ~ 60℃（放电） Charge: 0 ℃~ 45℃（充电）	Cells must be storied at 3.6V-3.9V. During long period storage, cells should be maintained every 90 days. The method is to do a charge-discharge cycle with standard method, then charge to 3.7V. 电芯应在 3.6V ~ 3.9V 状态下贮存。如果要长时间贮存，电芯应要每隔 90 天适时地进行一次充放电循环。
11	**Storage Temperature** **储存温度**	long time storage/长期储存：-5 ℃~+35℃	
12	**Cell Weight** **电芯重量**	Approx 34g	
13	**PCM**	GMB-ML131	
14	**Assemblage Dimension** **装配尺寸**	Length：70mm Max Width：50.5mm Max Thickness：5.3mm Max	Measured with weighting 300gf at 25℃± 0.5℃ Not including battery drawing line. 测量时测量仪器作用于电池上的压力为 300gf，温度 25℃± 0.5℃，不包括电池引线。

4. Battery Cell Performance Criteria

电芯性能检查及测试

4.1 Standard testing environment

标准测试条件及环境

Unless special stated, tests should be done within one month of delivery and the recharge time is less than 5 times. The following is test conditions:

Ambient Temperature： 25℃ ± 0.5℃

Ambient Humidity： 65 ± 20%

测试电池必须是本公司出厂时间不超过一个月的新电池，且电池未进行过五次以上充放电循环。除非其他特殊要求，本产品规格书中的所有测试均在以下环境条件下进行：

温度： 25℃ ± 0.5℃

湿度： 65 ± 20%

4.2 The requirement of measure instrument

测试设备要求

(1) The measure instrument is passed tested by qualified institute.

(2) The accuracy of the size instrument is not more than 0.01mm.

(3) The accuracy of multimeter is not less than 0.5%. while measure the voltage, the internal resistance mustn't less than 10KΩ.

(4) The principal of the internal resistance is 1KHz LCR, the accuracy is 0.2%.

(5) The internal resistance is changeable, it varies according to the temperature and the charging mode. And it is relevant to the PTC and the length and the capacity of the drawing line.

(6) The current accuracy of the battery test system is more than ±0.1%, is obarically accuracy is ±0.5%, timer accuracy is less than ±0.1%.

(7) The accuracy of the temperature meter is less than ±0.5℃.

(1) 所有测试（量）设备、仪器需经检定机构检验合格。

(2) 测量尺寸的仪器精确度不大于 0.01mm。

(3) 万用表测量电压及电流的准确度应不低于 0.5%，测量电压时内阻不应小于 10KΩ/V。

(4) 内阻测试仪测量原理应为交流阻抗法（1KHz LCR），精确度 0.2%。

(5) 内阻不是恒定值，会随着温度及充电状态的饱和度变化而变化。与是否装有 PTC 保护元件及引线长度、容量有关。

(6) 电池测试系统的电流精度应在±0.1%以上，恒压精度±0.5%，计时精度不低于±0.1%。

(7) 测量温度的仪表准确度应不低于±0.5℃。

4.3 Visual inspection

外观检查

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

不允许有任何影响电芯性能的外观缺陷，诸如裂纹、裂缝、泄漏等。

4.4 Charge/Discharge Methods and Test Conditions 充放电方法和条件

No. 序号	Item 项目	Testing Conditions and Method 测试方法及条件
1	**Charging Current** **充电电流**	Standard CC：0.2C Quick CC：0.5C 标准充电电流：0.2C 快速充电电流：0.5C
2	**Standard Charging** **标准充电**	Constant Current Charging at 0.2C to 4.2V. Constant Voltage Charging at 4.2V to cut-off current≤0.05C 先用 0.2C 恒流充电至 4.2V，再在 4.2V 恒压充电至电流≤0.05C 时截止。
3	**Quick Charging** **快速充电**	Constant Current Charging at 0.5C to 4.2V. Constant Voltage Charging at 4.2V to cut-off current≤0.05C 先用 0.5C 恒流充电至 4.2V，再在 4.2V 恒压充电至电流≤0.05C。
4	**Standard Discharge** **标准放电**	Constant discharge at 0.2C to cut-off voltage of 3.0V. 0.2C 电流恒流放电至 3.0V。
5	**Charging Time** **充电时间**	Standard charging time ：8 hours Quick charging time：2.8 hours 标准充电时间：8 小时 快速充电时间：2.8 小时
6	**Temperature & Humidity** **温度及湿度**	Standard charging：0℃~ 45 ℃ 45~85% RH Quick charging：10 ℃~ 45 ℃ 45~85%RH Standard discharging：-10 ℃~ 60 ℃ 45~85% RH 标准充电：0℃~ 45 ℃ 45~85%RH 快速充电：10℃~ 45 ℃ 45~85%RH 标准放电：-10℃~ 60 ℃ 45~85%RH
7	**Cell Voltage** **电芯电压**	3.6~3.9V (Before shipping) 出货状态：3.6~3.9V

Notes： The Max. voltage while charging is not more then 4.25V. The Max. protective voltage designed on PCB board should not be more then 4.3V.

备注：电芯充电最大的电压不能超过 4.25V，保护板设置的最大保护电压不能超过 4.3V。

4.5 Mechanical Characteristics 机械特性

No. 序号	Item 项目	Testing Conditions and Method 测试方法及条件	Standard 标准
1	**Vibration Test** **振动测试**	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 minutes between 10Hz and 55Hz, the excursion of the vibration is 0.38mm. The cell shall be vibrated for 30 minutes fro three axis of XYZ axes. 将标准充电后的电芯沿 X、Y、Z 三个方向各振动 30 分钟，振幅为 0.38mm ，振动频率为 10Hz－55Hz，每分钟变化 1Hz。	No leakage. Left Capacity≥90%, after 3 hours. 无泄漏 容量保持率≥90%（静置 3 小时后）
2	**Drop Test** **跌落测试**	Drop the cell from 1meter height onto the concrete ground twice. 将标准充电后的电芯从 1 米高度跌落至混凝土地面 2 次。	No explore, no fire and no leakage 无爆炸、无起火和泄漏。

4.6 Safety Test 安全测试

No. 序号	Item 项目	Testing Conditions and Method 测试方法及条件	Standard 标准
1.	**Over-charge** **过充电性能**	Charge is conducted for 8 hours while the invariable voltage is 4.6V. 将标准充电后的电芯，用恒定电压 4.6V 给电芯加压 8h。	No deformation and Leakage 无爆炸、起火 、泄漏
2	**Short-circuit** **短　路**	The charged battery is short-circuited for 1 hour at 0.4Ω. 将标准充电后的电芯，用 0.4Ω电阻器将正负极短接 1h。	No explode or fire 无爆炸、起火
3	**Heat shock** **热冲击**	Put the battery into the heat box, the temperature is rising to 120±2℃ at the rate of (5±2℃）/min and maintain for 10 minutes. Then cool down to room temperature at the rate of 5±2℃/min. 电池放于热箱中，温度以（5±2℃）/min 的速率升至 120±2℃并保温 10min，再以 5±2℃/min 降温至室温。	No explode or fire 无爆炸、起火
4	**Humid and heat test** **恒定湿热测试**	Put the charged battery into box for 48 hours, the temperature is 40℃±2℃ and the relative humidity is 90%～95% . 将标准充电后的电芯放入温度为 40℃±2℃，相对湿度为 90%～95%的恒温恒湿箱中 48h。	No smoke or explode 无冒烟、爆炸

4.7 High and low temperature test 高低温性能

No. 序号	Item 项目	Testing Conditions and Method 测试方法及条件	Standard 标准
1	**High Temperature** **高温性能**	Put the charged battery into the high temperature box for 2 hours at 55℃±2℃. And discharge the battery at 0.5C current until the voltage is ended. 将标准充电后的电芯，放入 55℃±2℃的高温箱中 2h，然后以 0.5C 电流放电至终止电压。	Discharge 90 percent of the original capacity. 可放出初始容量的 90%以上.
2	**Low Temperature** **低温性能**	Put the charged battery into the low temperature box for 16 hours～24 hours at -10℃±2℃. And then discharge the battery at 0.1C until the voltage is ended 将标准充电后的电芯，放入-10℃±2℃的低温箱中 16h～24h 后，以 0.1C 放电至终止电压。	Discharge more than 45 percent of the original capacity. 可放出初始容量的 45%（-10℃）以上.

4.8 Electricity maintenance 荷电保持能力

No. 序号	Item 项目	Testing Conditions and Method 测试方法及条件	Standard 标准
1	**Electricity maintenance** **荷电保持**	Rest the charged battery for 28 days at the ambient temperature of 25℃±0.5℃. And then discharge the battery until the voltage is ended.将标准充电后的电芯，在环境温度为 25±0.5℃的条件下，将电芯开路搁置 28 天，再以 0.2C 电流放电至终止电压。	Discharge more than 85 percent of the original capacity. 可放出初始容量的 85%以上.

5. Storage and others

贮存及其它事项

5.1 Long Period Storage

长期贮存

If the cell has been stored for 3 month, it should be transfer to a dry and cool environment. Storage Voltage is between 3.6V and 3.9V and the storage conditions as Item 4.1.

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 3.6~3.9V 且贮存环境要求如 4.1

5.2 Any matters that this specification does not cover should be conferred between the customer and GMB.

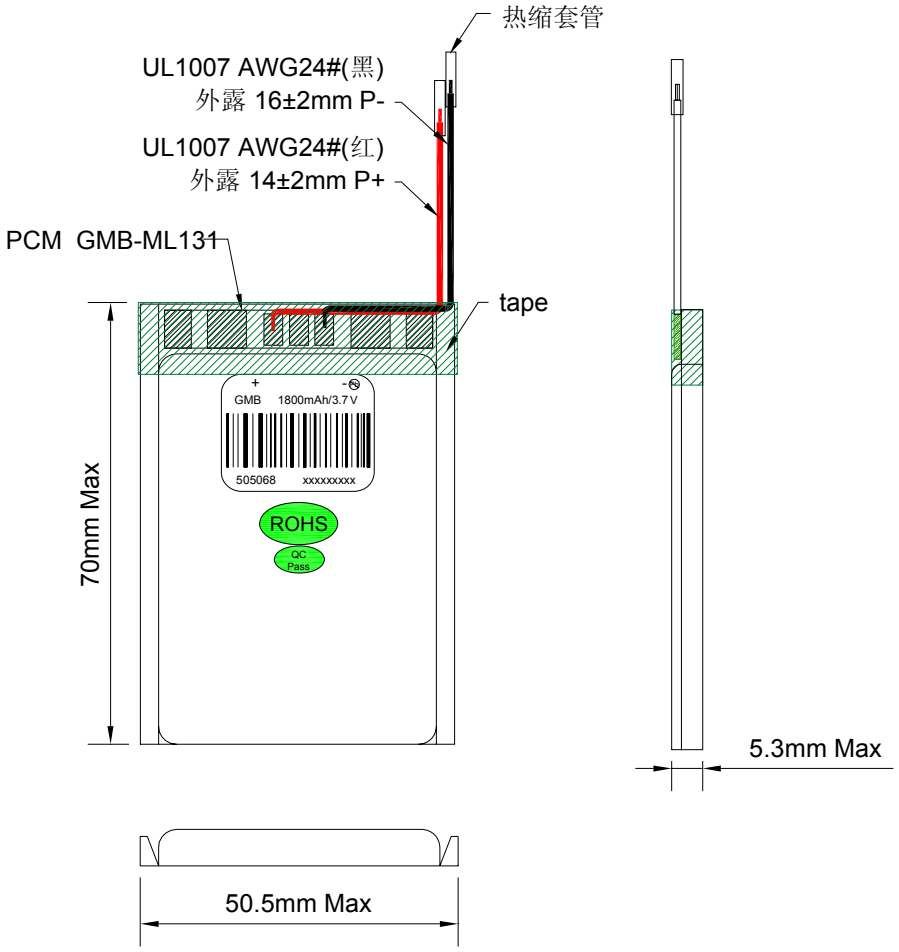
任何本说明书中未提及的事项，须经双方协商确定。

6. Assembly diagram（not in scale）

出货时电池组装配示意图(未按比例)

Model：505068

Unit：mm



Handling Precaution and Guideline For LIP (Lithium-Ion Polymer) Rechargeable Batteries Preface

This document of 'Handling Precautions and Guideline LIP Rechargeable Batteries' shall be applied to the battery cells manufactured by Guangzhou Markyn Battery Co.,Ltd

前言

本文件"聚合物锂离子充电电芯操作指示及注意事项"仅适用于广州基安彼电池有限公司生产的电芯。

Note (1): The customer is requested to contact GMB in advance, if and when the customer needs other applications of operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such condition.

声明一：

客户若需要将电芯用于超出文件以外的设备，或在文件规定以外的使用条件下使用电芯，应事先联系基安彼电池。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 (2): GMB will take no responsibility for any accident when the cell is used under other condition.

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, 基安彼电池概不负责。

Note (3): GMB will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the cell, if it is deemed necessary.

Our Company has right to revise it before customer signs the datasheet. If necessary to revise, GMB will notice the customer.

声明三：

如有必要基安彼电池会以书面形式告知客户有关正确操作使用电芯的改进措施。

在规格书未签确前，本公司有权对本产品规格书进行修订，如有必要修订后基安彼将会通知客户。

1. Charging

充　电

1.1 Charging Current:

Charging current should be less than maximum charge current specified in the Specification Approval Sheet.

充电电流

不能超过本规格书中规定的最大充电电流。

1.2 Charging Voltage:

Charging voltage should be done by voltage less than that specified in the Specification. Charging beyond 4.30V, which is the absolute maximum voltage.

充电电压：

不得超过本规格书中规定的最高额定电压 4.2V。4.30V（单节）为充电电压最高极限。

1.3 Charging Temperature:

充电温度：

The cell shall be charged within the range specified in this Specification Approval Sheet.

电芯必须在本规格书规定的环境温度范围内进行充电。

1.4 Notes:

Since charging with constant current or constant voltage, reverse charging is prohibited. 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.

采用恒流恒压方式充电，禁止反向充电。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和安全性，并会导致发热和泄漏。

2. Discharging Current:

The cell shall be discharged at less than the maximum discharge current specified in the Specification Approval Sheet. High discharging current may reduce the discharging capacity significantly or cause over-heat.

放电电流

放电电流不得超过本规格书规定的最大放电电流，过大的电流放电会导致电芯容量剧减并导致电芯过热。

3. Discharging Temperature

Discharging Temperature should be within the range specified in this Specification Approval Sheet.

放电温度

电芯放电必须在本规格书规定的环境温度范围内进行。

4. Over-Discharge

Over-charging will cause cell low-performance and function loss. The cell would be in an over-discharged state by its self-discharge characteristic. In order to prevent over-discharging, the cell shall be charged periodically to maintain between 3.6V and 3.9V.

过放电

过放电会导致电芯性能、电池功能的丧失，要避免过放电。电芯长期未使用期间，它也可能会因其自放电特性而处于某些过放电状态，为防止过放电的发生，电芯应定期充电，使其电压维持在 3.6V 到 3.9V 之间；另外，充电器应有相应的装置来防止电池放电至低于本规格书规定的截止电压。

5. Protective Circuit Module

保护电路模块（PCM）

5.1 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.

电芯/电池包装应配有 PCM 以正确保护电芯/电池。

PCM 应具备以下功能以保证安全并防止损坏电芯性能：

1）过充电保护；2）过放电保护；3）过流保护

5.2 Overcharging Protection

Overcharging prevention function shall stop charging if any cell of the battery pack reaches 4.30V.

过充电保护

当电池中任一电芯的电压达 4.30V，过充电保护应立刻停止充电。

5.3 Over-discharging protection

Over-discharging protection function shall monitor the voltage of every cell in the pack, and work to avoid further drop in the cell voltage of 2.8V or less.

过放电保护

当电池任一电芯的电压降至 2.8V 以下时，该保护功能应实时监控所有电池。

6. Storage

Cells should be stored in proper temperature specified in Specification Approval Sheet.

贮存

电芯应贮存在产品规格书规定的温度范围内。

7. Notice

⚠注意事项

7.1 Handling of cells:

- ★ Avoid any short-circuit, for it will caused the pole hot and lost electronic functions.
- ★ Soft packing is very damaged by sharp edge parts such as needles and knives. Avoid cells touch with sharp edge part, when handling and Storage.
- ★ Beside the poles is the sealed edge. Don't bend or fold dealing edge, for it is a sensitive part.
- ★ Don't open the folding edge on both sides of the cells.
- ★ Don't bend the tabs, for the tabs are not so stubborn.
- ★ Avoid mechanical shock to the cells.
- ★ Don't put the cells into the heater, washing machine or high-voltage container.
- ★ Don't use the charger without any safety guarantee, and recommend you use specified charger.
- ★ You should immediately stop charging, as cell is overheating, delivery any smell, changed color, distortion etc.

★ Put cells in the place where children cannot reach.
★ Before Children use batteries, adults should explain the usage first.
★ Before use batteries, please read the handling guideline carefully and fully understand.
★ Away from the static-electronic field, while using, charging and storing cells.
★ Avoid using, charging or storing cells near the fire or in the cars with higher than 60℃ ambient temperature.
★ Don't put the cells together with metal conductors such as chains, barrette, bolt into the pocket or stored them together.
★ Don't use metal conductor to shortcut the positive and negative poles.
★ Don't mis-assemble the positive pole with the negative one.
★ Don't use the damaged cells.

7.1 使用电芯时应注意

★ 慎防短路，任何情况引起的短路可能会导致极耳金属发热，使电池功能失效。
★ 电芯属于软包装，包装材料易被尖锐物品刺伤，诸如尖针，刀片等，电芯在使用和存放时，应避免与尖锐物品碰撞。
★ 电芯极耳引出端为顶封边，顶封边为电芯密封敏感区，使用时，禁止弯折顶封边。
★ 禁止打开电芯两侧的折边。
★ 电芯极耳的机械强度并非异常坚固，禁止弯折极耳，特别是铝极耳。
★ 禁止机械撞击电芯、坠落、弯折电芯。
★ 不要把电池放在加热器皿、洗衣机或高压容器中。
★ 不要使用非指定的和没有安全认证的充电器给电池充电。
★ 在使用充电或储存期间如发现电池有变热、散发气味、变色、变形或其它反常之处应停止使用。
★ 把电池放到小孩够不到的地方以免吞服。
★ 儿童使用电池时，监护人应详细解释操作方法。
★ 在使用电池之前，应详细阅读操作指南并对使用中的注意事项有足够深刻的理解。
★ 电池应在远离静电的场所进行充电、使用和储存。
★ 不要在火源附近或温度超过 60℃的轿车中使用或遗留电池，也不要在这些环境中进行充放电。
★ 不要把电池同项链发夹硬币或螺钉等金属品一起放在手提包中，也不要把电池同上述物品一起储存。
★ 不要使用金属导体短路电池的正、负极。
★ 在使用时应注意电池的正、负极不要反装。
★ 不要使用带有严重变形的电池。

7.2 Notice for Designing Battery Pack

电池外壳设计注意事项

7.2.1 Package Design

① Battery pack should have sufficient strength and battery should be protected from mechanical shock.
② No sharp edge components should be inside the pack containing the battery.

外壳设计

①电池外壳应有足够的机械强度以确保其内部电芯免受机械伤害。
②外壳内安装电芯的部位不应有锋利的边角。

7.2.2PCM Design

① The overcharge threshold voltage should not be exceed 4.30V (single pack)
② The over-discharge threshold voltage should not be lower than 2.8V (single pack)
③ The PCM should have short protection built inside.

7.2.2 保护电路模块设计

① 过充的限制电压应小于 4.30V（单节电芯）。
② 过放的限制电压应大于 2.8V（单节电芯）。
③ 保护电路模块应具有短路保护功能。

7.3 Notice for Assembling Battery Pack

电芯与外壳组装注意事项

7.3.1 Tab connection

① Ultrasonic welding or spot welding is recommended to connect battery with PCM or other parts.
② If apply manual solder method to connect tab with PCM, below notice is very important to ensure battery performance.
   a) The solder iron should be temperature controlled and ESD safe.
   b) Soldering temperature should not exceed 350℃.
   c) Soldering time should not be longer than 3 seconds .
   d) Keep battery tab cold down before next time soldering.
   e) Directly heat cell body is strictly prohibited. Battery should be damaged by heat above approx. 60℃.

电芯的连接

① 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。
② 如使用手工锡焊，须注意以下事项，以保证电芯的功能：
   a. 烙铁的温度可控且防静电。
   b. 烙铁的温度不能超过 350℃。
   c. 锡焊时间不能超过 3 秒；
   d. 锡焊次数不能超过 5 次；
   e. 必须在极耳金属片冷却后再进行二次焊接；
   f. 禁止直接加热电芯，高于 60℃会导致电芯损坏。

7.3.2 Cell fixing

① The battery should be fixed to the battery pack by its large surface area.
② No sharp edge at the assembling position.
③ No cell movement in the battery pack should be allowed.

电芯的安装

① 应将电芯的宽面安装在外壳内；
② 装电芯的位置不能有毛刺和尖锐边角；
③ 电芯不能在壳内活动。

8. Others

其它注意事项

8.1 The disassembling may generate internal shout circuit in the cell, which may cause gassing, firing, or other problem.
在任何情况下不得拆卸或解剖电芯，拆卸和解剖可能会引致电芯内部短路，进而引起

鼓气、冒烟、起火及其它安全问题。

8.2 LIP battery should not have liquid flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians, we recommend as below:

a. The electrolyte touch eyes: Flush the electrolyte immediately with fresh water for 15min. and medical advice is to be sought.

b. The electrolyte touch skin: Flush the electrolyte immediately with a great deal of fresh water.

c. Breath the released gas: Go outside to breath flash air.

d. Mis-eaten: Go to take some medical advice.

电芯内容物理论上不存在流动的电解液，但万一电池密封不严或刺伤造成吸潮而泄漏接触到皮肤、眼睛、或身体其它部位，以下是建议预防措施：

a. 眼睛触到电芯内容物：立即用清水冲洗至少 15 分钟，如仍有不适，建议到相关医院就诊。

b. 皮肤接触：立即用大量的清水冲洗。

c. 吸入排放气体：换场所吸入新鲜空气。

d. 误食：需马上医疗就诊。

8.3 Prohibition of dumping of cells into fire

Never incinerate or dispose the cells in fire, for these may cause firing of the cells.

严禁将电芯投入火中

8.4 The cells should never be soaked with liquids such as water, drinks or oil.

严禁将电芯浸入液体中，如水，饮料，汽油等。

8.5 Prohibit using the cells mixed with different manufactories. Prohibit using new cells mixed with old ones.

禁止和不同厂家的电芯混用，禁止新旧电芯混用。

8.6 Prohibit using damaged cells.

禁止使用已损坏的电芯。

9. Recommended Notice:

推荐使用事项

9.1 Using cells on specified facilities only.

仅在指定的设备上使用电池。

9.2 Using cells in normal ambition temperature. Temperature: -10～40℃，Relative Humidity：65±20%.

请在正常的室内环境中使用电池。温度-10～40℃，相对湿度：65±20%。

9.3 Using the cells, away from heat source. Don't let children play with cells. Don't drop cells. Charge cells with specified charger.

在使用过程中，应远离热源，避免儿童玩弄电池。切勿摔打电池。本电池只能使用配套标准充电器充电。

9.4 Avoid the positive pole shortcutting with the negative one. Avoid the cells affected with damp.

切勿将电池正、负极短路，切勿让电池受潮，以免发生危险。

9.5 Useless cells should be deal with in a safety way. Don't drop them into the water or fire.

废弃电池请安全妥当处理，不要投入火中或水中。

▲Special Notice: Keep the cells in half-charged state, which is keeping them fully charged or completely discharged. Store the cells in cool and dry place.

特别提醒：长期不使用时，要让电池处于半充饱电状态(一半电量)，即；不充满电，也别放完电。并在 2-3 个月的时间之后重新充电，并使用一半电量，然后，再将电池保存在避免阳光直接照射的地方和阴凉干燥处，这样可以长期有效的保证电池不受损坏。

附录

(GMB-ML131)保护板规格书

1、Electrical characteristics 电气特性

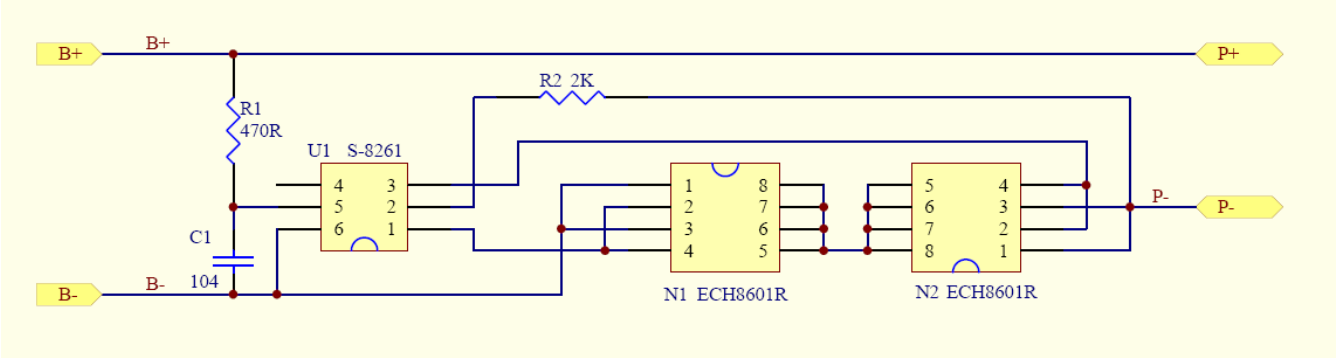
Item 项目	Symbol 符号	Content 详细内容	Criterion 标准
Over charge Protection 过充保护	V_{DET1}	Over charge detection voltage 过充电检测电压	4.325±0.025V
	tV_{DET1}	Over charge detection delay time 过充电检测延迟时间	0.96s-1.4s
	V_{REL1}	Over charge release voltage 过充电解除电压	4.125±0.025V
Over discharge protection 过放保护	V_{DET2}	Over discharge detection voltage 过放电检测电压	3.0±0.05V
	tV_{DET2}	Over discharge detection delay time 过放电检测延迟时间	115ms-173ms
	V_{REL2}	Over discharge release voltage 过放电解除电压	3.4±0.05V
Over current protection 过流保护	V_{DET3}	Over current detection voltage 过电流检测电压	0.06±0.015V
	I_{DP}	Over current detection current 过电流保护电流	1.8-4.5A
	tV_{DET3}	Detection delay time 检测延迟时间	7.2ms-11ms
		Release condition 保护解除条件	Cut load 断开负载
Short protection 短路保护		Detection condition 保护条件	Exterior short circuit 外部电路短路
	T_{SHORT}	Detection delay time 检测延迟时间	220us-380us
		Release condition 保护解除条件	Cut short circuit 断开短路电路
Interior resistance 内阻	R_{DS}	Main loop electrify resistance 主回路通态电阻	VC=4.2V,RDS≤100mΩ
Current consumption 消耗电流	I_{DD}	Current consume in normal operation 工作时电路内部消耗	7.0μA Type 12.0μA Max

2 Parts list主要元件清单

NO.	Location 元件编号	Part name 元件名称	Specification 元件规格	Pack type 封装形式	Q'ty 数量	Maker/Remark 厂商/备注
1	U1	Battery protection IC	S-8261ACMMD-G4M	SOT-23-6	1	Seiko, or equivalent
2	N1, N2	Silicon MOSFET	ECH8601R	TSSOP8	2	SANYO , or equivalent
3	R1	Resistance	SMD 470Ω ±5%	0402	1	SKYWELL, Or equivalent
4	R2	Resistance	SMD 2KΩ ±5%	0402	1	SKYWELL, or equivalent
5	C1	Capacitance	SMD 0.1μF /50V	0402	1	SKYWELL, or equivalent
6	PCB	Print circuit board	GMB-ML131 34mm±0.2mm×4.0mm ±0.2mm	0.6mm± 0.1mm	1	ASSUN

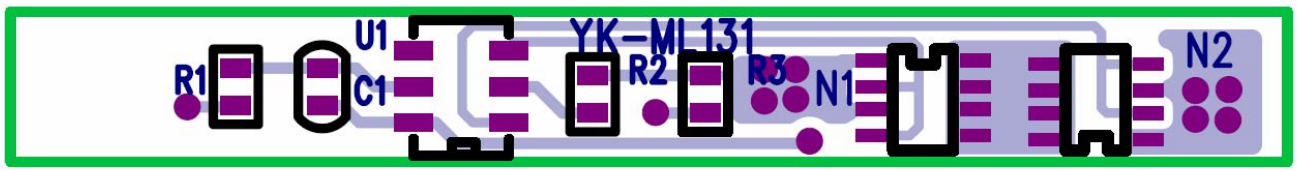
3 Application Circuit

线路板原理方框图



4 PCB layout

top layer



Bottom layer

top over view

5 Terminal explanations

端口说明:

B+: Connection cell +

B-: Connection cell -

P+: Connection output +

P-: Connection output -

6 Lead free product

Packing explanation