

天溯  
Tian Su



深圳天溯计量检测股份有限公司  
ShenZhen Tiansu Calibration and Testing Co.,Ltd.



中国认可  
国际互认  
检测  
TESTING  
CNAS L5138

Rep.No.:TCTTJ20210401598ZB-BR08

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## 检测报告 UN38.3

Name of sample:

Polymer Lithium ion Battery

产品名称:

聚合物锂离子电池

Client:

委托单位:

Classification:

Commission Test

检测类别:

委托测试

Shenzhen Tiansu Calibration and Testing Co.,Ltd

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UN38.3



TS(SZ)-J3-001-001-A1

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|                                                                                                                                                                                                                                                                                                                                                                                              |  |                                                      |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------|--|
| Name of samples: Polymer Lithium ion Battery<br>样品名称: 聚合物锂离子电池                                                                                                                                                                                                                                                                                                                               |  | Trade mark: -<br>商标: -                               |  |
|                                                                                                                                                                                                                                                                                                                                                                                              |  |                                                      |  |
| Type/Model<br>型号规格: 502030                                                                                                                                                                                                                                                                                                                                                                   |  | shape: Prismatic<br>样品形状: 棱柱形                        |  |
| Appearance color: Silver<br>样品颜色: 银色                                                                                                                                                                                                                                                                                                                                                         |  | Sample size<br>样品尺寸: T(4.91mm)*W(19.83mm)*L(31.03mm) |  |
| Rated info.<br>额定信息: 3.7V/200mAh/0.74Wh                                                                                                                                                                                                                                                                                                                                                      |  | Cell quantity<br>组成电芯数量: 1PCS                        |  |
| Quantity of sample: 30cells+18batteries<br>样品数量: 30 个电芯+18 个电池                                                                                                                                                                                                                                                                                                                               |  | Cell model<br>电芯型号: 502030                           |  |
| Limited charge voltage<br>充电限制电压: 4.2V                                                                                                                                                                                                                                                                                                                                                       |  | Cut-off voltage<br>放电截止电压: 3.0V                      |  |
| Standard charge current<br>标准充电电流: 40mA                                                                                                                                                                                                                                                                                                                                                      |  | Max continuous charge current<br>最大持续充电电流: 200mA     |  |
| Standard discharge current<br>标准放电电流: 40mA                                                                                                                                                                                                                                                                                                                                                   |  | Max continuous discharge current<br>最大持续放电电流: 200mA  |  |
| Receiving date<br>接样日期: 2024.5.09                                                                                                                                                                                                                                                                                                                                                            |  | Sample identification<br>样品标识序号: B1#~B18#,C1#~C30#   |  |
| Completing date<br>完成日期: 2024.5.14                                                                                                                                                                                                                                                                                                                                                           |  | Test item: 8 items<br>测试项目: 8 项                      |  |
| Test conclusion:<br>检测结论:<br>The Polymer Lithium ion Battery submitted by [REDACTED] are tested according to Section 38.3 of the Sixth Revised Edition Amendment 1 of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.6/Amend.1/Section38.3). The test results comply with the relevant requirements of the standard.<br>[REDACTED] |  |                                                      |  |
| Date of issue: May 17, 2024<br>签发日期: 2024 年 5 月 17 日                                                                                                                                                                                                                                                                                                                                         |  |                                                      |  |

批准\Approved by  
技术负责人\  
Technology Supervisor审核\Reviewed by  
项目工程师\  
Project Engineer主检\Tested by  
测试工程师\  
Test Engineer

刘澳



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Description and illustration of the sample:

样品说明及描述:

| Test item<br>测试项目 | Sample No.<br>样品编号 | State<br>状态                                                                                           | Remark<br>备注  |
|-------------------|--------------------|-------------------------------------------------------------------------------------------------------|---------------|
| T.1~T.5           | B1#~B5#            | at first cycle in fully charged states;<br>在第一个循环完全充电;                                                | Battery<br>电池 |
|                   | B6#~B10#           | after 25 cycles ending in fully charged states;<br>在第二十五个循环完全充电;                                      |               |
| T.6               | C1#~C5#            | at first cycle at 50% of the design rated capacity;<br>在第一个循环充电 50% 的额定容量;                            | Cell<br>电芯    |
|                   | C6#~C10#           | after 25 cycles ending in fully charged at 50% of the design rated capacity;<br>在第二十五个循环充电 50% 的额定容量; |               |
| T.7               | B11#~B14#          | at first cycle in fully charged states;<br>在第一个循环完全充电;                                                | Battery<br>电池 |
|                   | B15#~B18#          | after 25 cycles ending in fully charged states;<br>在第二十五个循环完全充电;                                      |               |
| T.8               | C11#~C20#          | at first cycle in fully discharged states;<br>在第一个循环完全放电;                                             | Cell<br>电芯    |
|                   | C21#~C30#          | after 25 cycles ending in fully discharged states;<br>在第二十五个循环完全放电;                                   |               |

Description of the sampling procedure:

取样程序的说明:

N/A

Description of report revision :

报告修订的说明:

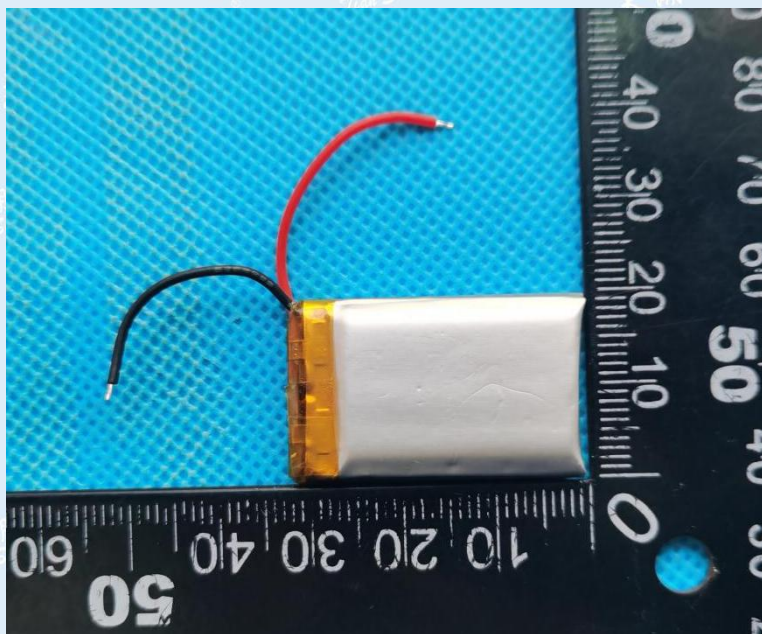
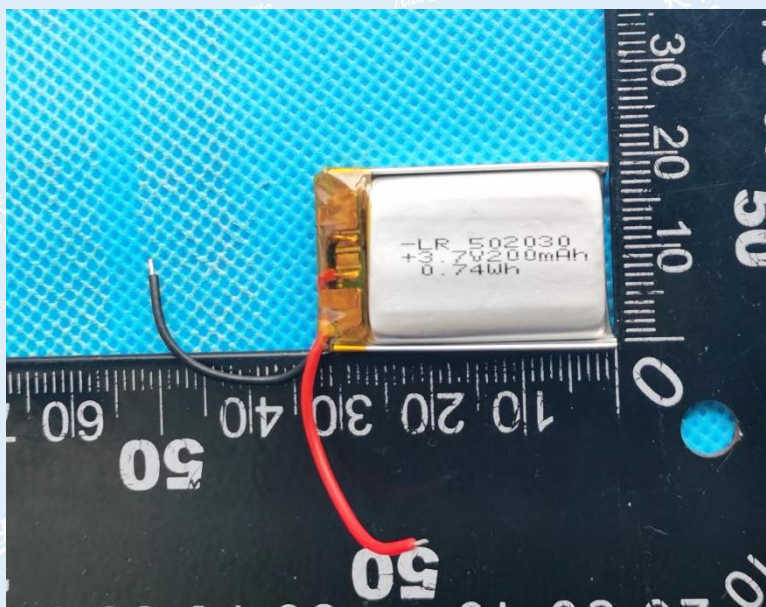
Remarks:

备注:

The Polymer Lithium ion Battery submitted by [redacted] are single cell batteries.

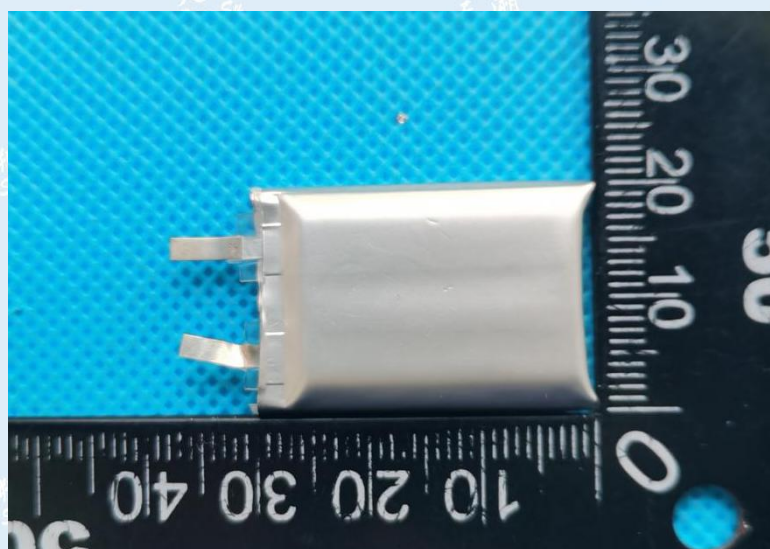
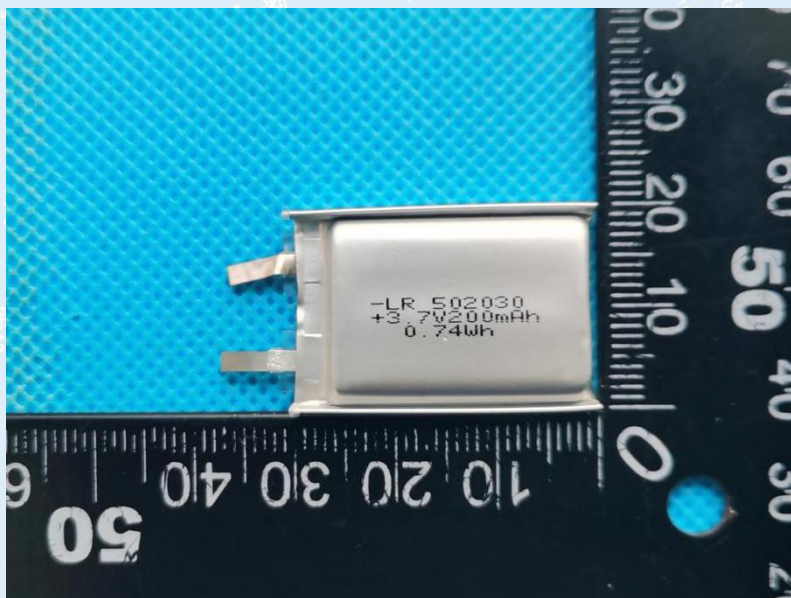
[redacted]

Photos of Battery\电池图片





Photos of Cell\电芯图片



|                                                                                                    |                                                                                                                                                                                                         |                    |                   |                    |                      |                         |                     |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|--------------------|----------------------|-------------------------|---------------------|
| 38.3.4                                                                                             | Procedure/测试步骤                                                                                                                                                                                          |                    |                   |                    |                      | —                       |                     |
| 38.3.4.1                                                                                           | Test 1: Altitude simulation/测试 1：高度模拟                                                                                                                                                                   |                    |                   |                    |                      | P                       |                     |
|                                                                                                    | Test cells and batteries shall be stored at a pressure of 11.6kPa or less for at least six hour at ambient temperature (20±5℃) .<br>将电芯和电池在温度为 20±5℃，大气压力为不大于 11.6kpa 的环境中贮存不少于 6 个小时。                  |                    |                   |                    |                      |                         |                     |
|                                                                                                    | Requirement/标准要求：                                                                                                                                                                                       |                    |                   |                    |                      |                         |                     |
|                                                                                                    | 1.Cells and batteries Mass loss limit: ≤0.2% .<br>样品质量损失≤0.2%。                                                                                                                                          |                    |                   |                    |                      |                         |                     |
|                                                                                                    | 2.Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states.<br>样品试验后开路电压应不低于试验前开路电压的 90%，此要求不适用于完全放完电的电池和电芯。 |                    |                   |                    |                      |                         |                     |
|                                                                                                    | 3.No leakage, no venting, no disassembly, no rupture and no fire.<br>样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生。                                                                                                  |                    |                   |                    |                      |                         |                     |
|                                                                                                    | Result<br>测试结果                                                                                                                                                                                          |                    |                   |                    |                      |                         |                     |
| Sample No.<br>样品编号                                                                                 | Before test<br>测试前                                                                                                                                                                                      |                    | After Test<br>测试后 |                    | Mass loss<br>质量损失(%) | Residual OCV<br>剩余电压(%) | Test result<br>测试结果 |
|                                                                                                    | Mass<br>样品质量 (g)                                                                                                                                                                                        | Voltage<br>开路电压(V) | Mass<br>样品质量(g)   | Voltage<br>开路电压(V) |                      |                         |                     |
| B1#                                                                                                | 5.341                                                                                                                                                                                                   | 4.164              | 5.341             | 4.164              | 0.00                 | 100.00                  | P                   |
| B2#                                                                                                | 5.328                                                                                                                                                                                                   | 4.164              | 5.328             | 4.164              | 0.00                 | 100.00                  | P                   |
| B3#                                                                                                | 5.334                                                                                                                                                                                                   | 4.166              | 5.333             | 4.164              | 0.02                 | 99.95                   | P                   |
| B4#                                                                                                | 5.344                                                                                                                                                                                                   | 4.167              | 5.344             | 4.167              | 0.00                 | 100.00                  | P                   |
| B5#                                                                                                | 5.344                                                                                                                                                                                                   | 4.185              | 5.344             | 4.185              | 0.00                 | 100.00                  | P                   |
| B6#                                                                                                | 5.344                                                                                                                                                                                                   | 4.179              | 5.344             | 4.179              | 0.00                 | 100.00                  | P                   |
| B7#                                                                                                | 5.334                                                                                                                                                                                                   | 4.164              | 5.334             | 4.164              | 0.00                 | 100.00                  | P                   |
| B8#                                                                                                | 5.335                                                                                                                                                                                                   | 4.176              | 5.334             | 4.174              | 0.02                 | 99.95                   | P                   |
| B9#                                                                                                | 5.341                                                                                                                                                                                                   | 4.178              | 5.341             | 4.178              | 0.00                 | 100.00                  | P                   |
| B10#                                                                                               | 5.334                                                                                                                                                                                                   | 4.176              | 5.334             | 4.176              | 0.00                 | 100.00                  | P                   |
| Other supplements : Test result "P" decides that the test item passes.<br>其他补充：测试结果“P”代表判定该测试项目通过。 |                                                                                                                                                                                                         |                    |                   |                    |                      |                         |                     |



[illegible]

|                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |                   |                    |                      |                         |                     |
|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|--------------------|----------------------|-------------------------|---------------------|
| 38.3.4                                                                                                 | Procedure/测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                   |                    |                      |                         | —                   |
| 38.3.4.3                                                                                               | Test 3: Vibration/测试 3: 振动                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                   |                    |                      |                         | P                   |
|                                                                                                        | Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration, The vibration shall be a sinusoidal wave form with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes, This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell.<br>将电芯和电池牢固地安装在振动台的台面上，然后开始振动。振动以正弦波形式，以 7Hz 增加至 200Hz，然后再减少回到 7Hz 为一个循环，一个循环持续 15 分钟的对数扫频。每个电芯和电池从三个互相垂直的方向上循环 12 次，3 个小时。 |                    |                   |                    |                      |                         |                     |
|                                                                                                        | Requirement/标准要求:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |                   |                    |                      |                         |                     |
|                                                                                                        | 1.Cells and batteries Mass loss limit: ≤0.2%.<br>样品质量损失≤0.2%.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                   |                    |                      |                         |                     |
|                                                                                                        | 2.Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states.<br>样品试验后开路电压应不低于试验前开路电压的 90%,此要求不适用于完全放完电的电池和电芯。                                                                                                                                                                                                                                                                                                                                                                          |                    |                   |                    |                      |                         |                     |
| 3.No leakage, no venting, no disassembly, no rupture and no fire.<br>样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生。 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |                   |                    |                      |                         |                     |
| Result<br>测试结果                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |                   |                    |                      |                         |                     |
| Sample No.<br>样品编号                                                                                     | Before test<br>测试前                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    | After Test<br>测试后 |                    | Mass loss<br>质量损失(%) | Residual OCV<br>剩余电压(%) | Test result<br>测试结果 |
|                                                                                                        | Mass<br>样品质量 (g)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Voltage<br>开路电压(V) | Mass<br>样品质量(g)   | Voltage<br>开路电压(V) |                      |                         |                     |
| B1#                                                                                                    | 5.339                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.141              | 5.339             | 4.141              | 0.00                 | 100.00                  | P                   |
| B2#                                                                                                    | 5.326                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.142              | 5.325             | 4.142              | 0.02                 | 100.00                  | P                   |
| B3#                                                                                                    | 5.331                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.143              | 5.331             | 4.143              | 0.00                 | 100.00                  | P                   |
| B4#                                                                                                    | 5.342                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.144              | 5.342             | 4.144              | 0.00                 | 100.00                  | P                   |
| B5#                                                                                                    | 5.342                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.161              | 5.342             | 4.159              | 0.00                 | 99.95                   | P                   |
| B6#                                                                                                    | 5.342                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.157              | 5.342             | 4.157              | 0.00                 | 100.00                  | P                   |
| B7#                                                                                                    | 5.332                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.142              | 5.332             | 4.142              | 0.00                 | 100.00                  | P                   |
| B8#                                                                                                    | 5.332                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.152              | 5.332             | 4.152              | 0.00                 | 100.00                  | P                   |
| B9#                                                                                                    | 5.339                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.154              | 5.338             | 4.151              | 0.02                 | 99.93                   | P                   |
| B10#                                                                                                   | 5.332                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.151              | 5.332             | 4.151              | 0.00                 | 100.00                  | P                   |
| Other supplements : Test result "P" decides that the test item passes.<br>其他补充: 测试结果“P”代表判定该测试项目通过。    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |                   |                    |                      |                         |                     |



|                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |                   |                    |                      |                         |                     |
|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|--------------------|----------------------|-------------------------|---------------------|
| 38.3.4                                                                        | Procedure/测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |                   |                    |                      |                         | —                   |
| 38.3.4.4                                                                      | <b>Test 4: Shock/测试 4：冲击</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |                   |                    |                      |                         | <b>P</b>            |
|                                                                               | <p>Test cells and batteries shall be secured to the testing machine, and each shall be subjected to a half-sine shock of peak acceleration of 150gn (or Acceleration(gn)=<math>\sqrt{\frac{100850}{mass}}</math>, which is smaller) and pulse duration of 6 milliseconds, large cells and large batteries shall be subjected to a half-sine of peak acceleration of 50gn (or Acceleration(gn)=<math>\sqrt{\frac{30000}{mass}}</math>, which is smaller) and pulse duration of 11 milliseconds. Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.</p> <p>以稳固的托架固定住每个电芯和电池样品的全部配件表面。对每个电芯或电池以峰值为 150gn（或与<math>\sqrt{\frac{100850}{mass}}</math>中的较小值）的半正弦的加速度撞击，脉冲持续 6 毫秒，大型电池和大型电池组须经受最大加速度 50gn（或与<math>\sqrt{\frac{30000}{mass}}</math>中的较小值）和脉冲持续时间 11 毫秒的半正弦波冲击。每个电池或电池组须在三个互相垂直的电池安装方位的正方向经受三次冲击，接着在反方向经受三次冲击，总共经受 18 次冲击。</p> |                    |                   |                    |                      |                         |                     |
|                                                                               | <p>Requirement/标准要求：</p> <p>1.Cells and batteries Mass loss limit: ≤0.2%.<br/>样品质量损失≤0.2%.</p> <p>2.Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states.<br/>样品试验后开路电压应不低于试验前开路电压的 90%，此要求不适用于完全放完电的电池和电芯。</p> <p>3.No leakage, no venting, no disassembly, no rupture and no fire.<br/>样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生。</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                   |                    |                      |                         |                     |
|                                                                               | <b>Result/测试结果</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                    |                   |                    |                      |                         |                     |
| Sample No.<br>样品编号                                                            | Before test<br>测试前                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                    | After Test<br>测试后 |                    | Mass loss<br>质量损失(%) | Residual OCV<br>剩余电压(%) | Test result<br>测试结果 |
|                                                                               | Mass<br>样品质量 (g)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Voltage<br>开路电压(V) | Mass<br>样品质量(g)   | Voltage<br>开路电压(V) |                      |                         |                     |
| B1#                                                                           | 5.339                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.141              | 5.338             | 4.141              | 0.02                 | 100.00                  | P                   |
| B2#                                                                           | 5.325                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.142              | 5.325             | 4.142              | 0.00                 | 100.00                  | P                   |
| B3#                                                                           | 5.331                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.143              | 5.331             | 4.143              | 0.00                 | 100.00                  | P                   |
| B4#                                                                           | 5.342                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.144              | 5.342             | 4.144              | 0.00                 | 100.00                  | P                   |
| B5#                                                                           | 5.342                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.159              | 5.342             | 4.157              | 0.00                 | 99.95                   | P                   |
| B6#                                                                           | 5.342                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.157              | 5.342             | 4.157              | 0.00                 | 100.00                  | P                   |
| B7#                                                                           | 5.332                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.142              | 5.332             | 4.142              | 0.00                 | 100.00                  | P                   |
| B8#                                                                           | 5.332                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.152              | 5.332             | 4.152              | 0.00                 | 100.00                  | P                   |
| B9#                                                                           | 5.338                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.151              | 5.337             | 4.149              | 0.02                 | 99.95                   | P                   |
| B10#                                                                          | 5.332                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.151              | 5.332             | 4.151              | 0.00                 | 100.00                  | P                   |
| <b>Other supplements ：</b> Test result "P" decides that the test item passes. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |                   |                    |                      |                         |                     |
| <b>其他补充：</b> 测试结果"P"代表判定该测试项目通过。                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |                   |                    |                      |                         |                     |

|                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |
|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 38.3.4                                                                                                                | Procedure/测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | —                   |
| 38.3.4.5                                                                                                              | <p><b>Test 5: External short circuit/测试 5: 外部短路</b></p> <p>The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches <math>57\pm4^{\circ}\text{C}</math> and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at <math>57\pm4^{\circ}\text{C}</math>. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to <math>57\pm4^{\circ}\text{C}</math>, the cell or battery must be observed for a further six hour for the test to be concluded.</p> <p>保持试验环境温度稳定在 <math>57\pm4^{\circ}\text{C}</math>，以使电芯或电池样品外表温度达到 <math>57\pm4^{\circ}\text{C}</math>，然后，在此温度下，将其正负极用小于 0.1 欧姆的线路短接，待电芯或电池的外表温度恢复到 <math>57\pm4^{\circ}\text{C}</math> 之后再持续 1 小时以上，对电芯或电池必须进一步观察 6 个小时才能下结论。</p> <p><b>Requirement/标准要求:</b></p> <p>1.Cells and batteries meet this requirement if their external temperature does not exceed <math>170^{\circ}\text{C}</math>;<br/>电芯或电池的外壳温度应不超过 <math>170^{\circ}\text{C}</math>;<br/>2. No disassembly, no rupture and no fire during the test and within six hours after this test.<br/>试验后 6 小时内无解体、无破裂、无起火。</p> <p><b>Result</b><br/>测试结果</p> | P                   |
| Sample No.<br>样品编号                                                                                                    | Max External Temp<br>样品表面最高温度( $^{\circ}\text{C}$ )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Test result<br>测试结果 |
| B1#                                                                                                                   | 57.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P                   |
| B2#                                                                                                                   | 58.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P                   |
| B3#                                                                                                                   | 57.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P                   |
| B4#                                                                                                                   | 57.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P                   |
| B5#                                                                                                                   | 57.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P                   |
| B6#                                                                                                                   | 57.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P                   |
| B7#                                                                                                                   | 58.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P                   |
| B8#                                                                                                                   | 57.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P                   |
| B9#                                                                                                                   | 58.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P                   |
| B10#                                                                                                                  | 58.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P                   |
| <p><b>Other supplements :</b> Test result "P" decides that the test item passes.</p> <p>其他补充: 测试结果"P"代表判定该测试项目通过。</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |



|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 38.3.4   | Procedure/测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | — |
| 38.3.4.6 | <b>Test 6: Crush\Impact/</b><br><b>测试 6: 挤压(适用)</b><br><b>撞击(不适用)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | P |
|          | <b>Crush</b><br>挤压<br>A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.<br>(a) The applied force reaches 13kN±0.78kN;<br>(b) The voltage of the cell drops by at least 100 mV;<br>(c) The cell is deformed by 50% or more of its original thickness.<br>Once the maximum pressure has been obtained, the voltage drops by 100mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released.<br>电池芯或组成电池芯在两个平面间挤压。挤压在第一个接触点以约 1.5cm/s 的速度慢慢进行,直到下面三个选项之一达到为止:<br>(a)作用力达到 13kN±0.78kN;<br>(b)电池芯电压降至少达到 100mV;<br>(c)电池厚度和最初比较变形至少 50%。<br>一旦达到最大压力,电压降超过 100 mV 或者电池芯变形超过 50%,压力应该解除。                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |   |
|          | <b>Impact</b><br>撞击<br>(applicable to cylindrical cells not less than 18mm in diameter)<br>The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1 mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the centre of the sample. A 9.1 kg ± 0.1 kg mass is to be dropped from a height of 61 ± 2.5 cm at the intersection of the bar and sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface.<br>The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1 mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.<br>Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire during the test and within six hours after this test.<br>(适用于直径不小于 18 毫米的圆柱形电池)将电池或元件电池样品平放在一个平面上,其纵轴平行于测试台面年,将一直径为 15.8 mm ± 0.1 mm 的 316 型不锈钢棒横放在电池中心位置。然后,将一质量为 9.1 kg ± 0.1 kg 的物体从 61±2.5 cm 的高度落向样品。样品在进行试验时,其外表温度应不超过 170°C。且试验结束后 6 个小时之内,样品应无解体、无起火现象发生。 |   |
|          | <b>Requirements/标准要求:</b><br>1.Cells and component cells meet this requirement if their external temperature does not exceed 170°C;<br>电芯的外壳温度应不超过 170°C;<br>2. No disassembly, no fire during the test and within six hours after this test.<br>试验后 6 小时内无解体、无起火。                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |

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| Result<br>测试结果                                                                                             |                                |                                  |                     |
|------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------|---------------------|
| Sample No.<br>样品编号                                                                                         | OCV prior to test<br>试验前电压 (V) | Max External Temp<br>样品表面最高温度(℃) | Test result<br>测试结果 |
| C1#                                                                                                        | 3.817                          | 24.6                             | P                   |
| C2#                                                                                                        | 3.783                          | 24.2                             | P                   |
| C3#                                                                                                        | 3.795                          | 23.4                             | P                   |
| C4#                                                                                                        | 3.829                          | 24.6                             | P                   |
| C5#                                                                                                        | 3.802                          | 24.7                             | P                   |
| C6#                                                                                                        | 3.811                          | 24.1                             | P                   |
| C7#                                                                                                        | 3.785                          | 24.2                             | P                   |
| C8#                                                                                                        | 3.799                          | 23.1                             | P                   |
| C9#                                                                                                        | 3.816                          | 24.6                             | P                   |
| C10#                                                                                                       | 3.813                          | 24.1                             | P                   |
| <b>Other supplements :</b> Test result "P" decides that the test item passes.<br>其他补充: 测试结果"P"代表判定该测试项目通过。 |                                |                                  |                     |



| 38.3.4                                                                                                         | Procedure/测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | —                   |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------------------|---------------------|------|-------|---|------|-------|---|------|-------|---|------|-------|---|------|-------|---|------|-------|---|------|-------|---|------|
| 38.3.4.7                                                                                                       | <b>Test 7: Overcharge/测试 7: 过度充电</b><br><br>When the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the or 22V, whichever is less. When the manufacturer's recommended charge voltage is more than 18V, the charging voltage of the test shall be 1.2 times maximum charge voltage. The charging current is 2 times of the maximum charging current recommended by the manufacturer.<br><br>如果厂家推荐的充电电压不超过 18V, 本测试的最小充电电压应该是两倍的厂家标定最大充电电压或者是 22V, 取其中较小者。如果厂家推荐的充电电压超过 18V, 充电电压应该为 1.2 倍的厂家标定最大充电电压。充电电流为厂家推荐的最大充电电流 2 倍。 | P                   |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
|                                                                                                                | <b>Requirements/标准要求:</b><br><br>No disassembly and no fire during the test and within seven days after the test.<br><br>试验样品在试验中和试验后 7 天内, 应无解体和无起火现象发生。                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                     |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
|                                                                                                                | <b>Result</b><br>测试结果                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                     |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
|                                                                                                                | <table> <tr> <th>Sample No.<br/>样品编号</th><th>OCV prior to test<br/>试验前电压 (V)</th><th>Test result<br/>测试结果</th></tr> <tr> <td>B11#</td><td>4.164</td><td>P</td></tr> <tr> <td>B12#</td><td>4.164</td><td>P</td></tr> <tr> <td>B13#</td><td>4.165</td><td>P</td></tr> <tr> <td>B14#</td><td>4.167</td><td>P</td></tr> <tr> <td>B15#</td><td>4.185</td><td>P</td></tr> <tr> <td>B16#</td><td>4.178</td><td>P</td></tr> <tr> <td>B17#</td><td>4.164</td><td>P</td></tr> <tr> <td>B18#</td><td>4.176</td><td>P</td></tr> </table>                                                                                                                |                     | Sample No.<br>样品编号 | OCV prior to test<br>试验前电压 (V) | Test result<br>测试结果 | B11# | 4.164 | P | B12# | 4.164 | P | B13# | 4.165 | P | B14# | 4.167 | P | B15# | 4.185 | P | B16# | 4.178 | P | B17# | 4.164 | P | B18# |
| Sample No.<br>样品编号                                                                                             | OCV prior to test<br>试验前电压 (V)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Test result<br>测试结果 |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
| B11#                                                                                                           | 4.164                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
| B12#                                                                                                           | 4.164                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
| B13#                                                                                                           | 4.165                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
| B14#                                                                                                           | 4.167                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
| B15#                                                                                                           | 4.185                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
| B16#                                                                                                           | 4.178                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
| B17#                                                                                                           | 4.164                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
| B18#                                                                                                           | 4.176                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |
| <b>Other supplements : Test result "P" decides that the test item passes.</b><br><br>其他补充: 测试结果"P"代表判定该测试项目通过。 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                                |                     |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |

|                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                                |                     |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|--------------------------------|---------------------|
| 38.3.4                                                                 | Procedure/测试步骤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                     |                    |                                | —                   |
| 38.3.4.8                                                               | <b>Test 8: Forced discharge/测试 8: 强制放电</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                     |                    |                                | P                   |
|                                                                        | Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C power supply at an initial current equal to the maximum discharge current specified the manufacturer The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell, Each cell shall be forced discharged for a time interval(in hours) equal to its rated capacity divided by the initial test current(in ampere). |                     |                    |                                |                     |
|                                                                        | 在 20±5℃ 的环境温度下，将单个电芯连接在 12V 的直流电源上进行强制放电，此直流电源提供每个电芯初始电流为制造厂指定的最大放电电流，放电时间为额定容量除以初始电流。                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |                    |                                |                     |
|                                                                        | <b>Requirements/标准要求:</b><br>No disassembly and no fire during the test and within seven days after the test.<br>试验样品在试验中和试验后 7 天内，应无解体和无起火现象发生。                                                                                                                                                                                                                                                                                                                                                            |                     |                    |                                |                     |
| <b>Result</b>                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                                |                     |
| <b>测试结果</b>                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                                |                     |
| Sample No.<br>样品编号                                                     | OCV prior to test<br>试验前电压 (V)                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Test result<br>测试结果 | Sample No.<br>样品编号 | OCV prior to test<br>试验前电压 (V) | Test result<br>测试结果 |
| C11#                                                                   | 3.344                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   | C21#               | 3.299                          | P                   |
| C12#                                                                   | 3.291                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   | C22#               | 3.323                          | P                   |
| C13#                                                                   | 3.307                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   | C23#               | 3.338                          | P                   |
| C14#                                                                   | 3.345                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   | C24#               | 3.302                          | P                   |
| C15#                                                                   | 3.333                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   | C25#               | 3.328                          | P                   |
| C16#                                                                   | 3.323                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   | C26#               | 3.313                          | P                   |
| C17#                                                                   | 3.297                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   | C27#               | 3.299                          | P                   |
| C18#                                                                   | 3.298                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   | C28#               | 3.295                          | P                   |
| C19#                                                                   | 3.314                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   | C29#               | 3.321                          | P                   |
| C20#                                                                   | 3.304                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P                   | C30#               | 3.347                          | P                   |
| Other supplements : Test result "P" decides that the test item passes. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                                |                     |
| 其他补充：测试结果“P”代表判定该测试项目通过。                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |                                |                     |



## STATEMENTS

## 声 明

1. The test report is invalid without the official stamp of Tiansu.  
本报告无检测单位印章无效。
2. Nobody is allowed to photocopy or partly photocopy this test report without written permission of Tiansu.  
未经本试验室书面同意，不得部分地复制本报告。
3. The test report is invalid without the signatures of Ratifier, Reviewer and Testing engineer.  
本报告无批准人、审核人及鉴定人签名无效。
4. The test report is invalid if altered.  
本报告涂改无效。
5. Objections to the test report must be submitted to Tiansu within 15 days.  
对检测报告若有异议，应于收到报告之日起十五天内向检测单位提出。
6. The test report is valid for the tested samples only.  
本报告仅与送检样品有关。

----- 报告结束 -----