



中国认可
国际互认
检测
TESTING
CNAS L4065



Report No.:/报告编号:
MLK20190116U01

检测报告

TEST REPORT

NAME OF SAMPLE: Lithium Manganese Dioxide Button Battery

产品名称: 锂-二氧化锰扣式电池

CLIENT: SHENZHEN M&LAK INDUSTRY CO., LTD

委托单位: 深圳市迈洛克实业有限公司

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



Applicant information 申请资料	
Name of samples 样品名称	Lithium Manganese Dioxide Button Battery 锂-二氧化锰扣式电池
Samples' type 样品类型	Lithium Metal Cell 锂金属电芯
Type/ Model 型号规格	CR2032 3V 230mAh (Lithium metal content: 0.06g)
Brand 商标	-
Appearance 样品外观	The cell consists of the positive electrode plate, negative electrode plate, separator, electrolyte and case. The positive and negative electrode plates are housed in the case in the state being separated by the separator, covered with silver metal case, approx 3.0g/pcs. 电芯由正极、负极、隔膜、电解液和外壳组成，正负极在封装前被隔膜所隔离，电芯覆盖银白色金属外壳，电池质量约为 3.0g。
Client 委托单位	SHENZHEN M&LAK INDUSTRY CO., LTD 深圳市迈洛克实业有限公司 Jinshan industrial park, No.375, Xixiang, Guangshen road, Xixiang district, Baoan, ShenZhen 深圳市宝安区西乡街道办广深路西乡段 375 号金山工业园五楼 5F Tel: 0755-27863350 E-mail: 537035367@qq.com
Manufacturer 制造商	SHENZHEN M&LAK INDUSTRY CO., LTD 深圳市迈洛克实业有限公司 Jinshan industrial park, No.375, Xixiang, Guangshen road, Xixiang district, Baoan, ShenZhen 深圳市宝安区西乡街道办广深路西乡段 375 号金山工业园五楼 5F
Factory 生产厂	SHENZHEN M&LAK INDUSTRY CO., LTD 深圳市迈洛克实业有限公司 Jinshan industrial park, No.375, Xixiang, Guangshen road, Xixiang district, Baoan, ShenZhen 深圳市宝安区西乡街道办广深路西乡段 375 号金山工业园五楼 5F
Testing standard 测试标准	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.6, amend1, 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, amend1, section 38.3.
Sample quantity 样品数量	40C
Receiving date 接收日期	2019.01.16
Test date 测试日期	2019.01.16 - 2019.01.28

Test Conclusion 测试结论				
No. 序号	Name of test 测试项目名称	Test result 测试结果	Conclusion 本项结论	Remarks 备注
1	38.3.4.1 Altitude simulation 38.3.4.1 高度模拟	See Appendix 1 见附表 1	Passed 合格	/
2	38.3.4.2 Thermal test 38.3.4.2 温度试验	See Appendix 2 见附表 2	Passed 合格	/
3	38.3.4.3 Vibration 38.3.4.3 振动	See Appendix 3 见附表 3	Passed 合格	/
4	38.3.4.4 Shock 38.3.4.4 冲击	See Appendix 4 见附表 4	Passed 合格	/
5	38.3.4.5 External Short-circuit 38.3.4.5 外部短路	See Appendix 5 见附表 5	Passed 合格	/
6	38.3.4.6 Impact 38.3.4.6 撞击	/	/	N/A 不适用
	38.3.4.6 Crush 38.3.4.6 挤压	See Appendix 6 见附表 6	Passed 合格	/
7	38.3.4.7 Overcharge 38.3.4.7 过度充电	/	/	N/A 不适用
8	38.3.4.8 Forced discharge 38.3.4.8 强制放电	See Appendix 7 见附表 7	Passed 合格	/

Conclusion/结论:

The Lithium Manganese Dioxide Button Batteries submitted by SHENZHEN M&LAK INDUSTRY CO., LTD have 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, amend1, section 38.3.

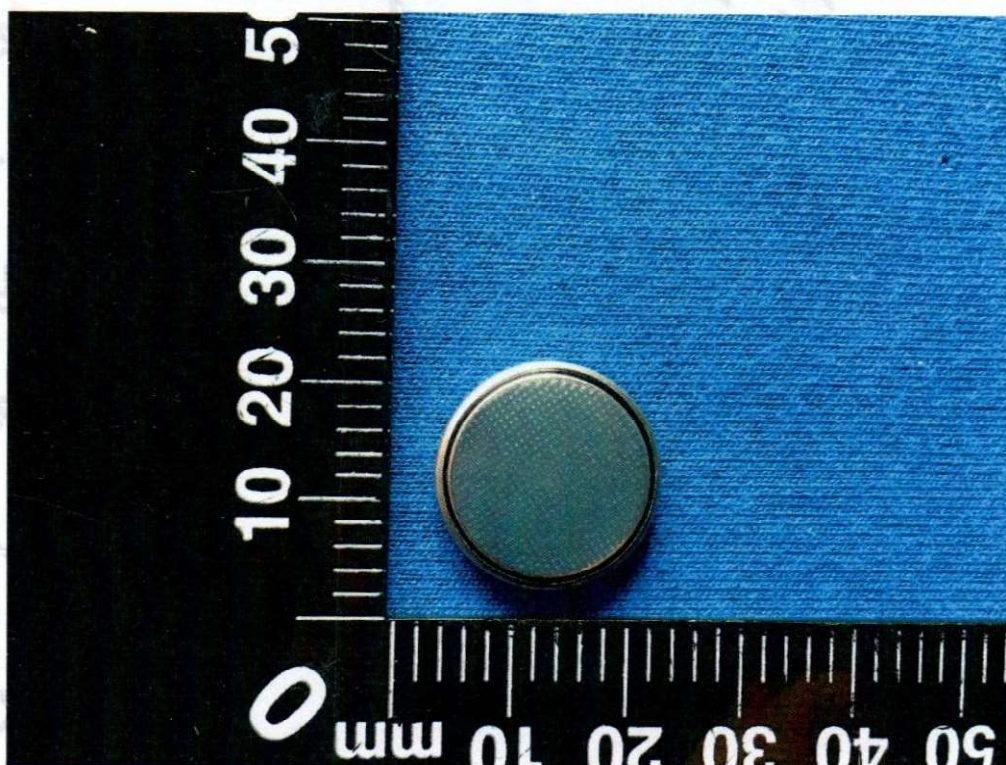
由深圳市迈洛克实业有限公司送检的锂-二氧化锰扣式电池符合联合国《关于危险品货物运输的建议书 试验和标准手册》ST/SG/AC.10/11/Rev.6, amend1, section 38.3 的要求。

Tested by Li Guangwei (Test Engineer)	 Seal/检测专用章 Date of issue/日期: Jan. 29, 2019
测试: <i>Li Guangwei</i> (测试工程师)	
Reviewed by Huang Yining (Audit Engineer)	
审核: <i>Huang Yining</i> (审核工程师)	
Approved by Xu Hongbin (Approval Engineer)	
批准: <i>Xu Hongbin</i> (批准工程师)	

Photos of samples and markings

样品及标识照片

Cell (CR2032 3V 230mAh)



Appendix 1

附表 1

Items 项目	38.3.4.1 Altitude simulation 38.3.4.1 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°C). 试验电池芯和电池在环境温度 (20±5°C) 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#: are in un-discharged state C1#-C10#: 在未放电状态						
	C11#-C20#: are in fully discharged state C11#-C20#: 在完全放电状态						
1.3	Result 测试结果						
Sample No. 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#	2.9512	3.362	2.9510	3.362	0.007	100.00	○
C2#	2.9549	3.371	2.9549	3.372	0.000	100.03	○
C3#	2.9613	3.360	2.9610	3.363	0.010	100.09	○
C4#	2.9682	3.365	2.9682	3.366	0.000	100.03	○
C5#	2.9705	3.362	2.9702	3.362	0.010	100.00	○
C6#	2.9573	3.355	2.9573	3.355	0.000	100.00	○
C7#	2.9641	3.366	2.9640	3.368	0.003	100.06	○
C8#	2.9704	3.356	2.9704	3.357	0.000	100.03	○
C9#	2.9585	3.368	2.9585	3.368	0.000	100.00	○
C10#	2.9463	3.365	2.9457	3.365	0.020	100.00	○
C11#	2.9334	/	2.9334	/	0.000	/	○
C12#	2.9626	/	2.9620	/	0.020	/	○
C13#	2.9473	/	2.9473	/	0.000	/	○
C14#	2.9608	/	2.9601	/	0.024	/	○
C15#	2.9657	/	2.9657	/	0.000	/	○
C16#	2.9532	/	2.9527	/	0.017	/	○
C17#	2.9724	/	2.9723	/	0.003	/	○
C18#	2.9645	/	2.9639	/	0.020	/	○

C19#	2.9681	/	2.9681	/	0.000	/	O
C20#	2.9592	/	2.9592	/	0.000	/	O
Note: 备注	L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire. 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

Items 项目	38.3.4.2 Thermal test 38.3.4.2 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 $72 \pm 2^\circ\text{C}$, followed by storage for at least six hours at a test temperature equal to $-40 \pm 2^\circ\text{C}$. 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 ($20 \pm 5^\circ\text{C}$). 将电芯和电池在温度为 $72 \pm 2^\circ\text{C}$ 的条件下贮存不少于 6 个小时, 然后, 在温度 $-40 \pm 2^\circ\text{C}$ 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 $20 \pm 5^\circ\text{C}$ 的条件下放置 24 个小时。						
1.2	Sample status 样品状态						
	C1#-C10#: are in un-discharged state C1#-C10#: 在未放电状态						
	C11#-C20#: are in fully discharged state C11#-C20#: 在完全放电状态						
1.3	Result 测试结果						
Sample No. 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#	2.9510	3.362	2.9504	3.364	0.020	100.06	O
C2#	2.9549	3.372	2.9542	3.370	0.024	99.94	O
C3#	2.9610	3.363	2.9602	3.361	0.027	99.94	O
C4#	2.9682	3.366	2.9675	3.366	0.024	100.00	O
C5#	2.9702	3.362	2.9696	3.362	0.020	100.00	O
C6#	2.9573	3.355	2.9565	3.356	0.027	100.03	O
C7#	2.9640	3.368	2.9633	3.366	0.024	99.94	O
C8#	2.9704	3.357	2.9697	3.359	0.024	100.06	O
C9#	2.9585	3.368	2.9578	3.369	0.024	100.03	O
C10#	2.9457	3.365	2.9450	3.367	0.024	100.06	O
C11#	2.9334	/	2.9326	/	0.027	/	O
C12#	2.9620	/	2.9611	/	0.030	/	O
C13#	2.9473	/	2.9465	/	0.027	/	O
C14#	2.9601	/	2.9592	/	0.030	/	O
C15#	2.9657	/	2.9649	/	0.027	/	O

C16#	2.9527	/	2.9518	/	0.030	/	O
C17#	2.9723	/	2.9715	/	0.027	/	O
C18#	2.9639	/	2.9630	/	0.030	/	O
C19#	2.9681	/	2.9673	/	0.027	/	O
C20#	2.9592	/	2.9584	/	0.027	/	O
Note: 备注	L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire. 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

Items 项目	38.3.4.3 Vibration 38.3.4.3 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 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. 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#: are in un-discharged state C1#-C10#:在未放电状态						
	C11#-C20#: are in fully discharged state C11#-C20#:在完全放电状态						
1.3	Result 测试结果						
Sample No. 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#	2.9504	3.364	2.9504	3.364	0.000	100.00	○
C2#	2.9542	3.370	2.9542	3.372	0.000	100.06	○
C3#	2.9602	3.361	2.9602	3.365	0.000	100.12	○
C4#	2.9675	3.366	2.9672	3.366	0.010	100.00	○
C5#	2.9696	3.362	2.9696	3.362	0.000	100.00	○
C6#	2.9565	3.356	2.9565	3.356	0.000	100.00	○
C7#	2.9633	3.366	2.9633	3.366	0.000	100.00	○
C8#	2.9697	3.359	2.9697	3.359	0.000	100.00	○
C9#	2.9578	3.369	2.9578	3.368	0.000	99.97	○
C10#	2.9450	3.367	2.9448	3.369	0.007	100.06	○
C11#	2.9326	/	2.9326	/	0.000	/	○
C12#	2.9611	/	2.9611	/	0.000	/	○
C13#	2.9465	/	2.9462	/	0.010	/	○
C14#	2.9592	/	2.9591	/	0.003	/	○
C15#	2.9649	/	2.9648	/	0.003	/	○

C16#	2.9518	/	2.9518	/	0.000	/	O
C17#	2.9715	/	2.9715	/	0.000	/	O
C18#	2.9630	/	2.9630	/	0.000	/	O
C19#	2.9673	/	2.9670	/	0.010	/	O
C20#	2.9584	/	2.9582	/	0.007	/	O
Note: 备注	L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire. 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

Items 项目	38.3.4.4 Shock 38.3.4.4 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#: are in un-discharged state C1#-C10#:在未放电状态						
	C11#-C20#: are in fully discharged state C11#-C20#:在完全放电状态						
1.3	Result 测试结果						
Sample No. 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#	2.9504	3.364	2.9504	3.364	0.000	100.00	○
C2#	2.9542	3.372	2.9540	3.371	0.007	99.97	○
C3#	2.9602	3.365	2.9602	3.365	0.000	100.00	○
C4#	2.9672	3.366	2.9672	3.366	0.000	100.00	○
C5#	2.9696	3.362	2.9696	3.362	0.000	100.00	○
C6#	2.9565	3.356	2.9564	3.356	0.003	100.00	○
C7#	2.9633	3.366	2.9633	3.365	0.000	99.97	○
C8#	2.9697	3.359	2.9697	3.359	0.000	100.00	○
C9#	2.9578	3.368	2.9575	3.368	0.010	100.00	○
C10#	2.9448	3.369	2.9448	3.369	0.000	100.00	○
C11#	2.9326	/	2.9326	/	0.000	/	○
C12#	2.9611	/	2.9611	/	0.000	/	○
C13#	2.9462	/	2.9462	/	0.000	/	○

C14#	2.9591	/	2.9591	/	0.000	/	O
C15#	2.9648	/	2.9648	/	0.000	/	O
C16#	2.9518	/	2.9516	/	0.007	/	O
C17#	2.9715	/	2.9715	/	0.000	/	O
C18#	2.9630	/	2.9628	/	0.007	/	O
C19#	2.9670	/	2.9670	/	0.000	/	O
C20#	2.9582	/	2.9581	/	0.003	/	O
Note: 备注	L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire. 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

Items 项目	38.3.1.5 External Short-circuit 38.3.1.5 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 $57\pm4^{\circ}\text{C}$, 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 $57\pm4^{\circ}\text{C}$ 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 $57\pm4^{\circ}\text{C}$, 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. The short circuit and cooling down phases shall be conducted at least at ambient temperature. 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 $57\pm4^{\circ}\text{C}$, 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 $57\pm4^{\circ}\text{C}$ 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 $57\pm4^{\circ}\text{C}$ 后至少持续 1 小时。或对于大型电池,已经下降至最高温升的一半,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#: are in un-discharged state C1#-C10#:在未放电状态 C11#-C20#: are in fully discharged state C11#-C20#:在完全放电状态				
1.3	Result 测试结果				
Sample No. 编号	Max. External Temperature 样品表面最高温度 ($^{\circ}\text{C}$)	Test result 测试结果	Sample No. 编号	Max. External Temperature 样品表面最高温度 ($^{\circ}\text{C}$)	Test result 测试结果
C1#	76.3	O	C11#	65.3	O
C2#	76.9	O	C12#	65.5	O
C3#	71.2	O	C13#	65.7	O
C4#	78.4	O	C14#	66.3	O
C5#	72.5	O	C15#	67.0	O
C6#	73.9	O	C16#	66.5	O
C7#	76.1	O	C17#	65.9	O
C8#	71.4	O	C18#	65.8	O
C9#	77.5	O	C19#	65.4	O
C10#	78.3	O	C20#	67.6	O
Note: 备注	D-Disassembly, R-Rupture, F-Fire, O- no disassembly, no rupture, no fire. D- 解体; R- 破裂; F- 起火; O- 无解体、无破裂、无起火。				

Appendix 6

附表 6

Items 项目	38.3.4.6 Crush 38.3.4.6 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) 电池芯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				
	C21#-C25#: are in un-discharged state C21#-C25#:在未放电状态 C26#-C30#: are in fully discharged state C26#-C30#:在完全放电状态				
1.3	Result 测试结果				
Sample No. 编号	Max. External Temperature 样品表面最高温度 (°C)	Test result 测试结果	Sample No. 编号	Max. External Temperature 样品表面最高温度 (°C)	Test result 测试结果
C21#	23.2	O	C26#	23.0	O
C22#	23.1	O	C27#	22.7	O
C23#	22.9	O	C28#	23.0	O
C24#	22.8	O	C28#	22.9	O
C25#	22.6	O	C30#	22.6	O
Note: 备注	D-Disassembly, F-Fire, O-no disassembly, no fire. D- 解体; F- 起火; O- 无解体、无起火。				

Appendix 7

附表 7

Items 项目	38.3.4.8 Forced discharge 38.3.4.8 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 $20 \pm 5^{\circ}\text{C}$ 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				
	C31#-C40#: are in fully discharged state C31#-C40#: 在完全放电状态				
1.3	Result 测试结果				
Sample No. 编号	Voltage before test 测试前电压 (V)	Test result 测试结果	Sample No. 编号	Voltage before test 测试前电压 (V)	Test result 测试结果
C31#	2.823	O	C36#	2.856	O
C32#	2.732	O	C37#	2.833	O
C33#	2.672	O	C38#	2.834	O
C34#	2.828	O	C39#	2.746	O
C35#	2.765	O	C40#	2.737	O
Note: 备注	D-Disassembly, F-Fire, O-no disassembly, no fire. D- 解体; F- 起火; O- 无解体、无起火。				

注意事项 Important

1. 本报告无检测单位检测专用章、骑缝章无效。

The test report is invalid without the special seal for testing and Paging seal of Guangzhou MCM Certification and Testing Co., Ltd.

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4. 本报告涂改无效。

The test report is invalid if altered.

5. 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。

Objections to the test report must be submitted to Guangzhou MCM Certification and Testing Co., Ltd. Within 15 days.

6. 本报告仅对来样负责。

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-End the test report-