

# 电池组规格书

## Specification for Battery Pack With BMS

电池组型号/ Battery Pack Type:  
11.1V 10AH  
三元锂储能箱/NCM Battery Pack

| 承认签章 Approval Signature |            |               |
|-------------------------|------------|---------------|
| 核准 Approved             | 审核 Checked | 拟定 Registered |
|                         |            |               |

| 客户确认栏 Customer Approval |          |
|-------------------------|----------|
| 确认意见 Conformation:      |          |
| 签章 Signature:           | 日期 Date: |

## 目录/ Contents

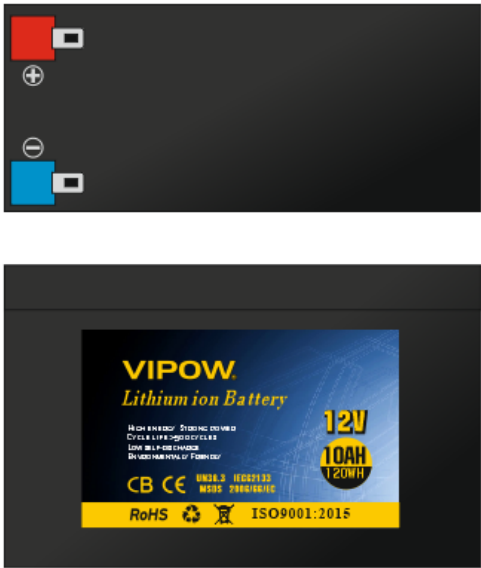
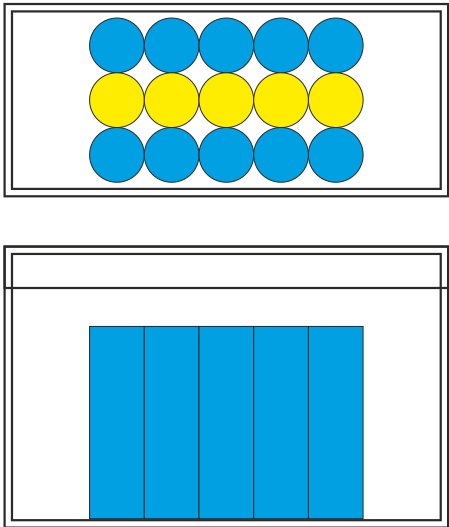
|                                                             |    |
|-------------------------------------------------------------|----|
| 1.前言/ Preface .....                                         | 3  |
| 2.说明/ Description .....                                     | 3  |
| 3.电芯尺寸/ Cell Size .....                                     | 3  |
| 4.电芯特性图准/Cell Character Diagram.....                        | 3  |
| 5.电芯标准/ Cell Specification .....                            | 4  |
| 6. 电芯电性能/ Cell Electrical Characteristics .....             | 5  |
| 7. 保护板电性能/ Protection Board Electrical Characteristics..... | 6  |
| 8. 电池组装配结构尺寸/Pack Size.....                                 | 7  |
| 9. 环境性能/Environment Characteristics.....                    | 7  |
| 10. 安全测试/ Safety test.....                                  | 8  |
| 11.出货/ Shipment.....                                        | 9  |
| 12.质量保证/ Warranty.....                                      | 9  |
| 13.安全守则/ Precautions and Safety Instructions.....           | 9  |
| 14. 安全保证要求/ Requirement for Safety Assurance.....           | 10 |

1. 前言/ Preface

本标准规定了由广州捷力公司生产的电池技术要求,测试方法及注意事项。  
This product specification describes the technique requirements, test procedure and precaution notes of battery to be supplied to customer by Guangzhou VIPOW Co., Ltd..

2. 说明/ Description

- 2.1 产品/ Product:可充电电池组/ Rechargeable battery pack  
2.2 电池型号/ Model (Type): 11.1V 10AH  
2.3. 电池组外形尺寸和装配结构尺寸/Assembly Drawing

|                                                                                    |                                                                                     |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |
| 产品外形图 Picture                                                                      | 电池组合图 Assembly Drawing                                                              |

2.4. 电池组规格参数:

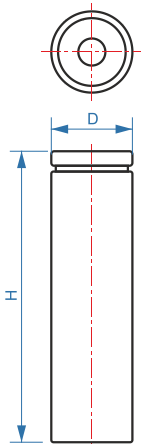
|                      |                   |
|----------------------|-------------------|
| 产品名称 Product Name:   | 11.1V 10AH        |
| 电池容量 Capacity:       | 11.1V 10AH 111WH  |
| 产品外形尺寸 Size:         | 151x65x95 MM      |
| 重量 Weight:           | 1000 g            |
| 内置电池类型 Battery Type: | 三元锂电池 NCM Battery |

3. 电芯尺寸/ Cell Size

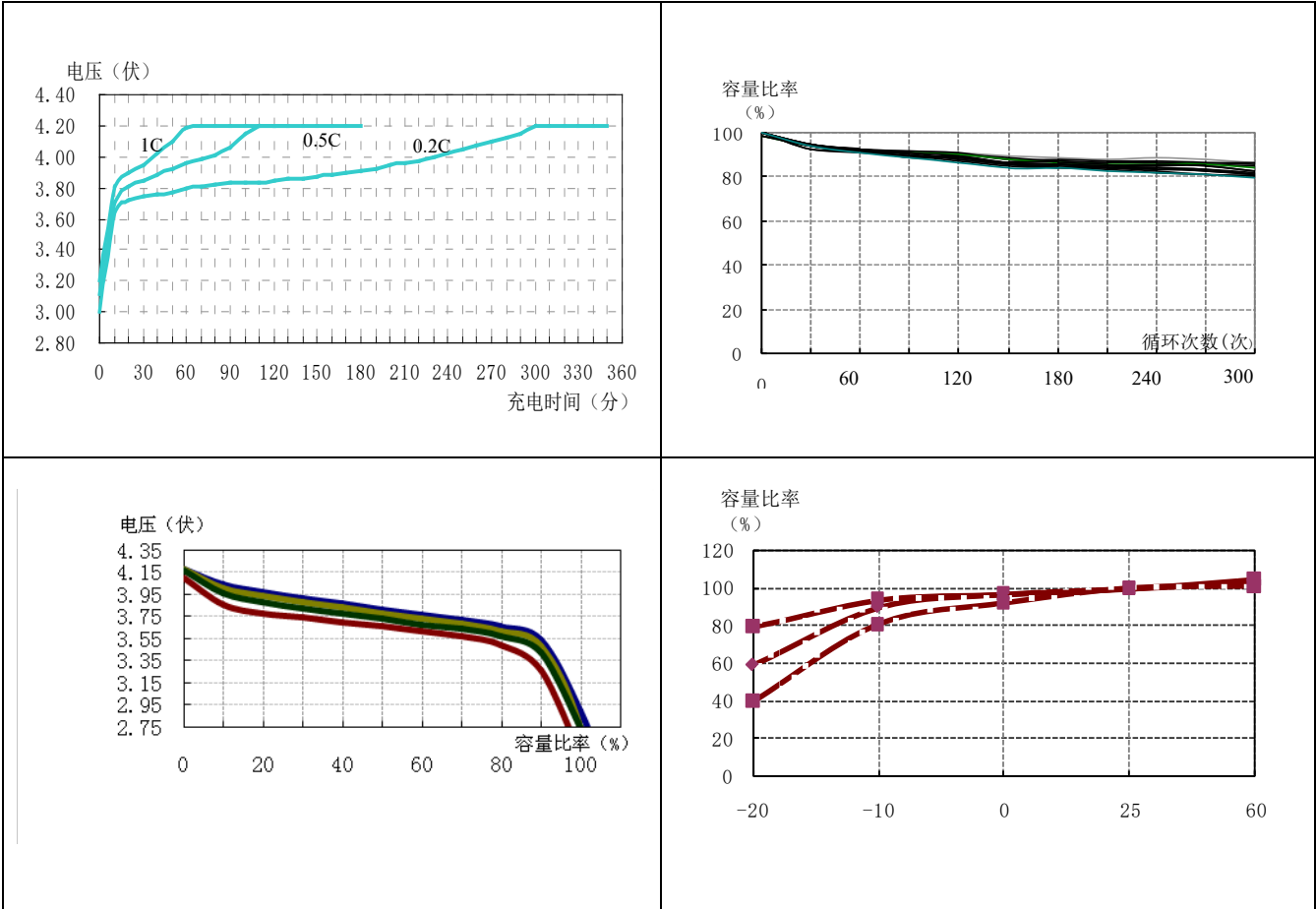
对于图形结构的详细资讯, 请参阅图A.

For details, please refer to Figure A.

| Item | Description           | Dimensions  |
|------|-----------------------|-------------|
| H    | Height (Bare Cell)    | 65.3 mm max |
| D    | Diameter ( Bare Cell) | 18.3 mm max |



4. 电芯特性图/Cell Characteristics diagram



5. 电芯标准/ Cell Specification

| 项目/ Item                                    |                            | 标准/ Specification | 备注/ Remark                   |
|---------------------------------------------|----------------------------|-------------------|------------------------------|
| 5.1 典型容量/ Typical capacity                  |                            | 2000mAh           | 0.2C rate discharge capacity |
| 5.2 最小容量/ Minimum capacity                  |                            | 1950mAh           |                              |
| 5.3 交流内阻/ Internal impedance                |                            | ≤70mΩ             | By 1kHz AC                   |
| 5.4 标称电压/ Nominal voltage                   |                            | 3.7V              |                              |
| 5.5 电芯重量/ Cell weight                       |                            | 42g±2g            |                              |
| 5.6 标准充电方式<br>Standard charge method        | 恒流/ Constant current       | 400mA             |                              |
|                                             | 充电电压 Charge voltage        | 4.2V±0.05V        |                              |
|                                             | 截止电流 Cut-off current       | 40 mA             |                              |
| 5.7 快速充电方式<br>Fast charge method            | 恒流/ Constant current       | 1000mA            |                              |
|                                             | 充电电压 Charge voltage        | 4.2V±0.05V        |                              |
|                                             | 截止电流 Cut-off current       | 40mA              |                              |
| 5.8 标准放电方法<br>Standard discharge conditions | 恒流/ Constant current       | 400 mA            |                              |
|                                             | 截止电压 End-of-charge voltage | 2.75V             |                              |
| 5.9 最大持续放电电流                                |                            | 2000mA            | 1C                           |

|                                          |                                      |                                                                                    |                                               |
|------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------|
| Max continuous discharge current         |                                      |                                                                                    |                                               |
| 5.10 脉冲放电电流<br>Pulse discharge at 10 Sec |                                      | 4000mA                                                                             | 2C                                            |
| 5.11 循环寿命<br>Cycle life                  |                                      | over 300 cycles                                                                    | 0.5C continual discharge<br>( 100% DOD)       |
| 5.12 操作温度<br>Operating temperature       | 充电温度<br>Charging ambient temperature | 0~45°C                                                                             | Cell skin temperature should not exceed 65°C. |
|                                          | 放电温度 Discharging ambient temperature | -20~45°C                                                                           | Cell skin temperature should not exceed 80°C  |
|                                          | 存储温度 Storage temperature             | 1 year                                                                             | 0~30°C                                        |
|                                          |                                      | 3 months                                                                           | -20~35°C                                      |
|                                          |                                      | 1 month                                                                            | -20~45°C                                      |
| 5.13 外观/ Appearance                      |                                      | 无破裂、划痕、变形、污迹、电解液泄露等<br>Without break, scratch, distortion, contamination, leakage. |                                               |

## 6.电芯电性能/ Cell Electrical Characteristics

| 测试项目/ Test Item                           | 测试方法/ Test Method                                                                                                                                                                                                                                                                                                                                                                 | 检验标准/ Criteria                                                                                                       |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| 6.1 1C 放电性能<br>Discharge performance (1C) | 电芯按5.6规定充电后，在环境温度为23°C±2°C的条件下搁置0.5h，而后以1C电流放电到2.0V.<br>A cell is charged using standard charge method (spec. 5.6), stored at 23°C±2°C for 0.5h, and then 1C constant current discharged to 2.0V.                                                                                                                                                                                 | 放电时间不低于57min.<br>the discharging time is not less than 1h.                                                           |
| 6.2高温性能<br>High temperature performance   | 电芯按5.6规定充电后，将电芯放入55°C±2°C的高温箱中恒温2h，然后以1.0C电流放电至2.0V,实验结束后,将电芯取出在环境温度为20°C±5°C的条件下搁置2h，然后目测电芯外观<br>A cell is charged using standard charge method (spec. 5.6), stored at 55°C±2°C for 2h, then 1C constant current discharged to 2.0V. After that, fetch out the cell and place it in the ambient temperature of 20°C±5°C for 2h, then check its appearance.                       | 1.放电时间不低51min;<br>2.电芯外观无变形,无爆裂.<br>1. the discharging time is not less than 51min;<br>2. no distortion, no rupture. |
| 6.3低温性能<br>Low temperature performance    | 电芯按5.6规定充电后，将电芯放入-20°C±2°C的低温箱中恒温16~24h,然后以0.2C电流放电至2.0V,实验结束后,将电芯取出在环境温度为20°C±5°C的条件下搁置2h,然后目测电芯外观.<br>A cell is charged using standard charge method (spec. 5.6), stored at -20°C±2°C for 16h~24h, then discharged to 2.0V at a constant current of 0.2C. After that, fetch out the cell and place it in the ambient temperature of 20°C±5°C for 2h, then check its appearance. | 1.放电时间不低于2h;<br>2.电芯外观无变形,无爆裂.<br>1.the discharging time is not less than 2h;<br>2.no distortion, no rupture         |
| 6.4荷电保持能力<br>Charge(Capacity) retention   | 电芯按5.6规定充电后,在环境温度为23°C±2°C条件下,将电芯搁置28天,再以0.2C电流放电至2.0V.<br>A cell is charged using standard charge method (spec. 5.6), and stored at 20°C±5°C for 28days, then discharged to 2.0V at a constant current of 0.2C.                                                                                                                                                                  | 容量保持率:85%<br>Capacity retention:85%Ch                                                                                |
| 6.5循环寿命<br>Cycle life                     | 电芯按5.6规定充电后,搁置0.5~1h,然后以1C电流放电至终止电压,放电结束后,搁置0.5~1h,再进行下一次充放电循环,连续进行充放电循环300次.<br>A cell is charged using standard charge method (spec. 5.6), and stored for 0.5h~1h, then discharged to cut-off voltage, after that, stored 0.5h~1h prior to next charge-discharge cycle. The cell shall be continuously charged and discharged for 300 times.                                    | 容量保持率≥75%<br>Capacity retention≥75%                                                                                  |

## 7. 环境性能/Environment Characteristics

| 测试项目/ Test item                                | 测试方法/ Test method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 检验标准/ Criteria                                                                                                                                   |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 7.1恒定湿热性能<br>Constant temperature and humidity | 电芯按5.6规定充电后,将电芯放入40±2℃(90~95%RH)的恒温恒湿箱中搁置48h后, 将电芯取出在室温下搁置2h,目测电芯外观,再以1C电流放电至终止电压.<br>A cell is charged using standard charge method (spec. 5.6),and stored at 40℃±2℃(90~95%RH) for 48h, then placed in room temperature for 2h. After that, check its appearance prior to being discharged to cut-off voltage at a constant current of 1C.                                                                                                                                                                                                                                                                                                                                         | 1.电芯外观应无变形,锈蚀,冒烟或爆炸;<br>2.放电时间应不低于36min.<br>1. No distortion, no rust, no fume, no explosion;<br>2. The discharging time is not less than 36min. |
| 7.2振动测试<br>Vibration test                      | 电芯按5.6规定充电后,将电芯用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设备.X,Y,Z三个方向每个方向上从10~55Hz循环扫频振动30min, 扫频速率为1oct/min:<br>振动频率: 10Hz~30Hz 位移幅值(单振幅): 0.38mm;<br>振动频率: 30Hz~55Hz 位移幅值(单振幅): 0.19mm.<br>A cell is charged using standard charge method (spec. 5.6), then installed onto the vibration desk with clamps. Equipment parameters of frequency and amplitude are as follows(the frequency is to be varied at the rate of 1oct/min between 10 and 55 Hz and repeat vibration for 30min.The cell is to be tested in three mutually perpendicular directions): frequency:10Hz~30Hz amplitude: 0.38mm frequency: 30Hz~55Hz amplitude: 0.19mm                                                      | 1.电芯外观应无明显损伤,漏液,冒烟或爆炸;<br>2. 单体电芯电压不低于3.6V.<br>1. No scratch, no leakage, no fume, no explosion;<br>2. The min voltage is 3.6V.                  |
| 7.3碰撞测试<br>Shock test                          | 电芯按5.6规定充电后,将电芯分别按X,Y,Z三个互相垂直轴通过夹具固定在振动台面上,按下述要求调好加速度,脉冲持续时间进行碰撞实验:<br>脉冲峰值加速度:100m/s <sup>2</sup> ,每min碰撞次数:40~80,<br>脉冲持续时间:16ms,碰撞次数: 1000±10.<br>A cell is charged using standard charge method (spec. 5.6),then secured to the testing machine by means of rigid mount which supports all mounting surfaces of the cell. Each cell shall be subjected to a total of three shocks of equal magnitude. The shocks are to be applied in each of three mutually perpendicular directions. The acceleration and impulse time are as follows: acceleration of impulse peak value:100m/s <sup>2</sup> ,shock frequency:40~80times/min, impulse lasting time:16min,shock times:1000±10 | 1.电芯外观应无明显损伤,漏液,冒烟或爆炸;<br>2. 单体电芯电压不低于3.6V.<br>1. No scratch, no leakage, no fume, no explosion;<br>2. The min voltage is 3.6V.                  |
| 7.4自由跌落<br>Drop test                           | 电芯按5.6规定充电后,将电芯样品由高度为1000mm的位置自由跌落到置于水泥地面上的18-20mm厚的木板上, 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,将电芯以1C电流放电至终止电压,然后以1C的电流进行充放电循环,直至放电时间不低于51min,即可终止充放电循环,充放电循环次数应不多于3次.<br>A cell is charged using standard charge method (spec. 5.6), then dropped from a height of 1000mm to a wooden board(18-20mm thick) which is placed on the concrete ground. Cells shall be dropped in each of three mutually perpendicular directions. Total drop times are 6.After that, the cell is discharged to cut-off voltage at CC of 1C, then repeat charge & discharge at a current of 1C until the discharge time is not less than 51min, the cycle times should be not more than 3.                 | 电芯应不漏液,冒烟或爆炸<br>No leakage, no fume, no explosion.                                                                                               |

## 8. 安全测试/ Safety test

下述试验应在有强制排风条件及防爆措施的装置内进行,在试验前所有的电芯按5.6规定充电后,并搁置24h后,再进行以下试验.

All below tests are carried out on the equipments with forced ventilation and explosion-proof device. Before test all cells are charged using standard charge method (spec. 5.6), and stored 24h prior to testing.

| 测试项目/ Test Item                    | 测试方法/ Test Method                                                                                                                                                                                                                                                                                                                                                                                                                              | 检验标准/ Criteria                          |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| 8.1热冲击<br>Heating test             | 将电芯放在电热鼓风干燥箱中,温度以 $5^{\circ}\text{C}\pm 2^{\circ}\text{C}/\text{min}$ 的速率由室温升至 $130^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 并保持10min.<br>A cell is to be heated in a circulating air oven. The temperature of the oven is to be raised at a rate of $5^{\circ}\text{C}\pm 2^{\circ}\text{C}$ per minute to a temperature of $130^{\circ}\text{C}\pm 2^{\circ}\text{C}$ and remain for 30min at that temperature before the test is discontinued. | 电芯不起火,不爆炸<br>No fire, no explosion      |
| 8.2 (3C/10V)过充电<br>Overcharge test | 先将电池以0.2C放电至终止电压,然后将电芯正负极连接于恒压电源,调节电流至3C,电压为10V,然后对电芯3C充电,直到输出电压不低于10V,持续充电7h或电压不再增大.<br>A cell is discharged to cut-off voltage at CC of 1C.then it is to be subjected to CC/CV power by connecting its positive & negative terminal, then set the current as 3C, the voltage as 10V, after that, Charge the cell up to 10V at CC of 3C, until that last 7h at the voltage of 10V or the voltage is no more increased.                        | 电芯不起火,不爆炸<br>No fire, no explosion      |
| 8.3 短路测试<br>Short-circuit test     | 将接有热电偶的电芯置于通风橱中,用铜线短路其正负极(线路总电阻不大于50毫欧),实验过程中监视电芯温度变化,当电芯温度下降到比峰值低约 $10^{\circ}\text{C}$ 时,结束实验.<br>A Cell is to be short-circuited by connecting the positive and negative terminals of the cell with copper wire having a maximum resistance load of 50m. Monitor its temperature while testing, the cell is to be discharged until the cell case temperature has returned to be $10^{\circ}\text{C}$ less then peak temperature.            | 1.电芯不起火,不爆炸<br>1. No fire, no explosion |

## 9.出货/ Shipment

单体电芯按3.30~3.45V的充电电压或客户要求出货,电芯出货后充电前的剩余容量取决于储存时间和条件.

The Cell shall be shipped in voltage range of 3.30 ~ 3.45 V or in accordance with customers' requirement. The remaining capacity before charging shall be changed depending on the storage time and conditions.

## 10. 质量保证/ Warranty

自出货之日起,电芯的保质期限依合同而定.但是,在此期限内,如果非捷力公司的制程原因而是客户的误用造成的电芯质量问题,捷力公司不承诺免费更换.

The Warranty period of cell is made according to business contract. However, even though the problem occurs within this period, VIPOW won't replace a new cell for free as long as the problem is not due to the failure of VIPOW manufacturing process or is due to customer's abuse or misuse.

捷力公司对违反安全守则操作所产生的问题不承担任何责任.

> VIPOW will not be responsible for trouble occurred by handling outside of the precautions in instructions.

捷力公司对与电路,电池组,充电器搭配使用所产生的问题不承担任何责任.

> VIPOW will not be responsible for trouble occurred by matching electric circuit, cell pack and charger.

出货后客户在电芯组装过程中产生的不良电芯不在捷力公司质量保证的范围之列.

> VIPOW will be exempt from warrantee any defect cells during assembling after acceptance.

## 11. 安全守则/ Precautions and safety instructions

滥用锂离子充电电芯可能会造成电芯的损害或人身的伤害.在使用锂离子充电电芯以前,请仔细阅读以下的安全守则:

Lithium-Ion rechargeable batteries subject to abusive conditions can cause damage to the cell and/or personal injury. Please read and observe the standard cell precautions below before using utilization.

注释1.如果客户需要将电芯在该文件之外的条件下操作或应用,请先咨询捷力公司相关事宜.

Note1. The customer is required to contact VIPOW advance, if and when the customer needs other applications or operating conditions than those described in this document.

注释2.在该文件说明的条件之外使用该电芯而产生的事故,捷力公司不承担任何责任.

Note2. VIPOW will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

### 11.1.0 电芯防范措施/ Standard cell Precaution

#### 11.1.1 不要将电芯暴露在极热或有火星的环境中.

- Do not expose the cell to extreme heat or flame.
- 11.1.2 不要将电芯短路,过充或过放.  
Do not short circuit, over-charge or over-discharge the cell.
- 11.1.3 不要使电芯承受过重的机械冲击.  
Do not subject the cell to strong mechanical shocks.
- 11.1.4 不要将电芯浸入海水或水中,或者使其吸湿.  
Do not immerse the cell in water or sea water, or get it wet.
- 11.1.5 不要颠倒电芯的正负极.  
Do not reverse the polarity of the cell for any reason.
- 11.1.6 不要拆卸或修整电芯.  
Do not disassemble or modify the cell.
- 11.1.7 不要和项链,硬币或发夹等金属物品放置在一起.  
Do not handle or store with metallic like necklaces, coins or hairpins, etc.
- 11.1.8 不要使电芯受到明显的损害或变形.  
Do not use the cell with conspicuous damage or deformation.
- 11.1.9 不要将电芯与插座连接.  
Do not connect cell to the plug socket or car-cigarette-plug.
- 11.1.10 不要直接焊接电芯.  
Do not make the direct soldering onto a cell.
- 11.1.11 不要直接接触泄漏的电芯.  
Do not touch a leaked cell directly.
- 11.1.12 不要将电芯用于其它设备.  
Do not use for other equipment.
- 11.1.13 不要将锂离子电芯混合使用.  
Do not use Lithium-ion cell in mixture.
- 11.1.14 不要将电芯放置在太阳光直射的地方.  
Do not use or leave the cell under the blazing sun (or in heated car by sunshine).
- 11.1.15 将电芯放置在远离儿童的地方.  
Keep cell away from children.
- 11.1.16 不要针刺,锤打或践踏电芯.  
Do not drive a nail into the cell, strike it by hammer or tread it.
- 11.1.17 不要撞击或投掷电芯.  
Do not give cell impact or fling it.

## 11.2 电芯使用说明/ Cell operation instruction

### 11.2.1 充电/ Charging

使用恒压恒流锂离子电芯充电器.

\* Use a constant current, constant voltage (CC/CV) lithium-ion (Li+) cell charge controller.

### 11.2.2 储存建议/ Storage recommendations

#### a. 储存温度和湿度 Storage Temperature and Humidity

- 电芯应储存在温度范围为0 ~45°C,低湿度和不含腐蚀性气体的环境中.  
Storage the cell at 0 ~ 45°C, low humidity and no corrosive gas atmosphere.
- 不要让电芯承担任何压力. No press on the cell

## 12. 安全保证要求/ Requirement for safety assurance

为了安全起见,如有设备设计,锂离子电芯系统保护电路或高电流,快速充电和其它方面的特殊应用,请先咨询捷力公司相关事宜. For the sake of safety assurance, please discuss the equipment design, its system and protection circuit of Lithium-ion cell with VIPOW in advance. And consult about the high rate current, rapid charge and special application in the same way.

## 13. 保护板电性能/ Protection Board Electrical Characteristics

| 项目 Item                        | 符号                 | 详细内容 Detail                               | 标准 Standard  |
|--------------------------------|--------------------|-------------------------------------------|--------------|
| 过充保护<br>Over charge Protection | V <sub>DET1</sub>  | 过充电检测电压<br>Over charge protection voltage | 4.25±0.025V  |
|                                | tV <sub>DET1</sub> | 过充电检测延迟时间<br>Over charge protection delay | 1000ms (MAX) |
|                                | V <sub>REL1</sub>  | 过充电解除电压<br>Over charge release voltage    | 4.05±0.05V   |

|                                   |                    |                                                  |                                  |
|-----------------------------------|--------------------|--------------------------------------------------|----------------------------------|
| 过放保护<br>Over discharge Protection | V <sub>DET2</sub>  | 过放电检测电压<br>Over charge detection voltage         | 2.7V±0.08V                       |
|                                   | tV <sub>DET2</sub> | 过放电检测延迟时间<br>Over discharge detection delay time | 1000ms (MAX)                     |
|                                   | V <sub>REL2</sub>  | 过放电解除电压<br>Over discharge release voltage        | 3.0V±0.1V                        |
| 过流保护<br>Over Current Protection   | V <sub>DET3</sub>  | 过电流检测电压<br>Over current detection current        | 100±15mV                         |
|                                   | I <sub>DP</sub>    | 过电流保护电流<br>Over current protection current       | 10-15A                           |
|                                   | tV <sub>DET3</sub> | 检测延迟时间<br>Over current detection delay time      | 1000ms (MAX)                     |
|                                   |                    | 保护解除条件<br>Over current lease                     | 断开负载<br>Disconnect the load      |
| 短路保护<br>Short circuit protection  |                    | 保护条件<br>Short circuit protection condition       | 外部电路短路<br>External short circuit |
|                                   | T <sub>SHORT</sub> | 检测延迟时间<br>Short circuit detect delay             | 600 μ s (MAX)                    |
|                                   |                    | 保护解除条件<br>Short circuit lease condition          | 断开短路电路<br>Disconnect the load    |
| 内阻<br>Internal resistance         | R <sub>DS</sub>    | 主回路通态电阻<br>Main loop electrify resistance        | R <sub>DS</sub> ≤60m Ω           |
| 消耗电流<br>Self-consuming            | I <sub>DD</sub>    | 工作时电路内部消耗<br>Sleeping current (over discharge)   | 2.0-6.0uA                        |