



APPROVAL SHEET

产品承认书

Customer 客户名称: _____

Part No 产品型号: _____ **HZT333994PL11-01** _____

Description 产品描述: _____ **3.80V 2150mAh** _____

Application 应用机型: _____

| SIGNATURE 制作方签名 | | |
|------------------------|-----|----------------------------|
| MADE BY 制作: | 单超杰 | DATE 日期: 2021/10/11 |
| APPROVED BY 批准: | 李美可 | DATE 日期: 2021/10/11 |

| CUSTOMER APPROVAL 客户确认 | | |
|----------------------------|--|-----------------|
| CONFIGURATION 结构确认: | | DATE 日期: |
| FUNCTION 性能确认: | | DATE 日期: |
| APPROVED BY 批准: | | DATE 日期: |

| | | | |
|-----------------------|------------------------------|---|-----|
| NO.编号 | HZT333994PL11-01 | | |
| DESCRIPTION 描述 | 3.8V 2150mAh 3.8V 2150mAh | Li-ion Rechargeable Battery 可充电锂离子电池 | |
| DATE 日期 | 2021/10/11 | Version 版别 | A/0 |



深圳市海芝通电子股份有限公司

Shenzhen Hi-Chipcom Electronics Co., Ltd

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Amendment Record

修正记录

| Revision 修订编号 | Description 修订内容 | Version 版别 | Date 日期 | Approval 审核 |
|------------------|---------------------|---------------|------------|----------------|
| 1 | 新发行 Initial Release | A/0 | 2021/10/11 | 李美可 |
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1. Scope 适用范围:

1.1 This product specification applies to the lithium ion battery of Shenzhen Hi-Chipcom Electronics Co., LTD.

本产品规格书适用于深圳市海芝通电子股份有限公司生产的锂离子成品电池

1.2 Please contact Hi-Chipcom coordination with the settlement if you have any questions.

如果有什么问题请与海芝通联系

2. Type 电池型号

2.1 Battery Type 电池型号: HZT333994PL11-01

2.2 Cell Type 电芯型号: 333994PL 3.8V 2150mAh(GF)

2.3 The products of all materials are in compliance with ROHS requirements 本产品所有物料均符合 ROHS 要求。

3. General Performance 常规性能

| Item 项目 | Specifications 性能 | Remark 备注 |
|---------------------------------------|--|---|
| 3.01 Typical Capacity 典型容量 | 2230mAh | Standard charge & Standard discharge / 标准充放电) |
| 3.02 Min Capacity 最小容量 | 2150mAh | |
| 3.03 Nominal Voltage 标称电压 | 3.80V | / |
| 3.04 Under Discharge Voltage 放电截止电压 | 3.2V | |
| 3.05 Limited charge voltage 充电限制电压 | 4.35V | / |
| 3.06 Standard Charge method 标准充电方式 | 0.2C CC charge to 4.35V, then CV to 0.02C cut off 0.2C 恒流充电至 4.35V, 然后 4.35V 恒压充电至电流 0.02C 截止 | 23±2℃ |
| 3.07 Standard Discharge method 标准放电方式 | 0.2C CC Discharge to 3.2V 0.2C 恒流放电至 3.2V | 23±2℃ |
| 3.08 Max. Charge Current 最大充电电流 | 0.7C | 15-45℃ |
| 3.09 Max. Discharge Current 最大放电电流 | 1.0C | 15-60℃ |

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| | | |
|--|--|---|
| 3.11 Operating Temperature and Humidity Range 工作环境 | Charge Temperature: 0°C~45°C 充电温度: 0°C~45°C Relative Humidity: 45-85%RH 相对湿度: 45-85%RH | 0°C~15°C: Charge Current Max. 0.2C Charge Voltage Max. 4.35V 最大充电电流 0.2C 最大充电电压 4.35V 15°C~45°C: Charge Current Max. 0.7C Charge Voltage Max. 4.35V 最大充电电流 0.7C 最大充电电压 4.35V |
| | Discharge Temperature: -10°C~60°C 放电温度: -10°C~60°C Relative Humidity: 45-85%RH 相对湿度: 45-85%RH | |
| 3.12 Impedance 内阻 | $\leq 140m\Omega$ | AC Impedance 1kHz 交流阻抗值 1kHz |
| 3.13 Weight 重量 | 38.6g | About 大约 |
| 3.14 Storage Environment 存储环境 | Less than 1 month 小于 1 个月 | -10°C ~ +45°C, 90%RH Max |
| | Less than 12 month 小于12个月 | -10°C ~+35°C, 85%RH Max |
| | Long Time Storage 长期 存储 | The capacity for a long time storage shall be 60~70% range 23°C±2°C 长期存储容量为 60%~70% |
| | Humidity 湿度 | 60%±20% |
| 3.15 Voltage of shipment 出货电压 | 3.90-4.00V | |

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4 Electrochemical Characteristic 电化学性能

| | | |
|-----------------------------------|---|---|
| <p>4.1 Cycle life 循环性能</p> | <p>Charge cell with 0.5C to 4.35V then CV to 0.02C cut off; Discharge cell with 0.2C until cell voltage reaches 3.2V. Repeat to 500 cycles, record remained capacity of 300th cycle. 0.5C 恒流充电至 4.35V, 4.35V 恒压充电至电流 0.02C 截止, 然后 0.5C 放电至 3.2V, 重复循环至 500 周, 记录第 500 周的容量。</p> | <p>Capacity Retention ≥80% of C_{min}.. 容量保持率不低于 80% Thickness Swelling</p> |
| <p>4.2 Self-Discharge 自放电</p> | <p>After the standard charging, storied the cells under the condition as ambient temperature 23±2 °C for 30 days, then measured the capacity with 0.2C till 3.2V at 23±2 °C as residual capacity.(one cell) 按照标准充电方式充满电后, 在温度为 23±2°C 的环境下存放 30 天, 然后以 0.2C 倍率放电至 3.2V 的容量为残余容量</p> | <p>Residual Capacity ≥85% C_{min} / 残余容量 ≥85% C_{min}</p> |

5 Environment Characteristic 环境适应性能

| | | |
|---|--|--|
| <p>5.1 Constant temperature and constant humidity test 恒定湿热性能</p> | <p>After Standard Charging, test condition: Temperature: 40±5°C Relative Humidity: 90~95%RH Storage Time: 48 hours Then return to room temperature for 2 hours, Then 0.2C discharged to 3.2V. 标准充电后, 测试条件如下: 温度: 40±5°C 相对湿度: 90~95% 放置时间: 48 小时 电芯取出在室温下放置 2 小时, 然后以 0.2C 电流放电至 3.2V。</p> | <p>No explosion No fire No leakage Residual capacity ≥ 60% initial capacity 不起火、不爆炸、不泄漏。残余容量不低于初始容量的 60%</p> |
| <p>5.2 Vibration test 振动</p> | <p>A cell after standard charging and then vibrated for 90 minutes for each of the three mutually perpendicular planes with total excursion of 0.8mm and with frequency of 10 Hz to 55 Hz. 准充电后在三个相互垂直方向以 0.8mm 振幅, 频率为 10~55Hz 振动 90 分钟。</p> | <p>No explosion, no fire no leakage 不起火、不爆炸、</p> |

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6. Safety Test 安全测试

| Test Item 测试项目 | Test Method 测试方法 | Criteria 检验标准 |
|---|---|--|
| 6.1 Heating Test 热冲击 | Acell after standard charging, is to be put into an hot box. The temperature of the oven is to be raised at a rate of 5 ±2°C per minute to a temperature of 130 ±2°C and remain for 30 minutes. 按标准充电后放置于热箱中，温度以(5±2°C)/min 的速率升温至 130±2°C 保温 30min。 | No explosion No fire Temperature≤150°C 不起火、不爆炸、温度 |
| 6.2 Overcharge protection 过充保护 | After the battery is fully charged, use constant current constant voltage source to continue to load the battery 8h, constant current constant voltage source voltage is set to 2 times the nominal voltage, the current is set to 2.0C external current 电池满充电后，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 2.0C 的外接电流。 | No fire, no smoking ,no explosion. The over charge protection function should be started. 无冒烟、无起火、无爆炸。电池应启动过充保护功能 |
| 6.3 Over discharge testing 过放测试 | At standard testing condition, the cells be discharge to 3.2V according to the requirements of standard discharge, then connect with external load of 30 ohm for 24 hours. 在标准测试环境下，按标准放电的要求放电至 3.2V 后，外接 30Ω 负载放电 24 小时。 | No fire, no smoking ,no explosion. The over charge discharge function should be started. 无冒烟、无起火、无爆炸。电池应启动过放保护功能 |
| 6.4 Short-circuit Test 短路 | Acell after standard charging, is to be short-circuited by connecting the positive and negative terminals of the cell with a circuit load having a resistance load of 80 ±20mΩ. When the cell temperature falls 20% lower than the peak or last 24h, stop testing. 标准充电后，使用内阻为 80±20mΩ 的导线短路正负极，当电芯温度下降到比峰值低约 20%或者持续短路 24 小时，结束试验。 | No explosion No fire 不起火、不爆炸 |

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7. Testing conditions 测试条件

Unless otherwise specified, all tests stated in this product specifications

Should be conducted under the following atmosphere conditions:

除非另有规定，本规格书中各项试验应在标准大气条件下进行：

Temperature: 21°C ~ 25°C

温度：21°C ~ 25°C

Relative humidity: 45% ~ 75%

相对湿度：45% ~ 75%

Atmospheric pressure: 86kpa ~ 106kpa

大气压力：86kPa ~ 106kPa

8. CAUTIONS IN USE 使用警告

8.1 To ensure proper use of the battery please read the manual carefully before using it. Handling

为了使电池安全的使用及处理请在使用前认真的阅读操作说明

- Do not expose to, dispose of the battery in fire.
不能把电池曝晒或丢在火中
- Do not put the battery in a charger or equipment with wrong terminals connected.
电池充电时不能把正负极性装反
- Avoid shorting the battery
避免短路电池
- Avoid excessive physical shock or vibration.
避免过分的物理震动和冲击电池
- Do not disassemble or deform the battery.
不能拆解或使电池变形
- Do not immerse in water.
不能将电池浸入水中
- Do not use the battery mixed with other different make, type, or model batteries.
不能将其它不同厂家，类型，型号的电池混合使用
- Keep out of the reach of children.
禁止小孩接触电池

8.2 charge and discharge 充放电

- Battery must be charged in appropriate charger only.
电池必须在合适的条件下充电
- Never use a modified or damaged charger.
决不能用故障的充电器给电池充电
- Do not leave battery in charger over 24 hours.
电池持续充电不能超过 24h

8.3 storage 贮存

- Store the battery in a cool, dry and well-ventilated area.

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电池贮藏在通风干燥的环境中

8.4 disposal 处理

- Regulations vary for different countries. Dispose of in accordance with local regulations.

不同国家法规的不同，处理时根据当地的法规。

9. Battery operation instruction 电池操作说明

9.1 Charging 充电

9.1.1 **Charging current:** Cannot surpass the biggest charging current which in this specification book stipulated.

充电电流：不能超过规格书规定的最大的充电电流

9.1.2 **Charging voltage:** Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

充电电压：不能超过规格书规定的最高的限制电压

9.1.3 **Charge temperature:** The battery must carry on the charge in the ambient temperature scope which this specification book stipulated.

充电温度：电池充电温度必须按照规格书的温度范围执行

9.1.4 Uses the constant electric current and the constant voltage way charge, the prohibition reverse charges.

If the battery positive electrode and the cathode meet instead, can damage the battery.

先恒流后恒压方式充电，禁止颠倒的方式充电。如果电池正负极颠倒充电会损坏电池并随时有爆炸的危险。

10.0 Discharging 放电

10.1.1 **Discharging current** The discharging current does not have to surpass this specification book stipulation the biggest discharging current, the oversized electric current electric discharge can cause the battery capacity play to reduce and to cause the battery heat.

放电电流：电池放电电流不能超过规格书规定的最大放电电流，过大的电流放电会造成电池发热和容量衰减。

10.2.2 **discharge temperature:** The battery discharge must carry on in the ambient temperature scope which this specification book stipulated

放电温度：电池放电温度必须按照规格书的温度范围执行

10.2.3 **Over-discharges:** After the short time excessively discharges charges immediately cannot affect the use, but the long time excessively discharges can cause the battery the performance, battery function losing. The battery long-term has not used, has the possibility to be able to be at because of its automatic flashover characteristic certain excessively discharges the condition, for prevented excessively discharges the occurrence, the battery should maintain the certain electric quantity.

过放电：短时间的的过充过放不影响电池的使用，但是长时间的过放电会使电池的功能失效、能量消失，则电池永久性不能使用。

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10.3 Storing the Batteries 贮存电池。

The battery should store in the product specification book stipulation temperature range. If has surpasses above for three months the long time storage, suggested you should carry on additional charge to the battery.

电池贮存在规格书规定的温度范围内，如果电池贮存超过三个月，要求给电池做 1-3 次循环，以激活电芯内的化学物质，否则会使电芯内化学物质逐渐僵滞而降低容量，缩短其使用寿命,电池过放可能产生漏液,鼓胀现象。另外电池存在静耗，长时间不使用也不激活，一旦电量耗完电池能量也将基本消失，出现电池不能充电使用现象。

10. Period of Warranty 保质期

The period of warranty is a year from the date of shipment. Guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customers abuse and misuse.

电池的保质期从出货之日算起为一年。如果证明电池的缺陷是在制造过程中形成的而不是由于用户滥用及错误使用造成，本公司负责退换电池。

11. Other The Chemical Reaction 其它化学反应

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.

由于电池是利用化学反应的原理，所以随时间的增加电池的性能会降低，即使未使用，存放太长一段时间也一样会使电池性能降低。如果使用条件如充电、放电及周围环境温度等情形不在指定的使用范围内，也会缩短电池的使用寿命，或者产生漏液导致设备损坏。

12. Note: 备注

Any other items which are not covered in this specification shall be agreed by both parties.

本说明书未包括事项应由双方协议确定。

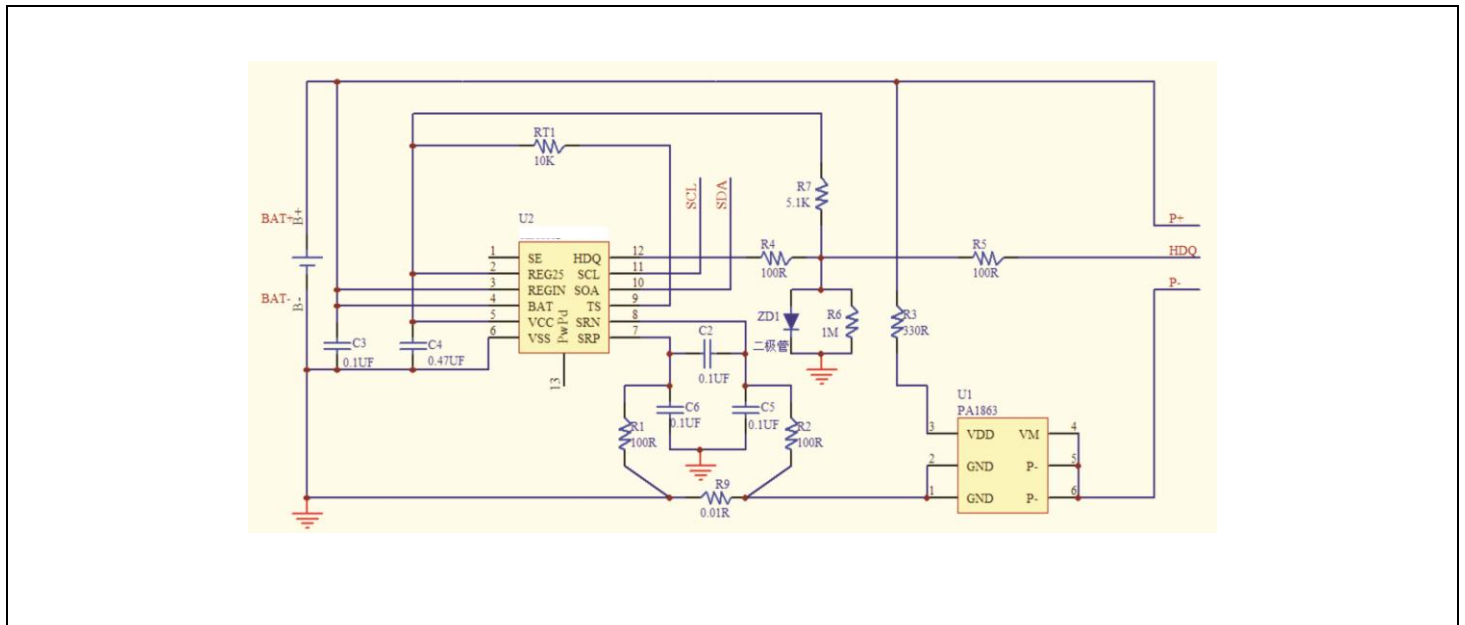
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13:PCM Characteristic 保护板性能

| Item 项目 | Syol 符号 | Content 内容 | Criterion 标准 |
|-----------------------------------|-------------|---|---------------------|
| Over charge Protection 过充保护 | V_{DET1} | Over charge detection voltage 过充保护电压 | $4.425V \pm 0.025V$ |
| | tV_{DET1} | Over charge detection delay time 过充保护延迟时间 | $\leq 90mS$ |
| | V_{REL1} | Over charge release voltage 过充恢复电压 | $4.225 \pm 0.04V$ |
| Over discharge protection 过放保护 | V_{DET2} | Over discharge detection voltage 过放保护电压 | $2.515V \pm 0.075V$ |
| | tV_{DET2} | Over discharge detection delay time 过放保护延迟时间 | $\leq 45mS$ |
| | V_{REL2} | Over discharge release voltage 过放恢复电压 | $2.915V \pm 0.075V$ |
| Over current protection 过流保护 | I_{DP} | Over current detection current 过流保护电流 | 4.5-9.7A |
| | tV_{DET3} | Detection delay time 延迟时间 | 14.4ms (MAX) |
| | / | Release condition 恢复条件 | Cut load 断开负载 |

附图 1: PCM Working Principle 保护板工作原理图:



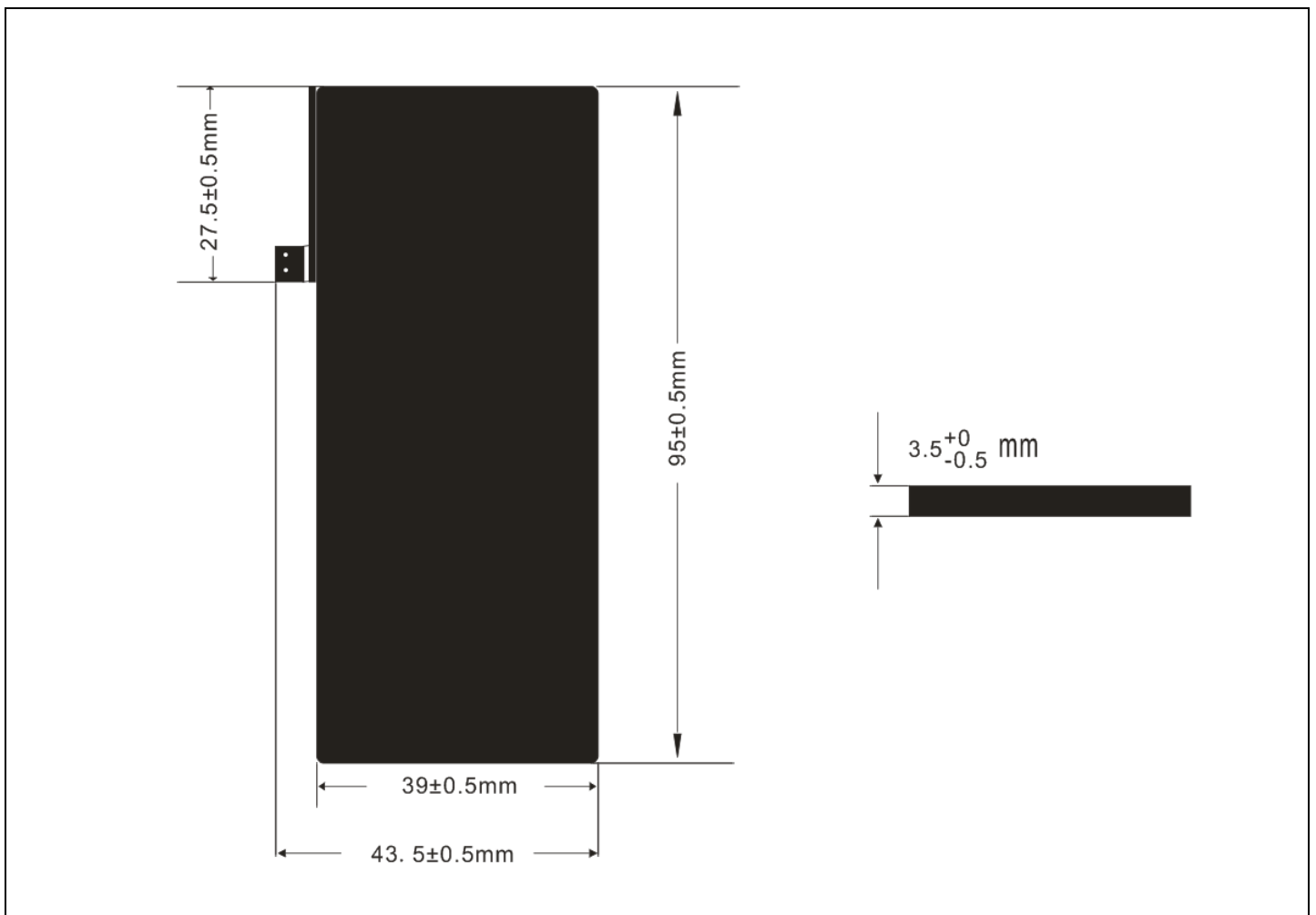
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PCM BOM LIST 保护板元件清单

| NO. | Location 元件编号 | Part name 元件名称 | Specification 元件规格 | Pack type 封装式 | Q'ty数量 |
|-----|------------------|-----------------------|-----------------------|------------------|--------|
| 1 | U1 | Battery protection IC | PA1860 | DNF | 1 |
| 2 | U2 | F | A1141 | DNF | 1 |
| 3 | R1、R2、 R9、R10 | Resistance | SMD 100Ω±5% | 0201 | 4 |
| 4 | R3 | Resistance | SMD 1KΩ±5% | 0201 | 1 |
| 5 | C1、C2、 C3、C6 | Capacitance | SMD 0.1μF | 0201 | 4 |
| 6 | J1 | Conntor | YCX-8G | / | 1 |

附图 2: Dimension 电池尺寸图



| | | | |
|----------------|------------------|-----------------------------|-----|
| NO.编号 | HZT333994PL11-01 | | |
| DESCRIPTION 描述 | 3.8V 2150mAh | Li-ion Rechargeable Battery | |
| | 3.8V 2150mAh | 可充电锂离子电池 | |
| DATE 日期 | 2021/10/11 | Version 版别 | A/0 |