# Specification Approval Sheet

产品规格确认书

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Li-MnO₂ Battery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model SPEC</td>
<td>CP155050/600mAh/3.0V</td>
</tr>
<tr>
<td>Company Name</td>
<td></td>
</tr>
<tr>
<td>Document Number</td>
<td>GMBJSYG170405</td>
</tr>
<tr>
<td>Sample Number</td>
<td></td>
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<tr>
<td>Document Revision</td>
<td>A0</td>
</tr>
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<thead>
<tr>
<th>Approved By</th>
<th>Checkup</th>
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<table>
<thead>
<tr>
<th>Customer Confirmation</th>
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<tbody>
<tr>
<td>Signature</td>
</tr>
<tr>
<td>Date</td>
</tr>
<tr>
<td>Company Name</td>
</tr>
<tr>
<td>Company Stamp</td>
</tr>
</tbody>
</table>

客户确认

公司名称:

公司印章:
## AMENDMENT RECORDS

( 规格变更记录 )

<table>
<thead>
<tr>
<th>Modification Time</th>
<th>Description</th>
<th>Issued Date</th>
<th>Approved By</th>
</tr>
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<tr>
<td>0</td>
<td>New release</td>
<td>2017-04-05</td>
<td>蔡欣</td>
</tr>
</tbody>
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1. Scope:
适用范围
This document is made according to customer parameter requirements, and it describes the Product Specification of soft-packed Li-MnO\textsubscript{2} Battery produced by Huizhou Markyn New Energy Co., LTD..
本规范书是惠州基安比新能源有限公司根据客户提供参数要求双方制定的锂锰软包装电池电芯。

2. Description
说明
2.1 Model: CP155050
型号：CP155050

2.2 Assembly method
装配方式
两节电池串联。
单电芯内折点焊 1S1P

3. Specification
产品规格：
3.1 Assembled cell parameters
装配后电芯组件参数：

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Spec</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Model</td>
<td>CP155050/600mAh</td>
<td>1S1P</td>
</tr>
<tr>
<td>2</td>
<td>Nominal Voltage</td>
<td>3.0V</td>
<td>Open circuit voltage range 3.05V and 3.25V. 出货时，电芯开路电压在 3.05V ~ 3.25V 之间。</td>
</tr>
<tr>
<td>3</td>
<td>Nominal Capacity</td>
<td>Typ:<a href="mailto:600mAh@1.0mA">600mAh@1.0mA</a> Discharge</td>
<td>Nominal Capacity refers to capacity at 1.0mA discharge to 2.0V cut-off voltage at 25℃ ambient. 在25℃，用1.0 mA 电流放电至 2.0V 的容量。</td>
</tr>
<tr>
<td>No.</td>
<td>Specification</td>
<td>Value</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>4</td>
<td>Max. Discharge Current</td>
<td>100 mA</td>
<td>At 25 ±2°C if the battery is discharged at the max continuous discharge rate or less, the battery capacity will be at least 50% of the nominal capacity. In 25 ±2°C, the battery capacity will be at least 50% of the nominal capacity.</td>
</tr>
<tr>
<td>5</td>
<td>Max. Discharge Pulse Current</td>
<td>200 mA</td>
<td>At 25 ±2°C, if pulse discharge duration is limited to 3 Seconds, repeating every 27 seconds, the battery capacity will be at least 50% of the nominal capacity. In 25 ±2°C, the battery capacity will be at least 50% of the nominal capacity.</td>
</tr>
<tr>
<td>6</td>
<td>Discharge Cut-off Voltage</td>
<td>2.0V</td>
<td>Exceeding the operating temperature range could lead to battery operating voltage reduction or even a safety risk.</td>
</tr>
<tr>
<td>7</td>
<td>Operating Temperature</td>
<td>-20°C~ +60°C</td>
<td>Exceeding the operating temperature range could lead to battery operating voltage reduction or even a safety risk.</td>
</tr>
<tr>
<td>8</td>
<td>Operating Humidity</td>
<td>15%RH – 90%RH</td>
<td>Exceeding the shipping temperature range could lead to battery operating voltage reduction or possibly a safety risk.</td>
</tr>
<tr>
<td>9</td>
<td>Shipping Temperature</td>
<td>-25°C~ +70°C</td>
<td>Exceeding the shipping temperature range could lead to battery operating voltage reduction or possibly a safety risk.</td>
</tr>
<tr>
<td>10</td>
<td>Storage temperature</td>
<td>-5°C~+35°C</td>
<td>The cell voltage shall be 3.05V ~ 3.25V range. The cell voltage shall be 3.05V ~ 3.25V range.</td>
</tr>
<tr>
<td>11</td>
<td>Storage life</td>
<td>5 years (年)</td>
<td>Relative humidity: 45<del>75%RH Temperature -10 °C</del>+40°C</td>
</tr>
<tr>
<td>12</td>
<td>Cell Weight</td>
<td>Approx: 5.5 g</td>
<td>Approx: 5.5 g</td>
</tr>
</tbody>
</table>

电芯重量约为 5.5 g。
### 4. Battery Cell Performance Criteria

#### 4.1 Standard testing environment

- **Ambient Temperature**: 25°C ± 2°C
- **Ambient Humidity**: 45~75%RH

Unless specifically stated otherwise, tests must be done within one month of delivery.

#### 4.2 The requirement of measure instrument

1. The measurement instrument has been certified by a qualified source.
2. The accuracy of the measuring instrument is less than 0.01mm.
3. The accuracy of voltage measurement is within ±0.5%.
4. Current measurement within ±0.1%, barometric measurement within ±0.5%, time measurement within ±0.1%.
5. Thermometer reading within ±0.5°C.

#### 4.3 Visual inspection

A battery must be rejected if it has any visual defects that could affect the electronic characteristics, such as leakage. Also, a battery must be rejected if it has visual defects resulting from damage to the pack.

不允许有影响电芯性能的外观缺陷，诸如泄漏、损坏等。
### 4.4 Mechanical Characteristics 机械特性

<table>
<thead>
<tr>
<th>No.序号</th>
<th>Item项目</th>
<th>Testing Conditions and Method 测试方法及条件</th>
<th>Standard标准</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vibration Test 振动测试</td>
<td>After standard charging, the cell is secured to a vibration table and subjected to vibration cycling in which the frequency is varied at the rate of 1Hz per minute between 10Hz and 55Hz; the excursion of the vibration is 0.38mm. The cell shall be vibrated for 30 minutes on each of X, Y, and Z axis.</td>
<td>UL1642 No explosion, no fire 无爆炸、无起火</td>
</tr>
<tr>
<td>2</td>
<td>Drop Test 跌落测试</td>
<td>A battery is dropped from a height of 1 meter two times onto a concrete surface.</td>
<td>UL1642 No explosion, no fire 无爆炸、无起火</td>
</tr>
</tbody>
</table>

### 4.5 Safety Test 安全测试

<table>
<thead>
<tr>
<th>No.序号</th>
<th>Item项目</th>
<th>Testing Conditions and Method 测试方法及条件</th>
<th>Standard标准</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Short-circuit 短路</td>
<td>A battery is short-circuited for 1 hour at 0.04Ω.</td>
<td>UL1642 No explosion, no fire 无爆炸、无起火</td>
</tr>
<tr>
<td>2</td>
<td>Heat shock 热冲击</td>
<td>The cell is placed in a thermal chamber. Temperature is raised to 130±2℃ at the rate of (5±2℃)/min and held for 10 minutes, then cooled to room temperature at the rate of 5±2℃/min.</td>
<td>UL1642 No explosion, no fire 无爆炸、无起火</td>
</tr>
<tr>
<td>3</td>
<td>Humidity and heat test 湿度和热度测试</td>
<td>A battery is placed in a box for 48 hours where the temperature is 40℃±2℃ and the relative humidity is 90% ~ 95%</td>
<td>UL1642 No explosion, no fire 无爆炸、无起火</td>
</tr>
</tbody>
</table>
### 4.6 High and low temperature test 高低温性能测试

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Testing Conditions and Method</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High Temp.</td>
<td>A battery is placed in an oven for 2 hours at 55ºC±2ºC, then discharged at a 1mA current to the termination voltage.</td>
<td>Discharge 90 percent of the original capacity. 可放出初始容量的90%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(55ºC±2ºC条件下，将电芯放入高温箱中2h后，再以1mA电流放电至终止电压。)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Low Temp.</td>
<td>A battery is placed in a thermal chamber for 2 hours at -10ºC±2ºC; then discharged at 1mA to the termination voltage.</td>
<td>Discharge more than 45 percent of the original capacity. 可放出初始容量的45% (-10ºC以上)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(在-10ºC±2ºC条件下，将标准充电后的电芯放入低温箱中2h后，再以1mA电流放电至终止电压。)</td>
<td></td>
</tr>
</tbody>
</table>

### 5. Storage and others 贮存及其它事项

#### 5.1 Long term Storage 长期贮存

If the cell is to be stored for 3 months or longer it should be held in a dry and cool environment. Voltage during storage will remain between 3.05V~3.25V and the storage conditions should comply with section 3.1.10 and 3.1.11.

长期贮存的电池(超过3个月)须置于干燥凉爽处，储存电压应保持在3.05V~3.25V，且储存要求与3.1.10和3.1.11条相同。

#### 5.2 Any issues not covered in this specification should be discussed between the customer and GMB. 本说明书中未提及的任何事项，须经双方协商确定。

### 6. Repair period 包修期限

The repair period is 6 months from the date that the batteries are shipped out from GMB factory (the printing date on the cell). 产品包修期限为6个月，自出厂日期（喷码）开始算起。
7. Drawing

7.1 Assembly diagram (not to scale)

装配尺寸图(未按比例)

Model: CP155050
Unit: mm
Handling Precautions and Guidelines

For CP batteries Preface

This document of ‘Handling Precautions and Guidelines for CP Batteries’ shall be applied to the battery cells manufactured by GMB Energy (Hui zhou) Co., Ltd.

前言

本文件 “锂锰软包装电池操作指示及注意事项” 仅适用于基安比新能源(惠州)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 variations of the operating conditions described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

注 (1):

客户若需要变动文件中规定的工作条件，应事先联系基安比新能源。需要额外进行试验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 conditions outside of this specification.

注 (2):

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，基安比新能源概不负责。

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

GMB Energy reserves the right to revise this specification before the customer signs the data sheet. If a revision is required, GMB will notify the customer.

注 (3):

如有必要基安比新能源会以书面形式告知客户有关正确使用及操作电芯的改进措施。

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，基安比新能源将会通知客户。

1. Discharging Current:

放电电流

The cell shall be discharged at less than the maximum discharge current specified in the Specification Approval Sheet. A high discharging current may reduce the discharge capacity significantly or cause overheating.

放电电流不得超过本规格书规定的最大放电电流，过大的放电电流会导致电芯容量剧减并导致电芯过热。
8. Discharge curve

8.1 Different current discharge curve at 23℃

**CP155050** 电池在 23℃不同电流条件下放电曲线图

![Discharge curve graph]

8.2 Voltage VS Current & Temperature Curve

**CP155050** 电压、电池与温度关系曲线

![Voltage VS Current & Temperature Curve graph]

8.3 Capacity VS Current & Temperature Curve

**CP155050** 容量、电池及温度关系曲线

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8.4 Storage characteristics

**CP155050** 储存特性

**Current 1.0mA**  **Temperature 23±2°C**
3. **Over-Discharge**

过放电

Over-discharging will cause cell degradation and functional losses. The cell can degrade into an over-discharge state through self-discharging.

过放电会导致电芯性能及功能的丧失，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。应保持其开路电压在 6.20 V ~ 6.50 V 之间。

4. **Storage**

贮存

Cells should be stored at the proper temperature that is identified in the Specification Approval Sheet.

电芯应在产品规格书规定的温度范围内储存。

5. **Notice**

注意事项

5.1 **Handling of cells:**

★ Avoid any short-circuit. It will cause the leads to get hot and lose electronic functions.

★ Soft package is easily damaged by sharp objects such as needles and knives. Avoid touching the cells with sharp objects when handling and storing.

★ Next to the leads is the sealed edge. Don’t bend or fold the sealing edge as it is sensitive to movement.

★ Don’t open the folded edge on the sides of the cell.

★ Don’t bend the tabs as the tabs are sensitive.

★ Avoid mechanical shock to the cells.

★ Don’t put the cells into an oven, washing machine or any high-voltage container.

★ Adults should supervise the use of batteries by children.

★ Before using batteries, please carefully read and understand the handling guidelines.

★ Avoid electro-static discharge when using, charging, and storing cells.

★ Avoid putting the battery in contact with metal conductors such as neck chains, barrettes, or bolts, etc.

★ Don’t use metal conductors to connect the positive and negative leads together.

★ During assembly, take precautions to prevent contact between the positive lead and the negative lead.

5.1 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。
5.2 Notice for Designing Battery Pack
电池外壳设计注意事项
5.2.1 Package Design
外壳设计
1. The battery pack should have sufficient strength and the battery should be protected from mechanical shock.
2. No sharp objects should be inside the pack containing the battery.
3. The battery pack should have sufficient strength to ensure that the battery and PCM are not damaged.
4. The battery pack should have sufficient strength to ensure that the battery and PCM are not damaged.
5. The battery pack should have sufficient strength to ensure that the battery and PCM are not damaged.
6. The battery pack should have sufficient strength to ensure that the battery and PCM are not damaged.

5.3 Notice for Assembling Battery Pack
电池外壳组装注意事项
5.3.1 Tab connection
电芯的连接
1. Ultrasonic welding or spot welding is recommended to connect the battery with the PCM or other parts.
2. If the tab is to be soldered to the PCM, the instructions below are very important to ensure battery performance.
   a) The solder iron should be temperature controlled and ESD safe.
   b) Soldering temperature should not exceed 350 ± 10°C.
   c) Soldering time should not be longer than 3 seconds.
   d) Soldering times should not exceed 5 times.
   e) Let the battery tab cool down before soldering again.
   f) Direct heat to the cell body is strictly prohibited. The battery will be damaged by heat above approx. 60°C.

1. 建议使用超声波焊接或点焊技术来连接电芯与保护电芯模块或其它部分。
2. 如使用手工焊接，须注意以下事项，以保证电池的功能：
   a) 焊铁的温度可控且防静电。
5.3.2 Cell fixing
电芯的安装
① The cell should be fixed to the battery pack by its large surface area.
② There should be no sharp edges at the assembly contact area.
③ Cells must be held firmly in the battery pack; movement is not allowed.
④ The total thickness (the cell thickness plus the thickness of auxiliary materials, e.g. sponge pad, insulate pad, tape and so on) can't exceed the interior room of the plastic case, in order to prevent the cell from the damage and safe issue.
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。
④ 电芯的厚度与辅助材料(如：海面垫、绝缘片、胶带等)的总厚度不能大于壳体内部空间尺寸，以免造成对电芯的损坏和安全隐患。

6. Others
其它注意事项
6.1 Disassembly may cause an internal short circuit to the cell, which may cause out-gassing, fire, or other problems.
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。
6.2 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:
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. The electrolyte touch eyes: Flush the electrolyte immediately with water for 15 minutes and seek medical advice immediately.
b. The electrolyte touch skin: Flush the electrolyte immediately with water for minimum 15 minutes.
c. Breath the released gas: Go outside to breath flash air.
d. If accidentally digested. Consult physician immediately.
a. 眼睛接触到电芯内容物：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。
6.3 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
6.4 The cells should never be soaked with liquids such as water, drinks or oil.
6.5 Prohibit using the cells mixed with different manufacturers. 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。

6.6 Prohibit using damaged cells.
禁止使用已损坏的电芯。

7. Recommended Notice:
推荐使用事项

7.1 Using cells on specified facilities only.
仅在指定的设施上使用电池。

7.2 Using cells in normal ambient temperature. Temperature: -10 ~ 35℃, Relative Humidity: 45~75%.
请在正常的室内环境中使用电池。温度：-10 ~ 35°C，相对湿度：45~75%。

7.3 Using the cells, away from heat source. Don’t let children play with cells.
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。

7.4 Avoid the positive pole shorting with the negative one. Avoid moisture.
切勿将电池正、负极短路，切勿让电池受潮，以免发生危险。

7.5 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。