Report NO.: 20190205346ZB-BR12

UN38.3检测报告

UN38.3 Test Report

产品名称	锂离子电池
Name of Sample	Lithium ion battery
委托单位	深圳市路创能源科技有限公司
Client	Shenzhen Luxtronic Energy Co.,Ltd
检测机构	深圳天溯计量检测股份有限公司
Testing Laboratory	Shenzhen Tiansu Calibration and Testing Co., Ltd.

深圳天溯计量检测股份有限公司

Shenzhen Tiansu Calibration and Testing Co., Ltd.

申请资料
Applicant information

样 品 名 称 Name of samples	锂离子电池 Lithium ion battery
型 号 规 格 Type/ Model	803496SH25-3S1P-11.1V-24.42Wh
委 托 单 位 Commission by	深圳市路创能源科技有限公司 Shenzhen Luxtronic Energy Co.,Ltd
委托单位地址 Commissioner address	深圳市龙华区龙华街道清华社区梅龙大道2113号卫龙龙商务大厦B座607 Room 607, block B, weilonglong business building, no. 2113, meilong avenue, tsinghua community, longhua street, longhua district, shenzhen
生 产 单 位 manufacturer	深圳市路创能源科技有限公司 Shenzhen Luxtronic Energy Co.,Ltd
生产单位地址 Manufacturer Address	深圳市龙华区龙华街道清华社区梅龙大道2113号卫龙龙商务大厦B座607 Room 607, block B, weilonglong business building, no. 2113, meilong avenue, tsinghua community, longhua street, longhua district, shenzhen
样 品 数 量 Quantity of sample	30个电芯\16个电池 30PCS Cells and 16PCS Batteries
接 样 日 期 Receiving date	2019年2月14日
测试完成日期 Completing date	2019年2月24日

Conclusion/结论：
The submitted samples comply with the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.6/Amend.1) Sixth revised edition.
样品符合联合国《关于危险货物运输的建议书》第六版修订版修正1。

Seal/检验专用章：
Date of issue: 2019/2/27

Tested by: 主检：

Reviewed by: 审核：

Approved by: 批准：

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样品描述 Sample Description			
样品名称 Name of samples	锂离子电池 Lithium ion battery	型号规格 Type/ Model	496SH25-3S1P-11.1V-24.42
商　　标 Trade Mark	—	电池形状 Cell Shape	棱形 Prismatic
样品尺寸(L×W×T) Sample Size	(105.4*34.8*24.1)mm	额定容量 Rated Capacity	2200mAh
标称电压 Nominal Voltage	11.1V	额定能量 Rated Energy	24.42Wh
充电限制电压 Limited Charge Voltage	4.2V	放电截止电压 Cut-off Voltage	3V
锂含量 Lithium content	0.994g	组合方式 Compound Mode	3S1P
电芯型号 Cell Mode	803496SH25	组成电芯数量 Cell Quantity	3PCS
标准充电电流 Standard Charge Current	2200mA	最大持续充电电流 Max Continuous Charge Current	6600mA
标准放电电流 Standard Discharge Current	2200mA	最大持续放电电流 Max Continuous Discharge Current	33000mA

测试结论 Test conclusion

序号 NO.	测试项目名称 Name of test	测试依据 Inspection according to	测试结果 Test result	本项结论 Conclusion	备注 Remarks
T1	高度模拟 Altitude simulation	UN 试验和标准手册,第III部分,第38.3.4.1 节 UN Manual of Test and Criteria,Part III, subsection 38.3.4.1	见附表1 See Appendix 1	合格 Pass	\
T2	温度试验 Thermal test	UN 试验和标准手册,第III部分,第38.3.4.2 节 UN Manual of Test and Criteria,Part III, subsection 38.3.4.2	见附表2 See Appendix 2	合格 Pass	\
T3	振动 Vibration	UN 试验和标准手册,第III部分,第38.3.4.3 节 UN Manual of Test and Criteria,Part III, subsection 38.3.4.3	见附表3 See Appendix 3	合格 Pass	\
T4	冲击 Shock	UN 试验和标准手册,第III部分,第38.3.4.4 节 UN Manual of Test and Criteria,Part III, subsection 38.3.4.4	见附表4 See Appendix 4	合格 Pass	\
T5	外部短路 External Short-circuit	UN 试验和标准手册,第III部分,第38.3.4.5 节 UN Manual of Test and Criteria,Part III, subsection 38.3.4.5	见附表5 See Appendix 5	合格 Pass	\
T6	挤压 Crush	UN 试验和标准手册,第III部分,第38.3.4.6 节 UN Manual of Test and Criteria,Part III, subsection 38.3.4.6	见附表6 See Appendix 6	合格 Pass	\
	撞击 Impact		见附表6 See Appendix 6	合格 Pass	\
T7	过度充电 Overcharge	UN 试验和标准手册,第III部分,第38.3.4.7 节 UN Manual of Test and Criteria,Part III, subsection 38.3.4.7	见附表7 See Appendix 7	合格 Pass	\
T8	强制放电 Forced discharge	UN 试验和标准手册,第III部分,第38.3.4.8 节 UN Manual of Test and Criteria,Part III, subsection 38.3.4.8	见附表8 See Appendix 8	合格 Pass	\

附表1
Appendix 1

测试项目 Test Items	高度模拟 Altitude simulation
1.1	测试步骤 Test procedure
	试验电池芯和电池在环境温度(20±5℃)下，储存在≤11.6kPa的压力下至少六小时。 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℃).
1.2	样品状态 Sample status
	B1#-B4# ，在第一个循环完全充电； B1#-B4# , at first cycle in fully charged states;
	B5#-B8# ，在第二十五个循环完全充电； B5#-B8# , after 25 cycles ending in fully charged states;
1.3	测试结果 Result

样品编号 Sample No.	测试前 Before Test		测试后 After Test		质量损失 Mass loss	剩余电压 Residual OCV	测试结果 Test result
	样品质量 (g) Mass	开路电压(V) Voltage	样品质量(g) Mass	开路电压(V) Voltage			
B1#	182.028	4.180	182.005	4.178	0.01%	99.95%	P
B2#	182.017	4.178	182.005	4.177	0.01%	99.98%	P
B3#	182.027	4.179	182.015	4.179	0.01%	100.00%	P
B4#	182.027	4.176	182.006	4.176	0.01%	100.00%	P
B5#	182.034	4.178	182.013	4.176	0.01%	99.95%	P
B6#	182.031	4.177	182.007	4.176	0.01%	99.98%	P
B7#	182.014	4.180	182.014	4.179	0.00%	99.98%	P
B8#	182.020	4.176	181.996	4.176	0.01%	100.00%	P

注：L- 泄漏；V- 排气；D- 解体；R- 破裂；F - 起火；P- 无泄漏、无排气、无解体、无破裂、无起火。
Note: L-Leakage, V-Venting, D -Disassembly, R -Rupture, F-Fire, P-No leakage, no venting, no disassembly, no rupture, no fire.

附表2
Appendix 2

测试项目 Test Items	温度测试 Thermal test
1.1	测试步骤 Test procedure
	将电芯和电池在温度为72±2℃的条件下贮存不少于6个小时，然后，在温度-40±2℃条件下贮存不少于6个小时，两个温度间的间隔最长为30min,重复操作上述步骤直到10次，然后，将其在环境温度为20±5℃的条件下放置24个小时。 Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72±2℃, followed by storage for at least six hours at a test temperature equal to -40±2℃, The maximum time interval between test temperature extremes in 30 minutes, This procedure is to be repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20±5℃).
1.2	样品状态 Sample status
	B1#-B4# ，在第一个循环完全充电； B1#-B4# , at first cycle in fully charged states;
	B5#-B8# ，在第二十五个循环完全充电； B5#-B8# , after 25 cycles ending in fully charged states;
1.3	测试结果 Result

样品编号 Sample No.	测试前 Before Test		测试后 After Test		质量损失 Mass loss	剩余电压 Residual OCV	测试结果 Test result
	样品质量 (g) Mass	开路电压(V) Voltage	样品质量(g) Mass	开路电压(V) Voltage			
B1#	182.005	4.177	181.994	4.177	0.01%	100.00%	P
B2#	182.005	4.177	181.985	4.175	0.01%	99.95%	P
B3#	182.015	4.179	182.014	4.178	0.00%	99.98%	P
B4#	182.006	4.175	181.998	4.175	0.00%	100.00%	P
B5#	182.013	4.176	182.006	4.176	0.00%	100.00%	P
B6#	182.007	4.176	181.983	4.176	0.01%	100.00%	P
B7#	182.014	4.178	182.012	4.177	0.00%	99.98%	P
B8#	181.996	4.176	181.974	4.174	0.01%	99.95%	P

注：L- 泄漏；V- 排气；D- 解体；R- 破裂；F - 起火；P- 无泄漏、无排气、无解体、无破裂、无起火。
Note: L-Leakage, V-Venting, D -Disassembly, R -Rupture, F-Fire, P-No leakage, no venting, no disassembly, no rupture, no fire.

附表3
Appendix 3

测试项目 Test Items	振动 Vibration
1.1	测试步骤 Test procedure
	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。 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.
1.2	样品状态 Sample status
	B1#-B4# ，在第一个循环完全充电； B1#-B4# , at first cycle in fully charged states;
	B5#-B8# ，在第二十五个循环完全充电； B5#-B8# , after 25 cycles ending in fully charged states;
1.3	测试结果 Result

样品编号 Sample No.	测试前 Before Test		测试后 After Test		质量损失 Mass loss	剩余电压 Residual OCV	测试结果 Test result
	样品质量 (g) Mass	开路电压(V) Voltage	样品质量(g) Mass	开路电压(V) Voltage			
B1#	181.994	4.177	181.984	4.176	0.01%	99.98%	P
B2#	181.985	4.175	181.977	4.175	0.00%	100.00%	P
B3#	182.014	4.178	182.004	4.177	0.01%	99.98%	P
B4#	181.998	4.175	181.996	4.173	0.00%	99.95%	P
B5#	182.006	4.176	181.992	4.174	0.01%	99.95%	P
B6#	181.983	4.176	181.976	4.174	0.00%	99.95%	P
B7#	182.012	4.177	181.992	4.176	0.01%	99.98%	P
B8#	181.974	4.174	181.955	4.173	0.01%	99.98%	P

注：L- 泄漏；V- 排气；D- 解体；R- 破裂；F - 起火；P- 无泄漏、无排气、无解体、无破裂、无起火。
Note: L-Leakage, V-Venting, D -Disassembly, R -Rupture, F-Fire, P-No leakage, no venting, no disassembly, no rupture, no fire.

附表4
Appendix 4

测试项目 Test Items	冲击 Shock
1.1	测试步骤 Test procedure
	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 $\sqrt{\frac{100000}{mass}}$ 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 $\sqrt{\frac{30000}{mass}}$ 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。 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)= $\sqrt{\frac{100000}{mass}}$, 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)= $\sqrt{\frac{30000}{mass}}$, 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.
1.2	样品状态 Sample status
	B1#-B4# ，在第一个循环完全充电； B1#-B4# , at first cycle in fully charged states;
	B5#-B8# ，在第二十五个循环完全充电； B5#-B8# , after 25 cycles ending in fully charged states;
1.3	测试结果 Result

样品编号 Sample No.	测试前 Before Test		测试后 After Test		质量损失 Mass loss	剩余电压 Residual OCV	测试结果 Test result
	样品质量 (g) Mass	开路电压(V) Voltage	样品质量(g) Mass	开路电压(V) Voltage			
B1#	181.984	4.176	181.979	4.174	0.00%	99.95%	P
B2#	181.977	4.175	181.957	4.174	0.01%	99.98%	P
B3#	182.004	4.177	181.984	4.177	0.01%	100.00%	P
B4#	181.996	4.173	181.977	4.173	0.01%	100.00%	P
B5#	181.992	4.174	181.970	4.174	0.01%	100.00%	P
B6#	181.976	4.174	181.968	4.174	0.00%	100.00%	P
B7#	181.992	4.176	181.986	4.176	0.00%	100.00%	P
B8#	181.955	4.173	181.941	4.171	0.01%	99.95%	P

注：L- 泄漏；V- 排气；D- 解体；R- 破裂；F - 起火；P- 无泄漏、无排气、无解体、无破裂、无起火。
Note: L-Leakage, V-Venting, D -Disassembly, R -Rupture, F-Fire, P-No leakage, no venting, no disassembly, no rupture, no fire.

附表5
Appendix 5

测试项目 Test Items	外部短路 External short circuit
1.1	测试步骤 Test procedure
	保持试验环境温度稳定在57±4℃，以使电芯或电池样品外表温度达到57±4℃，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57±4℃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。 The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 57±4℃ 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 57±4℃, This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57±4℃, the cell or battery must be observed for a further six hour for the test to be concluded.
1.2	样品状态 Sample status
	B1#-B4# ，在第一个循环完全充电； B1#-B4# , at first cycle in fully charged states;
	B5#-B8# ，在第二十五个循环完全充电； B5#-B8# , after 25 cycles ending in fully charged states;
1.3	测试结果 Result

样品编号 Sample No.	样品表面最高温度(℃) Max External Temp	测试结果 Test Result	备注 Remark
B1#	57.5	P	
B2#	57.6	P	
B3#	56.9	P	
B4#	55.9	P	
B5#	55.0	P	
B6#	55.1	P	
B7#	57.3	P	
B8#	56.5	P	

注： D- 解体；R- 破裂；F– 起火；OT– 超过170℃；P– 无解体、无破裂、无起火、不超过170℃
Note: D –Disassembly, R –Rupture, F –Fire, OT –Over Temperature, P –no disassembly, no rupture, no fire, no over temperature.

附表6
Appendix 6

测试项目 Test Items	挤压\撞击 Crush\Impact
1.1	测试步骤 Test procedure
	挤压 **Crush** 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： (a)作用力达到 13kN±0.78kN； (b)电池芯电压降至少达到100mV； (c)电池厚度和最初比较变形至少50%。 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。 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. (a) The applied force reaches 13kN±0.78kN; (b) The voltage of the cell drops by at least 100 mV; or (c) The cell is deformed by 50% or more of its original thickness. 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.
	撞击 **Impact** (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℃。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。 (applicable to cylindrical cells not less than 18mm in diameter) 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. 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. 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.

附表6
Appendix 6

1.2	样品状态 Sample status
	C9#-C13# ，在第一个循环充电50%的额定容量； C9#-C13# , at first cycle at 50% of the design rated capacity;
	C14#-C18# ，在第二十五个循环充电50%的额定容量； C14#-C18# , after 25 cycles ending in fully charged at 50% of the design rated capacity
1.3	测试结果 Result

样品编号 Sample No.	样品表面最高温度(℃) Max External Temp	测试结果 Test Result	备注 Remark
C9#	115.6	P	
C10#	119.6	P	
C11#	92.8	P	
C12#	136.4	P	
C13#	121.7	P	
C14#	91.9	P	
C15#	91.1	P	
C16#	111.6	P	
C17#	116.9	P	
C18#	114.1	P	

注：D- 解体；R- 破裂；F - 起火；OT– 超过170℃；P-无解体、无起火、不超过170℃
Note: D -Disassembly, R -Rupture, F-Fire, OT –Over Temperature, P- no disassembly, no fire, no over temperature .

附表7
Appendix 7

测试项目 Test Items	过度充电 Overcharge		
1.1	测试步骤 Test procedure		
	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。 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。		
1.2	样品状态 Sample status		
	B19#-B22#，在第一个循环完全充电； B19#-B22#，at first cycle in fully charged states;		
	B23#-B26#，在第二十五个循环完全充电； B23#-B26#，after 25 cycles ending in fully charged states;		
1.3	测试结果 Result		
样品编号 Sample No.	测试前开路电压(V) Voltage Before Test	测试结果 Test Result	备注 Remark
B19#	4.177	P	
B20#	4.178	P	
B21#	4.180	P	
B22#	4.178	P	
B23#	4.178	P	
B24#	4.178	P	
B25#	4.179	P	
B26#	4.179	P	

注： D- 解体；F - 起火；P-无解体、无起火。
Note: D -Disassembly, F-Fire, P- no disassembly, no fire.

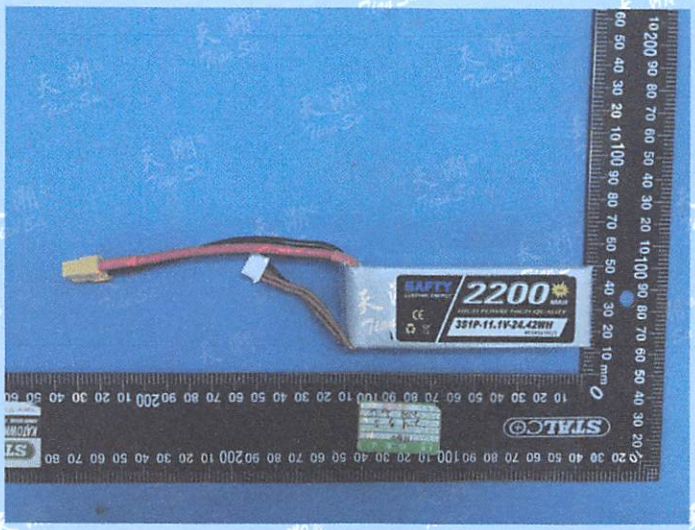
附表8
Appendix 8

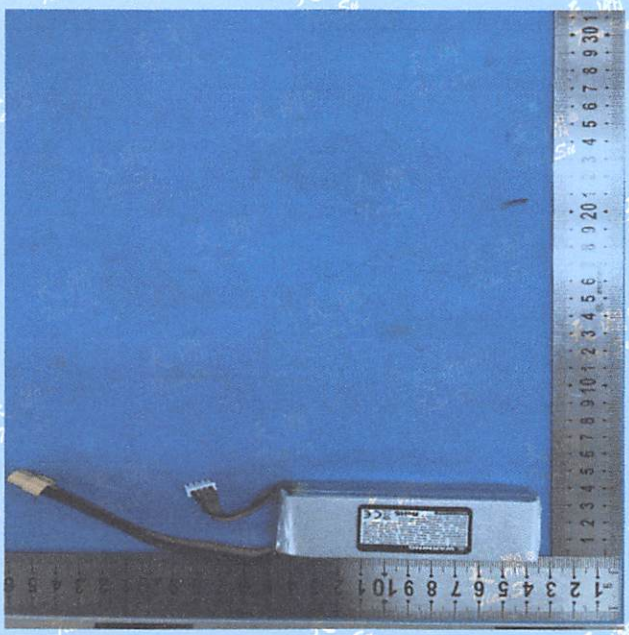
测试项目 Test Items	强制放电 Forced discharge
1.1	测试步骤 Test procedure
	在20±5℃的环境温度下，将单个电芯连接在12V的直流电源上进行强制放电，此直流电源提供每个电芯初始电流为制造厂指定的最大放电电流，放电时间为额定容量除以初始电流。 Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D. C, power supply at an initial current equal to the maximum 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).
1.2	样品状态 Sample status
	C27#-C36# ，在第一个循环完全放电； C27#-C36# , at first cycle in fully discharged states;
	C37#-C46# ，在第二十五个循环完全放电； C37#-C46# , after 25 cycles ending in fully discharged states;
1.3	测试结果 Result

样品编号 Sample No.	试验前电压(V) OCV prior to test	测试结果 Test Result	样品编号 Sample No.	试验前电压(V) OCV prior to test	测试结果 Test Result
C27#	3.429	P	C37#	3.425	P
C28#	3.403	P	C38#	3.421	P
C29#	3.412	P	C39#	3.413	P
C30#	3.422	P	C40#	3.416	P
C31#	3.409	P	C41#	3.420	P
C32#	3.413	P	C42#	3.417	P
C33#	3.404	P	C43#	3.417	P
C34#	3.407	P	C44#	3.403	P
C35#	3.406	P	C45#	3.406	P
C36#	3.421	P	C46#	3.426	P

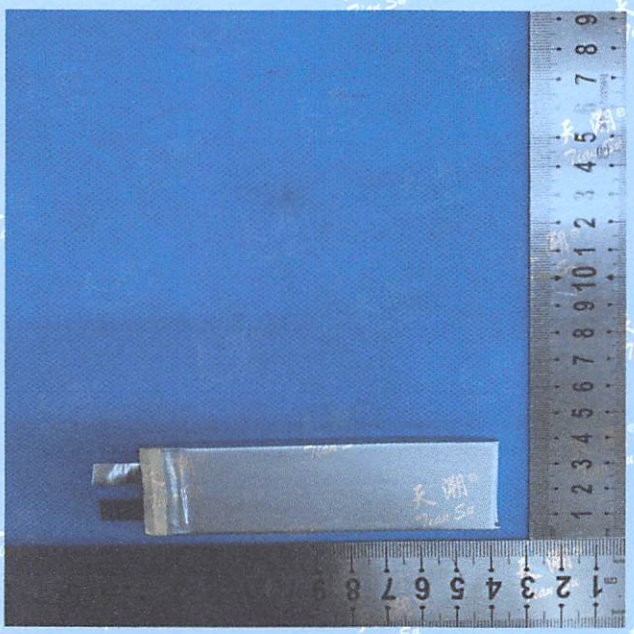
注：D- 解体；F - 起火；P-无解体、无起火。
Note: D -Disassembly, F-Fire, P- no disassembly, no fire.

样品及标识照片
Photos of samples and markings(battery)





样品及标识照片
Photos of samples and markings(Cell)



申　　明

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The test report is invalid without the official stamp of Tiansu.

2. 未经本试验室书面同意，不得部分地复制本报告。
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The test report is invalid if altered.

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Objections to the test report must be submitted to Tiansu within 15 days.

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