中国认可
国际互认
检测
TESTING
CNAS L4065

Report No.:
报告编号：JJY20180411U01

检 测 报 告

TEST REPORT

NAME OF SAMPLE: Rechargeable Lithium-Ion Battery
产品名称：二次锂离子电池组

CLIENT: CRYSTAL POWER INTERNATIONAL CO., LTD.
委托单位：晶炬源科技有限公司

CLASSIFICATION OF TEST: Commission test
检测类别：委托检测

广州邦禾检测技术有限公司

Guangzhou MCM Certification and Testing Co., Ltd

General information 基本资料	
Name of samples 样品名称	Rechargeable Lithium-Ion Battery 二次锂离子电池组
Type/ Model 型号规格	PT505068 3,7V 2000mAh 7,4Wh
Trade mark 商标	—
Commission by 委托单位	CRYSTAL POWER INTERNATIONAL CO., LTD. 晶炬源科技有限公司
Commissioner address 委托单位地址	12F,NO.41,LN.160,CHIAOHE RD,CHONG HO DIST.,NEW TAIPEI CITY,TAIWAN 台湾 新北市中和区中原里桥和路 160 巷 41 号 12 楼
Manufacturer 制造商	Guangdong Pow-Tech New Power Co., Ltd. 广东力科新能源有限公司
Manufacturer address 制造商地址	No.9,Hengdong 3Road,Hengkeng Shiling Industry Zone,Liaobu Town,Dongguan 广东省东莞市寮步镇横坑石岭工业区衡东三路 9 号
Factory 生产厂	Guangdong Pow-Tech New Power Co., Ltd. 广东力科新能源有限公司
Factory address 生产厂地址	No.9,Hengdong 3Road,Hengkeng Shiling Industry Zone,Liaobu Town,Dongguan 广东省东莞市寮步镇横坑石岭工业区衡东三路 9 号
Appearance: 样品外观颜色	White 白色
Sample status 样品状态	Good 完好
Package of goods 样品外包装	Carton 纸箱
Quantity of sample 样品数量	43pcs
Sample identification 样品标识序号	c1#～c43#
Reference standard 参考标准	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.6 section 38.3. 联合国《关于危险货物运输的建议书试验和标准手册》ST/SG/AC.10/11/Rev.6 section 38.3.
Receiving date 接样日期	2018.04.11
Completing date 完成日期	2018.04.25

Test Conclusion
测试结论

No. 序号	Name of test 测试项目名称	Testing standard 测试标准	Test result 测试结果	Conclusion 本项结论	Remarks 备注
1	Altitude simulation 高度模拟	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.6 section 38.3. 联合国《关于危险货物运输的建议书试验和标准手册》ST/SG/AC.10/11/Rev.6 section 38.3.	See Appendix 1 见附表 1	Passed 合格	/
2	Thermal test 温度试验		See Appendix 2 见附表 2	Passed 合格	/
3	Vibration 振动		See Appendix 3 见附表 3	Passed 合格	/
4	Shock 冲击		See Appendix 4 见附表 4	Passed 合格	/
5	External Short-circuit 外部短路		See Appendix 5 见附表 5	Passed 合格	/
6	Impact 撞击		/	/	N/A 不适用
	Crush 挤压		See Appendix 6 见附表 6	Passed 合格	/
7	Overcharge 过度充电		See Appendix 7 见附表 7	Passed 合格	/
8	Forced discharge 强制放电		See Appendix 8 见附表 8	Passed 合格	/

Conclusion/结论：

The Rechargeable Lithium-Ion Batteries submitted by CRYSTAL POWER INTERNATIONAL CO., LTD.had passed the test items of UNITED NATIONS “Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria ST/SG/AC.10/11/Rev.6 section 38.3.

由晶炬源科技有限公司送检的二次锂离子电池组符合联合国《关于危险品货物运输的建议书 试验和标准手册》ST/SG/AC.10/11/Rev.6 section 38.3 的要求。

广州邦禾检测技术有限公司 检测专用章

Seal/检测专用章：

Date of issue:/日期：May. 22, 2018

WARM PROMPT: This test report can be used only for areas excluding Shanghai (not including the use of applying for the certification for safe transport of SRI DGI of the second research institute of CAAC).

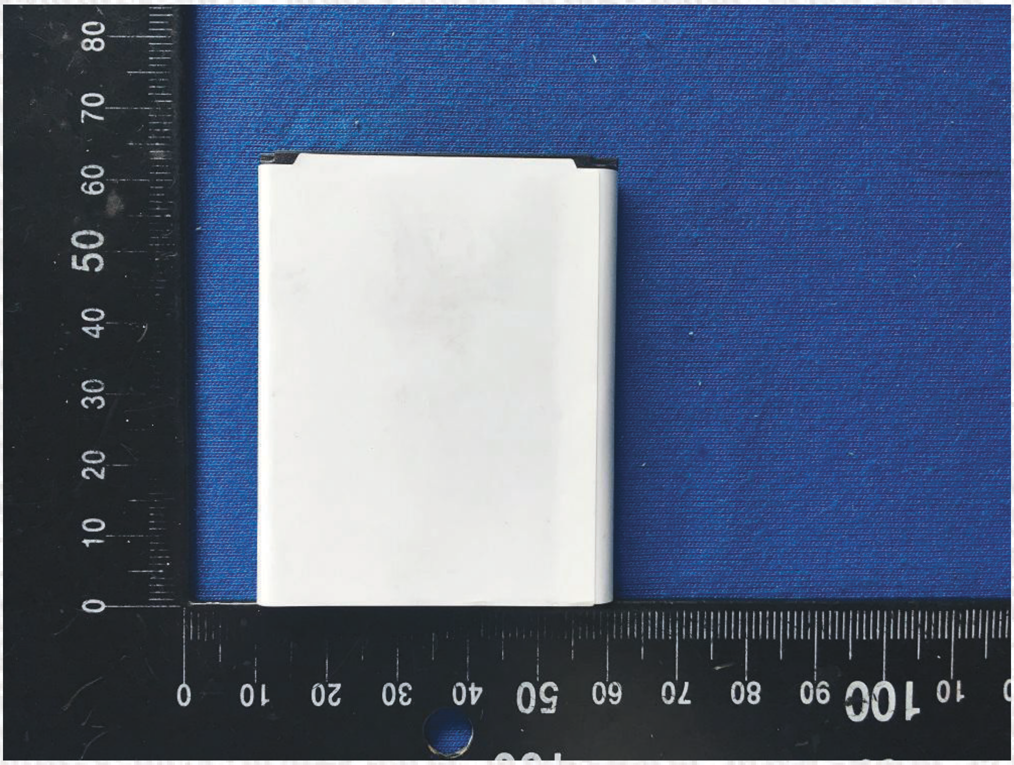
温馨提示：此份报告适用于“非上海地区”（不适用于申请中国民航局第二研究所危险品航空安全运输鉴定中心鉴定书）。

Approver:Xu Hongbin Checker: Tang Mingtao Tester: Cen Xishan

批准：Xu Hongbin 审核：Tang Mingtao 测试：Cen Xishan

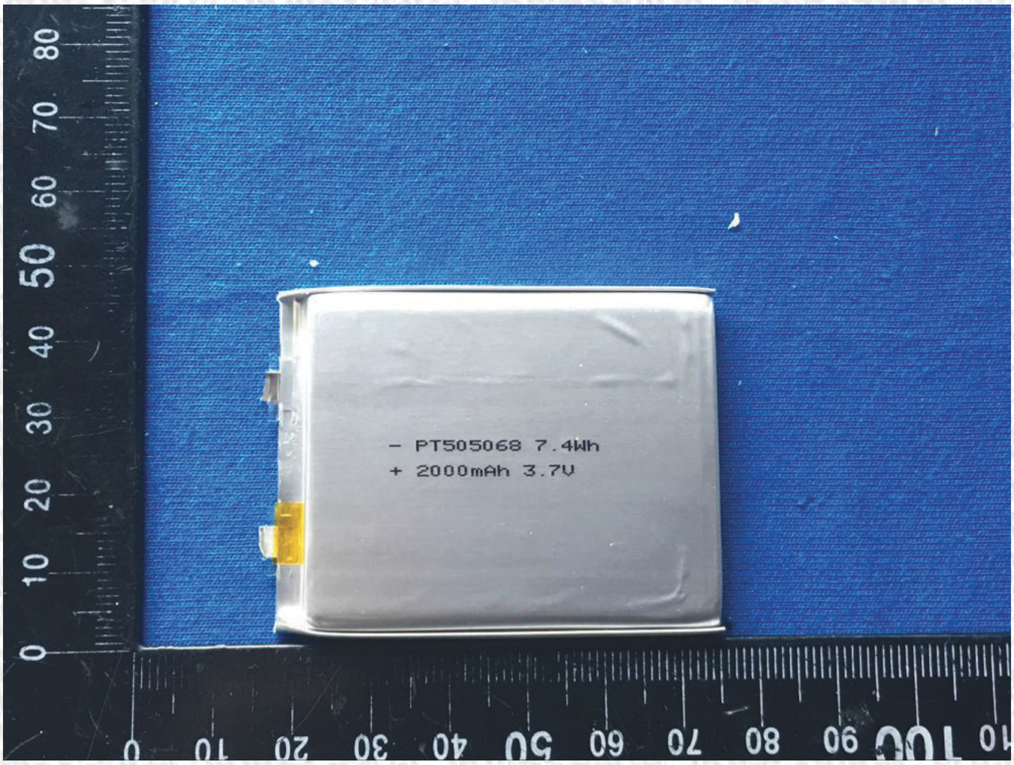
Photos of samples and markings
样品及标识照片

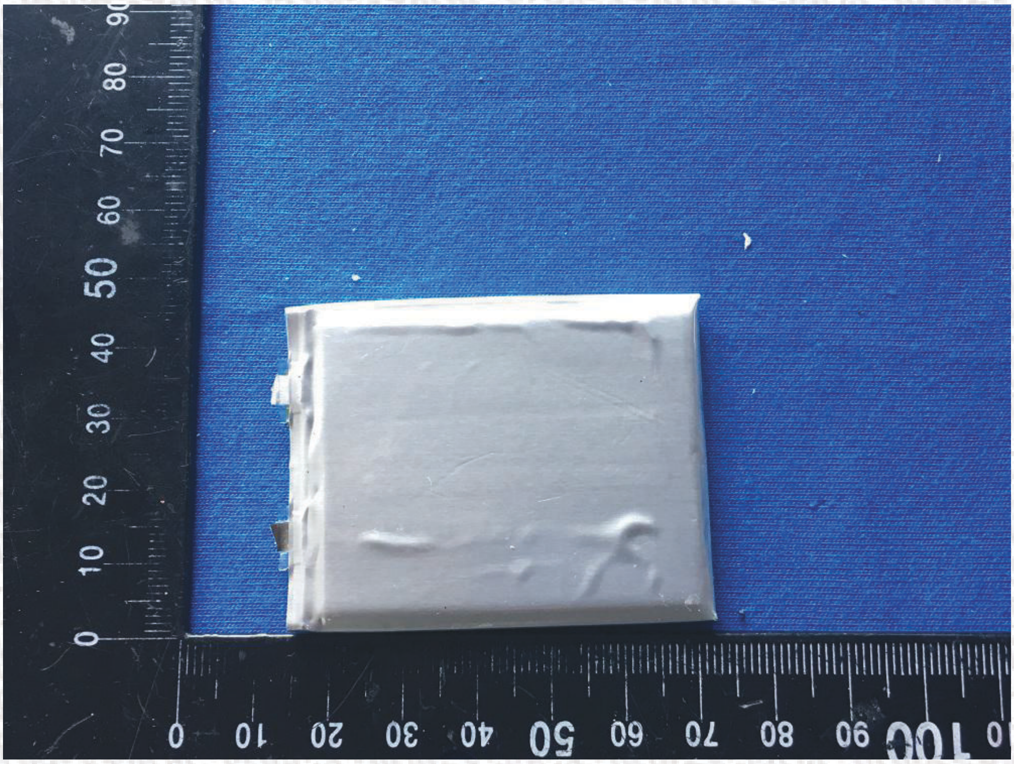
Battery（PT505068 3,7V 2000mAh 7,4Wh）



Photos of samples and markings
电池样品照片及标识

Cell（PT505068 3,7V 2000mAh 7,4Wh）





Appendix 1
附表 1

Test Items 测试项目	Altitude simulation 高度模拟
1,1	**Test procedure 测试步骤**
	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℃). 试验电池芯和电池在环境温度(20±5℃)下，储存在小于等于 11,6kPa 的压力下至少 6 小时。
1,2	**Sample status 样品状态**
	C1#~C10#, at first cycle in fully charged states; C1#~C10#,在第一个循环完全充电状态；
1,3	**Result 测试结果**

Sample No. 样品编号	Before 测试前		After 测试后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压 (V)	Mass 样品质量 (g)	Voltage 开路电压 (V)			
C1#	36,687	4,32	36,686	4,30	0,003	99,54	**O**
C2#	36,868	4,32	36,866	4,30	0,005	99,54	**O**
C3#	36,827	4,32	36,825	4,30	0,005	99,54	**O**
C4#	37,039	4,32	37,037	4,30	0,005	99,54	**O**
C5#	36,944	4,32	36,942	4,30	0,005	99,54	**O**
C6#	36,725	4,32	36,723	4,30	0,005	99,54	**O**
C7#	36,989	4,32	36,989	4,30	0,000	99,54	**O**
C8#	36,826	4,32	36,824	4,30	0,005	99,54	**O**
C9#	37,078	4,32	37,076	4,30	0,005	99,54	**O**
C10#	36,892	4,32	36,890	4,30	0,005	99,54	**O**

Note: **L**-Leakage, **V**-Venting, **D** -Disassembly, **R** -Rupture, **F**-Fire, **O**-No leakage, no venting, no disassembly, no rupture, no fire.

注：L- 泄漏；V- 排气；D- 解体；R- 破裂；F - 起火；O- 无泄漏、无排气、无解体、无破裂、无起火。

Appendix 2
附表 2

Test Items 测试项目	Thermal test 温度试验
1,1	**Test procedure 测试步骤**
	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 is 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℃). 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。
1,2	**Sample status 样品状态**
	C1#~C10#, at first cycle in fully charged states; C1#~C10#,在第一个循环完全充电状态；
1,3	**Result 测试结果**

Sample No. 样品编号	Before 测试前		After 测试后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压 (V)	Mass 样品质量 (g)	Voltage 开路电压 (V)			
C1#	36,686	4,30	36,682	4,22	0,011	98,14	**O**
C2#	36,866	4,30	36,862	4,22	0,011	98,14	**O**
C3#	36,825	4,30	36,820	4,22	0,014	98,14	**O**
C4#	37,037	4,30	37,033	4,22	0,011	98,14	**O**
C5#	36,942	4,30	36,938	4,22	0,011	98,14	**O**
C6#	36,723	4,30	36,714	4,22	0,025	98,14	**O**
C7#	36,989	4,30	36,986	4,22	0,008	98,14	**O**
C8#	36,824	4,30	36,822	4,22	0,005	98,14	**O**
C9#	37,076	4,30	37,074	4,22	0,005	98,14	**O**
C10#	36,890	4,30	36,885	4,22	0,014	98,14	**O**

Note: **L**-Leakage, **V**-Venting, **D** -Disassembly, **R** -Rupture, **F**-Fire, **O**-No leakage, no venting, no disassembly, no rupture, no fire.

注：L- 泄漏；V- 排气；D- 解体；R- 破裂；F - 起火；O- 无泄漏、无排气、无解体、无破裂、无起火。

Appendix 3
附表 3

Test Items 测试项目	Vibration 振动
1,1	**Test procedure** **测试步骤**
	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 7Hz and 200Hz 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. 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。
1,2	**Sample status** **样品状态**
	C1#~C10#, at first cycle in fully charged states; C1#~C10#,在第一个循环完全充电状态；
1,3	**Result** **测试结果**

Sample No. 样品编号	Before 测试前		After 测试后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压 (V)	Mass 样品质量 (g)	Voltage 开路电压 (V)			
C1#	36,682	4,22	36,680	4,21	0,005	99,76	**O**
C2#	36,862	4,22	36,860	4,21	0,005	99,76	**O**
C3#	36,820	4,22	36,820	4,21	0,000	99,76	**O**
C4#	37,033	4,22	37,032	4,21	0,003	99,76	**O**
C5#	36,938	4,22	36,937	4,21	0,003	99,76	**O**
C6#	36,714	4,22	36,713	4,21	0,003	99,76	**O**
C7#	36,986	4,22	36,985	4,21	0,003	99,76	**O**
C8#	36,822	4,22	36,820	4,21	0,005	99,76	**O**
C9#	37,074	4,22	37,072	4,21	0,005	99,76	**O**
C10#	36,885	4,22	36,884	4,21	0,003	99,76	**O**

Note: **L**-Leakage, **V**-Venting, **D** -Disassembly, **R** -Rupture, **F**-Fire, **O**-No leakage, no venting, no disassembly, no rupture, no fire,

注：L- 泄漏；V- 排气；D- 解体；R- 破裂；F - 起火；O- 无泄漏、无排气、无解体、无破裂、无起火。

Appendix 4
附表 4

Test Items 测试项目	Shock 冲击
1,1	**Test procedure 测试步骤**
	Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each battery, Each cell shall be subjected to a half-sine shock of peak acceleration of 150gn and pulse duration of 6 milliseconds, Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50gn and pulse duration of 11 milliseconds, Each cell or battery shall be subjected to three shocks in the positive direction and to three shocks in the negative direction in each of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks, 被测电芯和电池用坚硬的支架紧固在试验装置上，支架支撑着每个试验电池的所有安装面。每个电芯须经受 150gn 的最大加速度和脉冲持续时间为 6 毫秒的半正弦波冲击。另外，大电芯可能经受 50gn 的加速度和脉冲持续时间 11 毫秒的半正弦冲击。每个电池芯或电池应在三个垂直面的正向各承受 3 次冲击，负向再各承受 3 次冲击，共 18 次。
1,2	**Sample status 样品状态**
	C1#~C10#, at first cycle in fully charged states; C1#~C10#, 在第一个循环完全充电状态；
1,3	**Result 测试结果**

Sample No, 样品编号	Before 测试前		After 测试后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压 (V)	Mass 样品质量 (g)	Voltage 开路电压 (V)			
C1#	36,680	4,21	36,680	4,21	0,000	100,00	**O**
C2#	36,860	4,21	36,860	4,21	0,000	100,00	**O**
C3#	36,820	4,21	36,820	4,21	0,000	100,00	**O**
C4#	37,032	4,21	37,032	4,21	0,000	100,00	**O**
C5#	36,937	4,21	36,937	4,21	0,000	100,00	**O**
C6#	36,713	4,21	36,712	4,21	0,003	100,00	**O**
C7#	36,985	4,21	36,985	4,21	0,000	100,00	**O**
C8#	36,820	4,21	36,820	4,21	0,000	100,00	**O**
C9#	37,072	4,21	37,072	4,21	0,000	100,00	**O**
C10#	36,884	4,21	36,884	4,21	0,000	100,00	**O**

Note: **L**-Leakage, **V**-Venting, **D**-Disassembly, **R**-Rupture, **F**-Fire, **O**-No leakage, no venting, no disassembly, no rupture, no fire,

注：L- 泄漏；V- 排气；D- 解体；R- 破裂；F - 起火；O- 无泄漏、无排气、无解体、无破裂、无起火。

Appendix 5
附表 5

Test Items 测试项目	External short circuit 外部短路
1,1	**Test procedure** **测试步骤**
	The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of 57±4°C, measured on the external case, This period of time depends on the size and design of the cell or battery and should be assessed and documented, If this assessment is not feasible, the exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries, Then the cell or battery at 57± 4°C shall be subjected to one short circuit condition with a total external resistance of less than 0,1 ohm, 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, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value, 待试验电芯或电池的温度须处于稳定状态，使其外壳温度达到 57±4℃，测量外表温度，这段时间取决于电芯或电池的尺寸和设计,应该评估和记录。如果这个评估是不可行的,曝光时间应小电芯和小电池至少 6 小时、大电芯和大型电池至少 12 个小时。接着使电芯或电池在 57±4℃下经受总外阻小于 0,1 欧姆的短路状况。 这一短路状况应在电芯或电池外壳温度恢复至 57±4℃后至少持续 1 小时。或对于大型电池,已经下降至最高温度的一半，测试期间的观察,仍低于这个值。短路和降温阶段应当至少到环境温度。
1,2	**Sample status** **样品状态**
	C1#~C10#, at first cycle in fully charged states; C1#~C10#,在第一个循环完全充电状态；
1,3	**Result** **测试结果**

Sample No, 样品编号	Max, External Temperature 样品表面最高温度 （℃）	Test result 测试结果	Remark 备注
C1#	57,5	**O**	/
C2#	57,5	**O**	/
C3#	57,9	**O**	/
C4#	56,9	**O**	/
C5#	57,3	**O**	/
C6#	57,0	**O**	/
C7#	57,1	**O**	/
C8#	57,3	**O**	/
C9#	57,5	**O**	/
C10#	57,7	**O**	/

Note: **D** -Disassembly, **R** -Rupture, **F**-Fire, **O**- no disassembly, no rupture, no fire,

注：D- 解体；R- 破裂；F – 起火；O-无解体、无破裂、无起火。

Appendix 6
附表 6

Test Items 测试项目	Crush 挤压
1,1	**Test procedure** **测试步骤**
	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, (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, 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。
1,2	**Sample status** **样品状态**
	C11#~C15#, at first cycle at 50% of the design rated capacity; C11#~C15#，在第一个循环 50%的额定容量；
1,3	**Result** **测试结果**

Sample No, 样品编号	Max, External Temperature 样品表面最高温度 (℃)	Test result 测试结果	Remark 备注
C11#	23,5	**O**	/
C12#	23,5	**O**	/
C13#	23,7	**O**	/
C14#	24,0	**O**	/
C15#	24,2	**O**	/

Note: **D** -Disassembly, **F**-Fire, **O**- no disassembly, no fire,

注：D- 解体；F - 起火；O-无解体、无起火。

Appendix 7
附表 7

<table>
<tr><td>Test Items
测试项目</td><td colspan="2">Overcharge
过度充电</td></tr>
<tr><td>1,1</td><td colspan="2">Test procedure
测试步骤</td></tr>
<tr><td></td><td>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
制造商建议的充电电压不大于 18 伏时，实验的最小电压应是电池组最大充电电压的两倍或 22 伏两者中的较小者。</td><td>The manufacturer’s recommended maximum charge voltage is 4,35, The manufacturer’s recommended maximum continuous charge current is 2000mA,The voltage of the test is 8,7V, And the Current is 4000mA,
厂家推荐最大充电电压为 4,35V，厂家推荐最大充电电流为 2000mA,测试的电压为 8,7V，电流为 4000mA。</td></tr>
<tr><td></td><td>When the manufacturer’s recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1,2 times maximum charge voltage
制造商建议的充电电压大于 18 伏时，实验的最小电压应是最大充电电压的 1,2 倍</td><td>/</td></tr>
<tr><td>1,2</td><td colspan="2">Sample status
样品状态</td></tr>
<tr><td></td><td colspan="2">C16#~C19#, at first cycle in fully charged states;
C16#~C19#,在第一个循环完全充电状态；</td></tr>
<tr><td></td><td colspan="2">C20#~C23#, after 50 cycles ending in fully charged states;
C20#~C23#,在第五十个循环完全充电状态；</td></tr>
<tr><td>1,3</td><td colspan="2">Result
测试结果</td></tr>
</table>

Sample No, 样品编号	Voltage Before test(V) 测试前开路电压(V)	Test result 测试结果	Remark 备注
C16#	4,32	**O**	/
C17#	4,32	**O**	/
C18#	4,32	**O**	/
C19#	4,32	**O**	/
C20#	4,32	**O**	/
C21#	4,32	**O**	/
C22#	4,32	**O**	/
C23#	4,32	**O**	/

Note: **D** -Disassembly, **F**-Fire, **O**- no disassembly, no fire,

注： D- 解体；F - 起火；O-无解体、无起火。

Appendix 8
附表 8

Test Items 测试项目	Forced discharge 强制放电
1,1	**Test procedure** **测试步骤**
	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 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。
1,2	**Sample status** **样品状态**
	C24#~C33#, at first cycle in fully discharged states; C24#~C33#, 在第一个循环完全放电状态；
	C34#~C43#, after 50 cycles ending in fully discharged states; C34#~C43#, 在第五十个循环完全放电状态；
1,3	**Result** **测试结果**

Sample No, 样品编号	Voltage Before test 测试前开路电压 (V)	Test result 测试结果	Sample No, 样品编号	Voltage Before test 测试前开路电压 (V)	Test result 测试结果
C24#	3,254	**O**	C34#	3,242	**O**
C25#	3,255	**O**	C35#	3,232	**O**
C26#	3,247	**O**	C36#	3,265	**O**
C27#	3,242	**O**	C37#	3,253	**O**
C28#	3,247	**O**	C38#	3,247	**O**
C29#	3,234	**O**	C39#	3,237	**O**
C30#	3,256	**O**	C40#	3,245	**O**
C31#	3,252	**O**	C41#	3,243	**O**
C32#	3,243	**O**	C42#	3,259	**O**
C33#	3,237	**O**	C43#	3,260	**O**

Note: **D** -Disassembly, **F**-Fire, **O**- no disassembly, no fire,

注： D- 解体；F – 起火；O-无解体、无起火。

注 意 事 项

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检测单位：广州邦禾检测技术有限公司

Laboratory：Guangzhou MCM Certification and Testing Co,, Ltd

地　　址：中国 广州市番禺区市广路钟三路段 13 号之一

Address: 1 F No,13, Zhong San Section, ShiGuang Road, Panyu District, Guangzhou City, Guangdong Province, China,

电　　话：0086-20-34777662

0086-20-34777663

Email: mark,miao@mcmtek,com

传　　真：0086-20-34777665-609

Web: Http://www,mcmtek,com