UN38.3 TEST REPORT

UN38.3 检测报告

Report No.: 报告编号：	CMC230613029
Name of Goods: 物品名称：	Li-ion Battery 锂离子电池
Model: 型号：	CLY503048
Type: 规格：	3.7V 700mAh 2.59Wh
Client: 委托单位：	Seeed Technology Co., Ltd 深圳矽递科技股份有限公司
Classification of test: 检测类别：	Commission Test 委托测试

Tested by: 主检人：	Riley Xiao 肖兰	**Approved by:** 批准人：	Danny Le 何玉清
Inspected by: 审核人：	Dylan Dou 窦明强		
Date of Issue: 签发日期：	2023.06.30	**Seal of CMC:** CMC 印章：	CMC Testing International (Shenzhen) Co., Ltd.

CMC Testing International (Shenzhen) Co., Ltd.

众检检验认证（深圳）有限公司

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TEST REPORT
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Name of Goods 物品名称	Li-ion Battery 锂离子电池		Model 型号	CLY503048	
Commissioner 委托单位	Seeed Technology Co., Ltd 深圳矽递科技股份有限公司				
Commissioner's Address 委托单位地址	901 G3 TCL international E city, Zhong Shan Yuan Road, Xi'Li Street, NanShan District, ShenZhen, CHINA 广东省深圳市南山区中山园路国际 E 城 G3 栋 901 Seeed 518052				
Manufacturer 制造商	SHENZHEN CHAOLIYANG TECHNOLOGY DEVELOPMENT CO., LTD. 深圳市超力扬科技发展有限公司				
Manufacturer's Address 制造商地址	B401, Pu Mingsheng Technology, No.616, Zhoushi Road, Hezhou Community, Hangcheng Street, Bao'an District, Shenzhen 深圳市宝安区航城街道鹤洲社区洲石路 616 号普明生科技 B401				
Manufacturer's Contact Telephone 制造商联系电话	+86-755-29558690		E-mail 邮箱	chaoliyang@foxmail.com	
			Web 网址	http://www.chaoliyang.com	
Trade Mark/ identification 商标/识别码	--	Shape 形状	Cuboid 长方体	Size 尺寸 (L×W×T)	(48.3×33.1×3.9)mm
Nominal Voltage 标称电压	3.7V	Charge Voltage 充电电压	4.2V	Rated Capacity 额定容量	700mAh
Cell Model 电池型号	CLY503048	Cell Nominal Voltage 电池标称电压	3.7V	Cell Rated Capacity 电池额定容量	700mAh
Cells Number 电池数量	1PC	Sample Receiving Date 样品接收日期	2023.06.13	Testing Date 测试日期	2023.06.13 — 2023.06.27
Test conclusion 检测结论	The sample has passed the test items of UNITED NATIONS "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.7/ Amend.1 Subsection 38.3 经测试，该样品符合联合国《试验和标准手册》（第 7 修订版 修正 1）38.3 标准要求。				

Test Standard 检测标准

UN "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.7/Amend.1 Subsection 38.3

联合国《试验和标准手册》（第 7 修订版 修正 1）38.3 节

Description and illustration of the sample: The sample's status is good.

样品说明及描述：样品状况良好。

Test item 检测项目	Sample No. 样品编号	State 状态	Remark 备注
Test 1 ~ Test 5	B001~B005	First cycle fully charged 第一个充电周期，完全充电	--
	B006~B010	25 cycles fully charged 第 25 个充电周期，完全充电	
Test 6	C001~C005	First cycle 50% Capacity 第一个充电周期，50%容量	--
	C006~C010	25 cycle 50% Capacity 第25个充电周期，50%容量	
Test 7	B011~B014	First cycle fully charged 第一个充电周期，完全充电	--
	B015~B018	25 cycles fully charged 第25个充电周期，完全充电	
Test 8	C011~C020	First cycle fully charged 第一个充电周期，完全放电	--
	C021~C030	25 cycles fully charged 第25个充电周期，完全放电	

CXXX is used as the sample number of cells SN230613029CXXX, "X" is 0~9.

CXXX 代表电芯样板编号 SN230613029CXXX，X=0~9。

BXXX is used as the sample number of batteries SN230613029BXXX, "X" is 0~9

BXXX 代表电池包样板编号 SN230613029BXXX，X=0~9。

Description of the deviation from the standard, if any: --

检测结果不符合标准项的说明：

Test environment conditions: Ambient temperature: 25℃±5℃, Ambient humidity: 45%-75%

检测环境条件：环境温度：25℃±5℃；环境湿度：45%-75%

Remarks: --

备注：

ST/SG/AC.10/11/Rev.7/Amend.1 Subsection 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
38.3.4	**Procedure 检测步骤**		**--**
38.3.4.1	**Test 1: Altitude simulation 检测 1：高度模拟**		Pass 合格
	Test cells and batteries shall be stored at a pressure of 11.6kPa or less for at least six hours at ambient temperature (20±5°C). 将电池和电池组在温度为 20±5°C，大气压力为不大于 11.6kPa 的环境中贮存不少于 6 小时。		
	Requirements 标准要求： 1) Cells and batteries Mass loss limit reference: Table 38.3.1 样品质量损失限值参考：表 38.3.1 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. 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或电池组。 3) No leakage, no venting, no disassembly, no rupture and no fire. 样品（电池）应无渗漏、无排气、无解体、无破裂以及无起火现象的发生。	The samples B001~B010: No leakage, no venting, no disassembly, no rupture and no fire. 编号为 B001~B010 的样品：无渗漏、无排气、无解体、无破裂以及无起火现象。 The data is shown in Test T.1 数据见表 T.1	
38.3.4.2	**Test 2: Thermal test 检测 2: 温度试验**		Pass 合格
	Test cells and batteries are to be stored for 电池和电池组存储条件如下： 1) For small cells and batteries: one temperature cycle: 72±2°C (6h) ~ -40±2°C (6h) 对于小型电池和电池组：一次温度循环为 72±2°C (6h) ~ -40±2°C (6h) For large cells and batteries: one temperature cycle: 72±2°C (12h) ~ -40±2°C (12h) 对于大型电池和电池组：一次温度循环为 72±2°C (12h) ~ -40±2°C (12h) 2) The maximum time interval between test temperature extremes is 30minutes. 温度转换最大间隔时间为 30min。 3) This procedure is to be repeated 10 times. 重复 10 次循环。 4) after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20±5°C). 循环结束后，电池和电池组在 20±5°C 的条件下搁置 24 小时。		
	Requirement 标准要求： 1) Cells and batteries Mass loss limit reference: Table 38.3.1 样品质量损失限值参考：表 38.3.1 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. 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池组。 3) No leakage, no venting, no disassembly, no rupture and no fire. 样品（电池）应无渗漏、无排气、无解体、无破裂以及无起火现象的发生。	The samples B001~B010: No leakage, no venting, no disassembly, no rupture and no fire. 编号为 B001~B010 的样品：无渗漏、无排气、无解体、无破裂以及无起火现象。 The data is shown in Table T.2 数据见表 T.2	

ST/SG/AC.10/11/Rev.7/Amend.1 Subsection 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
38.3.4.3	**Test 3: Vibration** **检测 3: 振动**		Pass 合格
	1) Cells and batteries are firmly secured to the platform of the vibration machine. 电池和电池组牢固地安装在振动台（的台面）上。 2) The vibration: a sinusoidal waveform with a logarithmic sweep between 7Hz and 200Hz and back to 7Hz traversed in 15 minutes. 振动以正弦波形式，以 7Hz 增加至 200Hz，然后在减少回到 7Hz 为一个循环，一个循环持续 15 分钟的对数前移传送。 3) For cells and small batteries: from 7Hz a peak acceleration of $1g_n$ is maintained until 18Hz is reached. The amplitude is then maintained at 0.8mm (1.6mm total excursion) and the frequency increased until a peak acceleration of $8g_n$ occurs (approximately 50Hz). A peak acceleration of $8g_n$ is then maintained until the frequency is increased to 200Hz. 对于电池和小型电池：从 7Hz 开始，以 $1g_n$的峰值加速度保持不变，直到达到 18Hz。然后将振幅保持在 0.8mm（总偏移 1.6mm）并且频率增加直到出现 $8g_n$的峰值加速度（大约 50Hz）。然后保持 $8g_n$的峰值加速度，直到频率增加到 200Hz。 For large batteries: from 7Hz a peak acceleration of $1g_n$ is maintained until 18Hz is reached. The amplitude is then maintained at 0.8mm (1.6mm total excursion) and the frequency increased until a peak acceleration of $2g_n$ occurs (approximately 25Hz). A peak acceleration of $2g_n$ is then maintained until the frequency is increased to 200Hz. 对于大型电池：从 7Hz 开始，以 $1g_n$的峰值加速度保持不变，直到达到 18Hz。然后将振幅保持在 0.8mm（总偏移 1.6mm）并且频率增加直到出现 $2g_n$的峰值加速度（大约 25Hz）。然后保持 $2g_n$的峰值加速度，直到频率增加到 200Hz。 4) This cycle repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell. One of the directions of vibration must be perpendicular to the terminal face. 以振动的其中一个方向必须是垂直样品极性，对每个电池从三个互相垂直的方向上循环 12 次，每个方向 3 个小时，共 9 小时。		
	Requirements 标准要求： 1) Cells and batteries Mass loss limit reference: Table 38.3.1 样品质量损失限值参考：表 38.3.1 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. 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池组。 3) No leakage, no venting, no disassembly, no rupture and no fire. 样品（电池）应无渗漏、无排气、无解体、无破裂以及无起火现象的发生。	The samples B001~B010: No leakage, no venting, no disassembly, no rupture and no fire. 编号为 B001~B010 的样品：无渗漏、无排气、无解体、无破裂以及无起火现象。 The data is shown in Table T.3 数据见表 T.3	

ST/SG/AC.10/11/Rev.7/Amend.1 Subsection 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
38.3.4.4	**Test 4: Shock 检测 4: 冲击**		Pass 合格
	1) Test cells and batteries shall be secured to the testing machine. 以稳固的托架固定住每个电池和电池组样品的全部配件表面。 2) Each cell shall be subjected to a half-sine shock of peak acceleration of 150g_n and pulse duration of 6 milliseconds. Large cells may be subjected to a half-sine shock of peak acceleration of 50g_n and pulse duration of 11 milliseconds. 对每个电池以峰值为 150g_n的半正弦的加速度撞击，脉冲持续 6ms，大型电池须经受最大加速度 50g_n和脉冲持续时间 11ms 的半正弦波冲击。 Small batteries shall be subjected to a half-sine shock of peak acceleration of 150g_n (or Acceleration (g_n)=$\sqrt{\left(\frac{100850}{mass}\right)}$, which is smaller) aneration of 50g_n (or Acceleration(g_n)=$\sqrt{\left(\frac{30000}{mass}\right)}$, which is smaller) and pulse dud pulse duration of 6 milliseconds, large batteries shall be subjected to a half-sine of peak accelration of 11 milliseconds. 对每个电池以峰值为 150g_n（或与$\sqrt{\left(\frac{100850}{mass}\right)}$中的较小值）的半正弦的加速度撞击，脉冲持续 6ms，大型电池须经受最大加速度 50g_n（或与$\sqrt{\left(\frac{30000}{mass}\right)}$中的较小值）和脉冲持续时间 11ms 的半正弦波冲击。 3) 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. 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。		
	Requirements 标准要求： 1) Cells and batteries Mass loss limit: ≤0.2%. 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. 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或电池组。 3) No leakage, no venting, no disassembly, no rupture and no fire. 样品（电池）应无渗漏、无排气、无解体、无破裂以及无起火现象的发生。	The samples B001~B010: No leakage, no venting, no disassembly, no rupture and no fire. 编号为 B001~B010 的样品：无渗漏、无排气、无解体、无破裂以及无起火现象。 The data is shown in Table T.4 数据见表 T.4	

ST/SG/AC.10/11/Rev.7/Amend.1 Subsection 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
38.3.4.5	**Test 5: External Short Circuit** **检测 5: 外部短路**		Pass 合格
	1) The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature 57±4°C. 加热电池或电池组样品直到温度稳定在 57±4°C 2) The cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 57±4°C, This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57±4°C. 将样品正负极用小于 0.1Ω 的总电阻回路进行短路，样品的外表温度恢复到 57±4°C 之后保持短路状态 1 小时以上。 3) The cell or battery must be observed for a further six hours for the test to be concluded. 对电池或电池组必须进一步观察 6 个小时才能下结论。		
	Requirements 标准要求： 1) Cells external temperature not exceed 170°C. 电池的最高表面温度应不超过 170°C。 2) No disassembly, no rupture and no fire during the test and within six hours after the test. 测试中与测试后 6 小时内无解体、无破裂、无起火。	The samples B001~B010: No leakage, no venting, no disassembly, no rupture and no fire. 编号为 B001~B010 的样品：无解体、无破裂以及无起火现象。 The data is shown in Table T.5 数据见表 T.5	
38.3.4.6	**Test 6: Impact / Crush** **检测 6: 撞击/挤压**		Pass 合格
	Impact (applicable to cylindrical cells not less than 18mm in diameter) 撞击（适用于直径不小于 18 毫米的圆柱形电池）		N/A 不适用
	1) This test sample cell or component cell is to be placed on a flat smooth surface. 将试验样品用的电池或元件电池放在一个平坦光滑的平面上 2) A 15.8 mm diameter bar is to be placed across the center of the sample, A 9.1kg mass is to be dropped from a height of 61±2.5cm onto the sample. 将一直径为 15.8mm 的不锈钢圆棒横过电池中部放置后，将一质量为 9.1kg 的物体从 61±2.5cm 的高度落向样品。 3) The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm ± 0.1mm diameter curved surface lying across the center of the test sample. Each sample is to be subjected to only a single impact. 接受撞击的试样，纵轴应与平坦的表面平行并与横放在试样中心的直径 15.8±0.1 毫米弯曲表面的纵轴垂直。每一个试样只经受一次撞击。		
	Requirements 标准要求： 1) Cells external temperature not exceed 170°C. 电池的最高表面温度应不超过 170°C。 2) No disassembly, no rupture and no fire during the test and within six hours after the test. 测试中与测试后 6 小时内无解体、无破裂、无起火。	--	

ST/SG/AC.10/11/Rev.7/Amend.1 Subsection 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
	Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18mm in diameter). 挤压（适用于棱柱形、袋装、硬币/纽扣电池和直径小于 18 毫米的圆柱形电池）。		Pass 合格
	1) A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached. 将电池或元件电池放在两个平面之间挤压，挤压力度逐渐加大，在第一个接触点上的速度大约为 1.5 厘米/秒。挤压持续进行，直到出现以下三种情况之一： (a) The applied force reaches 13kN ± 0.78kN. 施加的力达到 13 千牛顿±0.78 千牛顿。 (b) The voltage of the cell drops by at least 100mV. 电池的电压下降至少 100 毫伏。 (c) The cell is deformed by 50% or more of its original thickness. 电池变形达原始厚度的 50%或以上。 2). A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis. 棱柱形或袋装电池应从最宽的一面施压。纽扣/硬币形电池应从其平坦表面施压。圆柱形电池应从与纵轴垂直的方向施压。		
	Requirements 标准要求： 1) Cells external temperature not exceed 170°C. 电池的最高表面温度应不超过 170°C。 2) No disassembly, no rupture and no fire during the test and within six hours after the test. 测试中与测试后 6 小时内无解体、无破裂、无起火。	The samples C001~C010: No leakage, no venting, no disassembly, no rupture and no fire. 编号为 C001~C010 的样品：无解体、无破裂、无起火现象。 The data is shown in Table T.6 数据见表 T.6	

ST/SG/AC.10/11/Rev.7/Amend.1 Subsection 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
38.3.4.7	**Test 7: Overcharge** **检测 7: 过度充电**		Pass 合格
	1) The charge current shall be twice the manufacturer's recommended maximum continuous charge current. 以制造商建议的最大持续充电电流的两倍对样品充电。 2) The minimum voltage of the test shall be as follows: 试验的最小电压如下： a) 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 battery or 22V. 制造商建议的充电电压不大于 18V 时，试验的最小电压应是电池组最大充电电压的两倍或 22V 两者中的较小者。 b) when the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage. 制造商建议的充电电压大于 18V 时，试验的最小电压应为最大充电电压的 1.2 倍。 3) Tests are to be conducted at ambient temperature 20±5°C, The duration of the test shall be 24 hours. 试验应在环境温度（20±5°C）下进行。进行试验的时间应为 24 小时。		
	Requirements 标准要求: No disassembly and no fire during the test and within seven days after the test. 试验过程中和试验后 7 天内无解体，无起火。	The samples B011~B018: No disassembly and no fire. 编号为 B011~B018 的样品： 无解体、无起火现象。 The data is shown in Table T.7 数据见表 T.7	
38.3.4.8	**Test 8: Forced discharge** **检测 8: 强制放电**		Pass 合格
	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 by the manufacturer. 每个电池应在环境温度（20±5°C）下与 12V 直流电源串联在起始电流等于制造商给定的最大放电电流的条件下强制放电。		
	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). 将适当大小和额定值的电阻负荷与试验电池串联，计算得出给定的放电电流。对每个电池进行强制放电，放电时间(小时)应等于其额定容量除以初始试验电流(安培)。		
	Requirements 标准要求: No disassembly and no fire during the test and within seven days after the test. 试验过程中和试验后 7 天内无解体，无起火。	The samples C011~C030: no disassembly and no fire. 编号为 C011~C030 的样品： 无解体、无起火现象。 The data is shown in Table T.8 数据见表 T.8	

Table 38.3.1:Mass loss limit

表 38.3.1:质量损失限值

Mass M of cell or battery 电池或电池组质量 M	Mass loss limit 质量损失限值
M ＜ 1 g	0.5%
1 g ≤ M ≤75 g	0.2%
M ＞ 75 g	0.1%

In order to quantify the mass loss, the following procedure is provided:

$$\text{Mass loss (\%)} = (M_1 - M_2)/M_1 \times 100$$

质量损失的量化值，可用以下公式计算：

$$\text{质量损失(\%)} = (M_1 - M_2)/M_1 \times 100$$

Where M1 is the mass before the test and M2 is the mass after the test. When mass loss does not exceed the values in Table 38.3.1, it shall be considered as "no mass loss".

式中：M1 是试验前的质量，M2 是试验后的质量。如果质量损失不超过表 38.3.1 所列的数值，应视为“无质量损失”。

Leakage means the visible escape of electrolyte or other material from a cell or battery or the loss of material (except battery casing, handling devices or labels) from a cell or battery such that the loss of mass exceeds the values in Table 38.3.1.

渗漏是指可以看到的电解液或者其他物质从电池或电池组中漏出，或电池或电池组中的物质损失（不包括电池外壳、搬运装置、或标签），质量损失超过表 38.3.1 所列的数值。

Venting means the release of excessive internal pressure from a cell or battery in a manner intended by design to preclude rupture or disassembly.

排气是指按设计方式释放电池或电池组内部过高的压力，防止其破裂或解体。

Disassembly means a vent or rupture where solid matter from any part of a cell or battery penetrates a wire mesh screen (annealed aluminium wire with a diameter of 0.25 mm and grid density of 6 to 7 wires per cm) placed 25 cm away from the cell or battery.

解体是指排气或破裂使电池或电池组任何部分的固体物质穿过放在离电池或电池 25 cm 处的丝网筛（直径 0.25 mm 的软铝丝，网格密度每厘米 6 至 7 条铝丝）。

Rupture means the mechanical failure of a cell container or battery case induced by an internal or external cause, resulting in exposure or spillage but not ejection of solid materials.

破裂是指内部或外部原因引起的电池容器或电池组外壳机械损坏，造成内装物暴露或溢出，但无固体喷射。

Fire means that flames are emitted from the test cell or battery.

起火是指试验电池或电池组有火焰冒出。

Test Data 检测数据

Table T.1 Altitude simulation (表 T.1) 高度模拟

Test sample status 检测样品状态	No. 编号	Pre-test 试验前		After test 试验后		Mass loss 质量损失 (%)	Change ratio 电压比(%)	Status 结果
		Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
First cycle, fully charged state 首次循环满电状态	B001	13.379	4.19	13.379	4.19	0.000	100.00	Pass 合格
	B002	12.753	4.18	12.753	4.18	0.000	100.00	Pass 合格
	B003	12.908	4.18	12.908	4.17	0.000	99.76	Pass 合格
	B004	13.207	4.18	13.207	4.18	0.000	100.00	Pass 合格
	B005	12.777	4.19	12.776	4.19	0.008	100.00	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	B006	13.282	4.17	13.282	4.17	0.000	100.00	Pass 合格
	B007	12.665	4.18	12.665	4.18	0.000	100.00	Pass 合格
	B008	12.803	4.18	12.803	4.18	0.000	100.00	Pass 合格
	B009	13.171	4.17	13.170	4.17	0.008	100.00	Pass 合格
	B010	13.180	4.19	13.180	4.19	0.000	100.00	Pass 合格

Notes 注释:

After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. And change ratio is not less than 90 %. 检测后，样品无渗漏、无排气、无解体、无破裂和无起火。电压比不小于 90 %。

Table T.2 Thermal test (表 T.2) 温度试验

Test sample status 检测样品状态	No. 编号	Pre-test 试验前		After test 试验后		Mass loss 质量损失 (%)	Change ratio 电压比(%)	Status 结果
		Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
First cycle, fully charged state 首次循环满电状态	B001	13.379	4.19	13.377	4.14	0.015	98.81	Pass 合格
	B002	12.753	4.18	12.751	4.14	0.016	99.04	Pass 合格
	B003	12.908	4.17	12.907	4.13	0.008	99.04	Pass 合格
	B004	13.207	4.18	13.204	4.15	0.023	99.28	Pass 合格
	B005	12.776	4.19	12.774	4.15	0.016	99.05	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	B006	13.282	4.17	13.279	4.14	0.023	99.28	Pass 合格
	B007	12.665	4.18	12.662	4.14	0.024	99.04	Pass 合格
	B008	12.803	4.18	12.801	4.14	0.016	99.04	Pass 合格
	B009	13.170	4.17	13.169	4.14	0.008	99.28	Pass 合格
	B010	13.180	4.19	13.178	4.14	0.015	98.81	Pass 合格

Notes 注释:

After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. And change ratio is not less than 90 %. 检测后，样品无渗漏、无排气、无解体、无破裂和无起火。电压比不小于 90 %。

Table T.3 Vibration (表 T.3) 振动

Test sample status 检测样品状态	No. 编号	Pre-test 试验前		After test 试验后		Mass loss 质量损失 (%)	Change ratio 电压比(%)	Status 结果
		Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
First cycle, fully charged state 首次循环满电状态	B001	13.377	4.14	13.376	4.14	0.007	100.00	Pass 合格
	B002	12.751	4.14	12.751	4.14	0.000	100.00	Pass 合格
	B003	12.907	4.13	12.907	4.13	0.000	100.00	Pass 合格
	B004	13.204	4.15	13.204	4.15	0.000	100.00	Pass 合格
	B005	12.774	4.15	12.774	4.14	0.000	99.76	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	B006	13.279	4.14	13.278	4.14	0.008	100.00	Pass 合格
	B007	12.662	4.14	12.662	4.13	0.000	99.76	Pass 合格
	B008	12.801	4.14	12.801	4.14	0.000	100.00	Pass 合格
	B009	13.169	4.14	13.169	4.13	0.000	99.76	Pass 合格
	B010	13.178	4.14	13.178	4.14	0.000	100.00	Pass 合格

Notes 注释:

After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. And change ratio is not less than 90 %. 检测后，样品无渗漏、无排气、无解体、无破裂和无起火。电压比不小于 90 %。

Table T.4 Shock (表 T.4) 冲击

Test sample status 检测样品状态	No. 编号	Pre-test 试验前		After test 试验后		Mass loss 质量损失 (%)	Change ratio 电压比(%)	Status 结果
		Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
First cycle, fully charged state 首次循环满电状态	B001	13.376	4.14	13.376	4.14	0.000	100.00	Pass 合格
	B002	12.751	4.14	12.751	4.14	0.000	100.00	Pass 合格
	B003	12.907	4.13	12.907	4.13	0.000	100.00	Pass 合格
	B004	13.204	4.15	13.203	4.14	0.008	99.76	Pass 合格
	B005	12.774	4.14	12.774	4.13	0.000	99.76	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	B006	13.278	4.14	13.278	4.14	0.000	100.00	Pass 合格
	B007	12.662	4.13	12.662	4.13	0.000	100.00	Pass 合格
	B008	12.801	4.14	12.801	4.14	0.000	100.00	Pass 合格
	B009	13.169	4.13	13.169	4.13	0.000	100.00	Pass 合格
	B010	13.178	4.14	13.177	4.13	0.008	99.76	Pass 合格

Notes 注释:

After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. And change ratio is not less than 90 %. 检测后，样品无渗漏、无排气、无解体、无破裂和无起火。电压比不小于 90 %。

Table T.5 External short circuit (表 T.5) 外部短路

Test sample status 检测样品状态	No. 编号	Maximum external temperature (°C) 表面最高温度(°C)	Status 结果
First cycle, fully charged state 首次循环满电状态	B001	57.7	Pass 合格
	B002	57.6	Pass 合格
	B003	57.5	Pass 合格
	B004	57.5	Pass 合格
	B005	57.8	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	B006	57.7	Pass 合格
	B007	57.4	Pass 合格
	B008	57.7	Pass 合格
	B009	57.3	Pass 合格
	B010	57.8	Pass 合格

Notes 注释:

Test sample external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire during the test and within six hours after the test.

检测样品表面温度不超过 170 °C，检测中与检测后 6 小时内无解体、无破裂、无起火。

Table T.6 Crush (表 T.6) 挤压

Test sample status 检测样品状态	No. 编号	Maximum external temperature (°C) 表面最高温度(°C)	Status 结果
First cycle, 50% charged state 首次循环 50%充电状态	C001	23.6	Pass 合格
	C002	23.6	Pass 合格
	C003	23.4	Pass 合格
	C004	23.5	Pass 合格
	C005	23.5	Pass 合格
25th cycle, 50% charged state 25 次循环 50%充电状态	C006	23.7	Pass 合格
	C007	23.4	Pass 合格
	C008	23.7	Pass 合格
	C009	23.7	Pass 合格
	C010	23.6	Pass 合格

Notes 注释:

Test sample external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire during the test and within six hours after the test.

检测样品表面温度不超过 170°C，检测中与检测后 6 小时内无解体、无破裂、无起火。

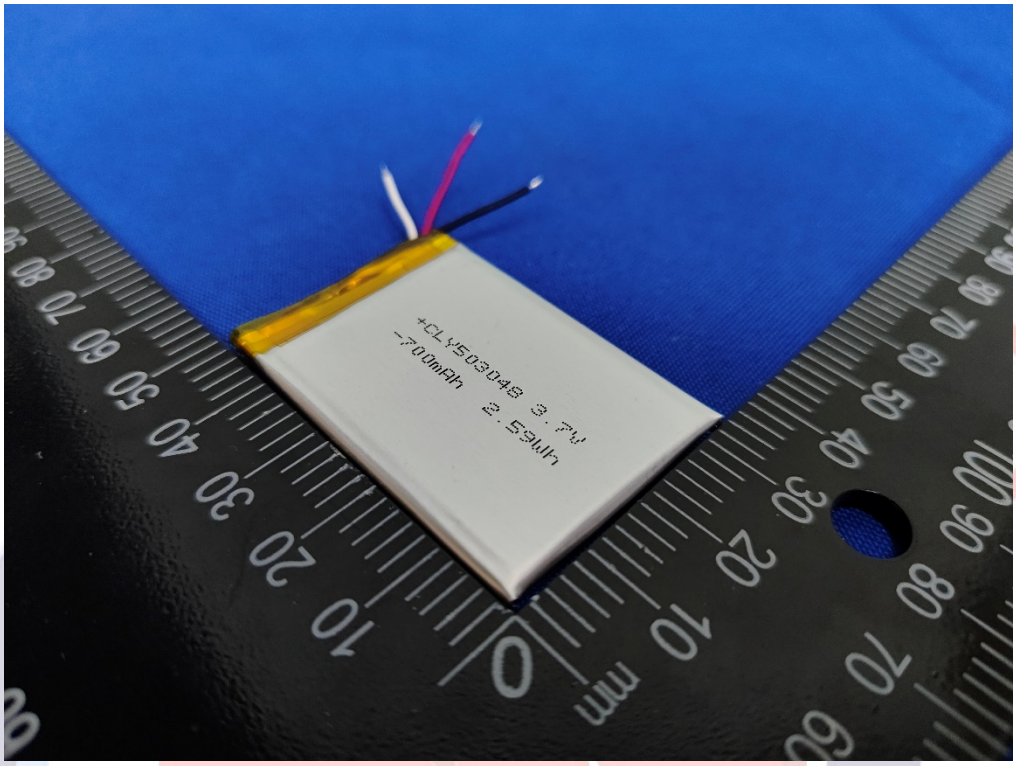
Table T.7 Overcharge (表 T.7) 过充电

Test sample status 检测样品状态	No. 编号	Status 结果
First cycle, fully charged state 首次循环满电状态	B011	Pass 合格
	B012	Pass 合格
	B013	Pass 合格
	B014	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	B015	Pass 合格
	B016	Pass 合格
	B017	Pass 合格
	B018	Pass 合格
Notes 注释: There is no disassembly and no fire during the test and within seven days after the test. 样品在检测中和检测后 7 天内无解体、无起火。		

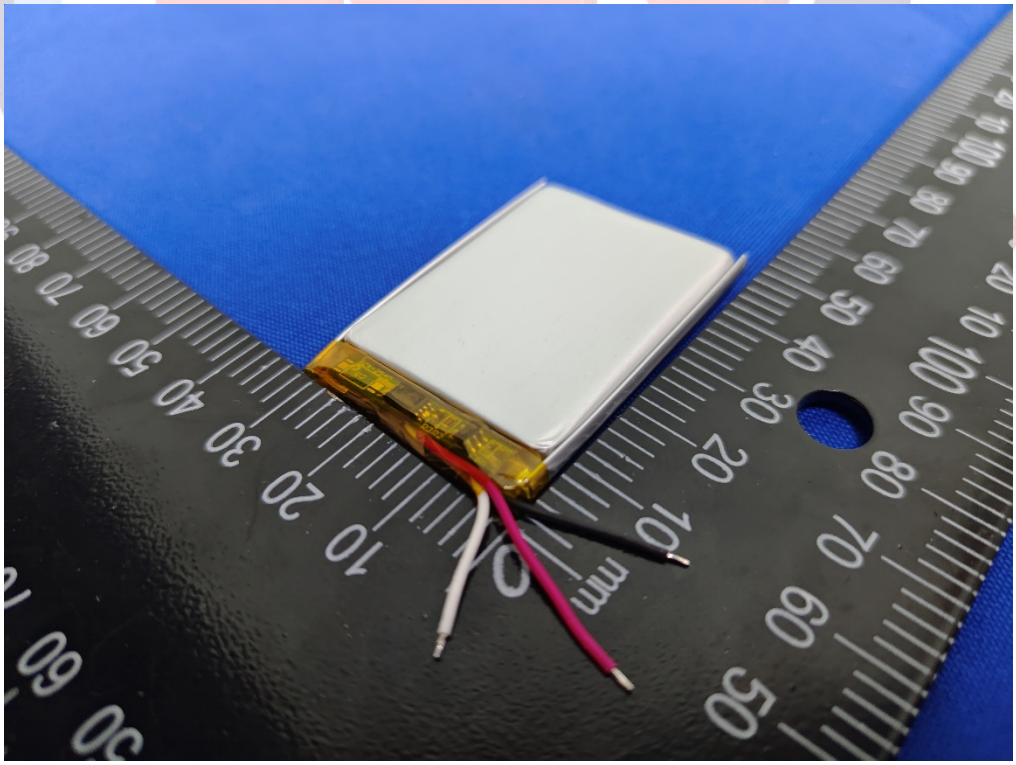
Table T.8 Forced discharge (表 T.8) 强制放电

Test sample status 检测样品状态	No. 编号	Status 结果
First cycle, fully discharged state 首次循环完全放电状态	C011	Pass 合格
	C012	Pass 合格
	C013	Pass 合格
	C014	Pass 合格
	C015	Pass 合格
	C016	Pass 合格
	C017	Pass 合格
	C018	Pass 合格
	C019	Pass 合格
	C020	Pass 合格
25th cycle, fully discharged state 25 次循环完全放电状态	C021	Pass 合格
	C022	Pass 合格
	C023	Pass 合格
	C024	Pass 合格
	C025	Pass 合格
	C026	Pass 合格
	C027	Pass 合格
	C028	Pass 合格
	C029	Pass 合格
	C030	Pass 合格
Notes 注释: There is no disassembly and no fire during the test and within seven days after the test. 样品在检测中和检测后 7 天内无解体、无起火。		

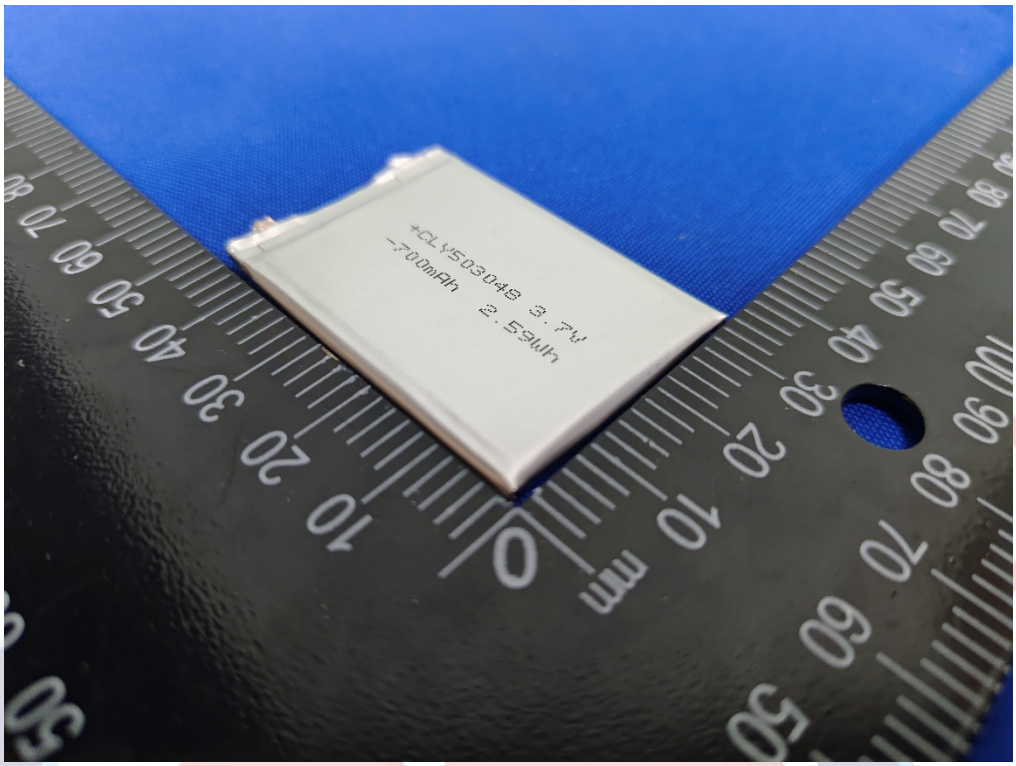
Photos of Samples
样品照片



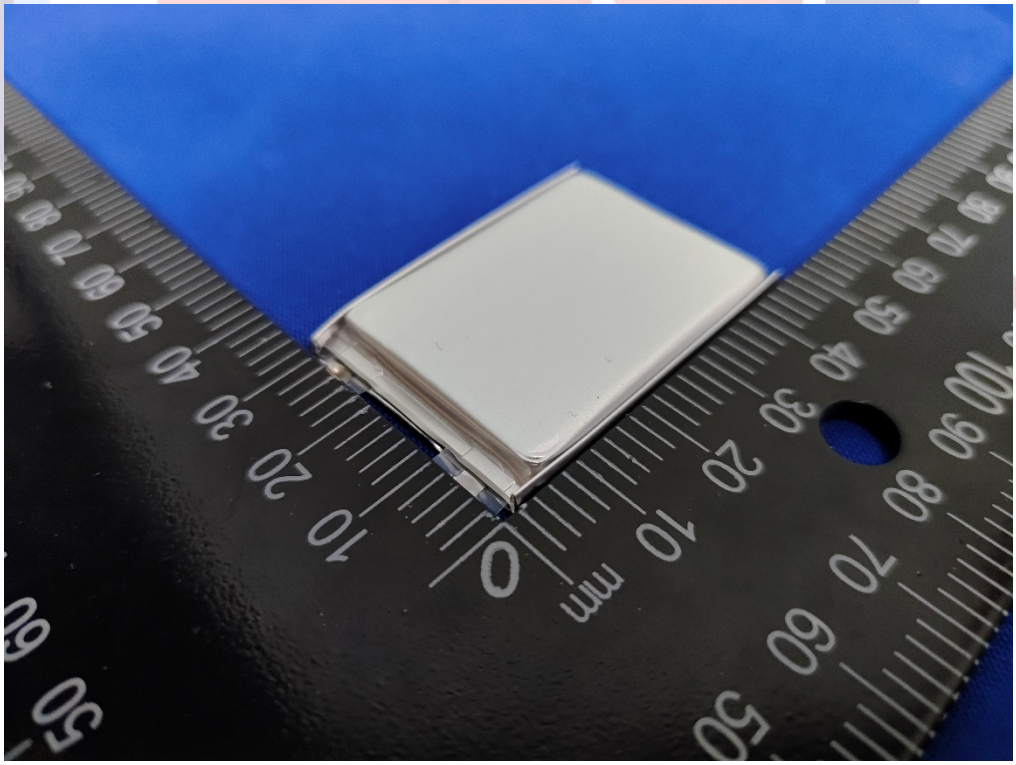
Picture 1. Front view of battery
图片 1. 电池组前视图



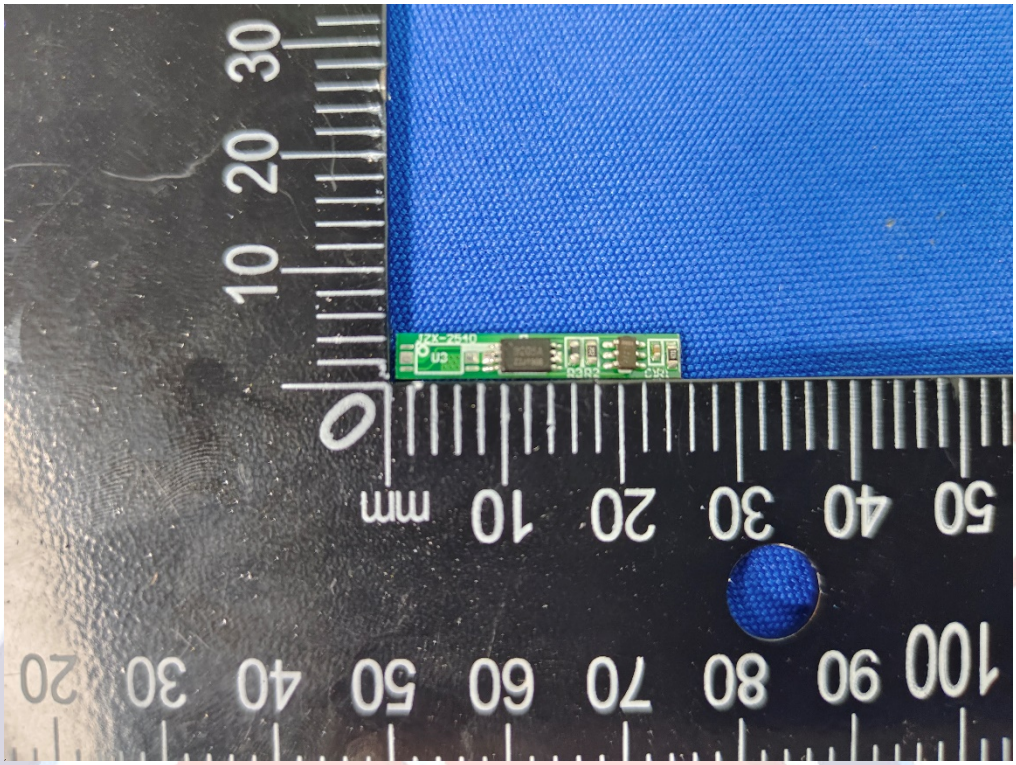
Picture 2. Back view of battery
图片 2. 电池组后视图



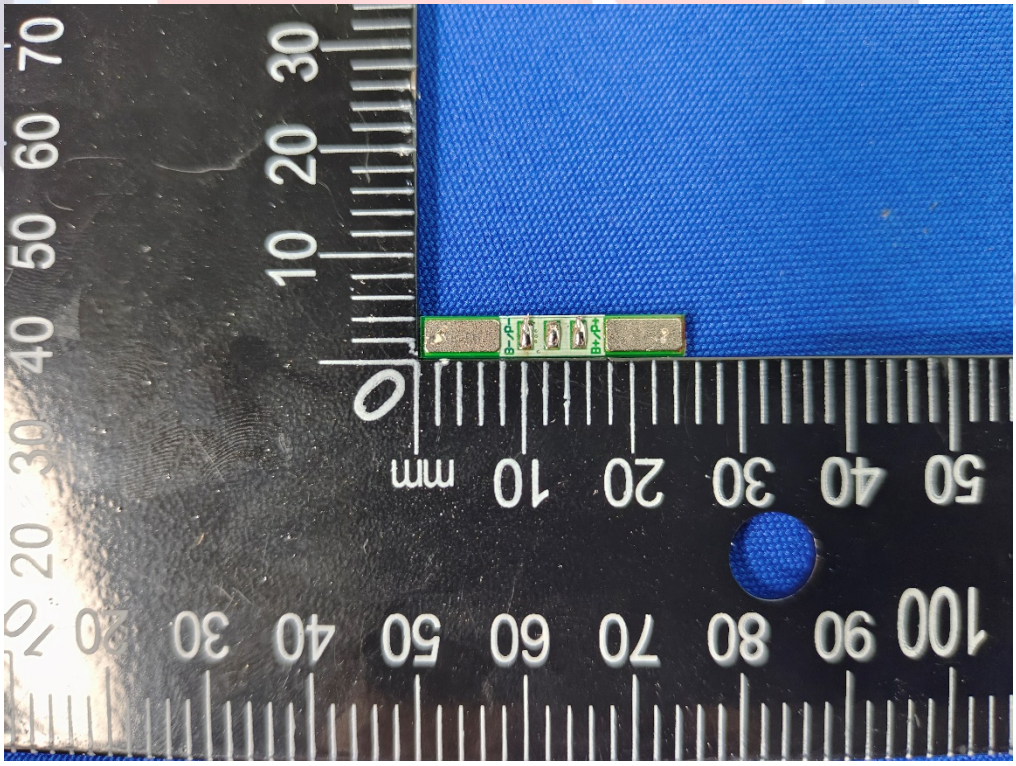
Picture 3. Front view of cell
图片 3. 电池前视图



Picture 4. Back view of cell
图片 4. 电池后视图



Picture 5. Front view of Protection board
图片 5. 保护板前视图



Picture 6. Back view of Protection board
图片 6. 保护板后视图

Important
注意事项

1. The test report is invalid if it is not affixed the official seal of the laboratory to it.
   检测报告无本实验室公章（或检验检测专用章）无效。
2. Copies of the test report without the official seal of the laboratory are invalid.
   复制检测报告未重新加盖本实验室公章(或检验检测专用章)无效。
3. It is forbidden to copy the test report partially without the written approval of the laboratory.
   未经本实验室书面批准不得部分复制检测报告。
4. The test report is invalid without the signatures of Approver, Reviewer and Testing engineer.
   检测报告无检测、审核、批准人签名无效。
5. The test report is invalid if it is blotted out.
   检测报告涂改无效。
6. Objections to the test report must be submitted to CMC Testing International (Shenzhen) Co., Ltd. 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众检检验认证（深圳）有限公司提出。
7. The test report is valid for the tested samples only.
   本检测报告仅对检测样品负责。
8. As for the Verdict, “--” means “no need for judgment”, “P” means “pass”, “F” means “fail” and “N/A” means “not applicable”.
   判定栏中“--”表示“不需要判定”，“P”表示“通过”，“F”表示“不通过”，“N/A”表示“不适用”。

*** End of Report ***
*** 报告结束 ***