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Report No.:
报告编号: GZLS20160701Z01

检 验 报 告

TEST REPORT

NAME OF SAMPLE: Rechargeable Li-ion(3,6V) battery

产品名称: 可充电锂离子电池

CLIENT: LEUNG'S COMMUNICATION & ELECTRIC PRODUCTS
(GUANGZHOU)LTD

委托单位: 广州梁氏通讯电器有限公司

CLASSIFICATION OF TEST: Commission test

检验类别: 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 Li-ion(3,6V) battery 可充电锂离子电池
Type/ Model 型号规格	82-166537-01 3,6V 3150mAh/11,34Wh(TYP) 3100mAh/11,16Wh (MIN)
Trade mark 商标	ZEBRA
Commission by 委托单位	LEUNG'S COMMUNICATION & ELECTRIC PRODUCTS(GUANGZHOU)LTD 广州梁氏通讯电器有限公司
Commissioner address 委托单位地址	No.39 Nanyunsan Road, Science Park, Hi-Tech Industrial Development Zone, Guangzhou 广州市高新技术产业开发区科学城南云三路 39 号
Manufacturer 制造商	LEUNG'S COMMUNICATION & ELECTRIC PRODUCTS(GUANGZHOU)LTD 广州梁氏通讯电器有限公司
Manufacturer address 制造商地址	No.39 Nanyunsan Road, Science Park, Hi-Tech Industrial Development Zone, Guangzhou 广州市高新技术产业开发区科学城南云三路 39 号
Factory 生产厂	LEUNG'S COMMUNICATION & ELECTRIC PRODUCTS(GUANGZHOU)LTD 广州梁氏通讯电器有限公司
Factory address 生产厂地址	No.39 Nanyunsan Road, Science Park, Hi-Tech Industrial Development Zone, Guangzhou 广州市高新技术产业开发区科学城南云三路 39 号
Appearance: 样品外观颜色	—
Sample status 样品状态	Good 完好
Package of goods 样品外包装	—
Quantity of sample 样品数量	43pcs
Sample identification 样品标识序号	c1#~c43#
Reference standard 参考标准	MH/T1052-2013 《Tests for lithium batteries transported by air》 MH/T1052-2013 《航空运输锂电池测试规范》
Receiving date 接样日期	2016.06.17
Completing date 完成日期	2016.07.07

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.5, amend.2, 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.5, amend.2 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		See Appendix 6 见 附表 6	Passed 合格	/
	Crush 挤压		/	/	N/A 不适用
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 Li-ion(3,6V) batteries submitted by LEUNG'S COMMUNICATION & ELECTRIC PRODUCTS(GUANGZHOU)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.5 amend.2, 38.3. 由广州梁氏通讯电器有限公司送检的可充电锂离子电池符合联合国《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.5 amend.2, 38.3 的要求。 Seal/公章: Date of issue:/日期: Jul. 12, 2016					
WARM PROMPT: This test report can be used worldwide (including apply for the certification for safe transport of Shanghai Research Institute of Chemical Industry). 温馨提示: 此份报告全球通用 (包含申请上海化工鉴定书)。					

Approver: Liang Hongcheng

Checker: Hu Pingfei

Tester: Gao Puzheng

批准: Liang Hongcheng审核: Hu Pingfei测试: Gao Pu zheng

Photos of samples and markings

样品及标识照片

Battery (82-166537-01 3,6V 3150mAh/11,34Wh(TYP) 3100mAh/11,16Wh(Min))



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 的压力下至少六小时。						
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#	63,293	4,18	63,290	4,11	0,005	98,33	O
C2#	63,340	4,17	63,337	4,12	0,005	98,80	O
C3#	63,358	4,18	63,353	4,11	0,008	98,33	O
C4#	63,079	4,17	63,077	4,11	0,003	98,56	O
C5#	63,194	4,18	63,189	4,12	0,008	98,56	O
C6#	63,355	4,17	63,350	4,12	0,008	98,80	O
C7#	63,340	4,17	63,331	4,12	0,014	98,80	O
C8#	63,298	4,17	63,291	4,12	0,011	98,80	O
C9#	63,295	4,18	63,289	4,11	0,009	98,33	O
C10#	63,344	4,18	63,338	4,12	0,009	98,56	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 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℃). 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#	63,290	4,11	63,277	4,08	0,021	99,27	O
C2#	63,337	4,12	63,331	4,08	0,009	99,03	O
C3#	63,353	4,11	63,347	4,07	0,009	99,03	O
C4#	63,077	4,11	63,058	4,08	0,030	99,27	O
C5#	63,189	4,12	63,179	4,07	0,016	98,79	O
C6#	63,350	4,12	63,340	4,08	0,016	99,03	O
C7#	63,331	4,12	63,322	4,08	0,014	99,03	O
C8#	63,291	4,12	63,289	4,07	0,003	98,79	O
C9#	63,289	4,11	63,280	4,08	0,014	99,27	O
C10#	63,338	4,12	63,331	4,08	0,011	99,03	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#	63,277	4,08	63,274	4,08	0,005	100,00	O
C2#	63,331	4,08	63,329	4,08	0,003	100,00	O
C3#	63,347	4,07	63,347	4,07	0,000	100,00	O
C4#	63,058	4,08	63,055	4,08	0,005	100,00	O
C5#	63,179	4,07	63,175	4,07	0,006	100,00	O
C6#	63,340	4,08	63,340	4,08	0,000	100,00	O
C7#	63,322	4,08	63,321	4,08	0,002	100,00	O
C8#	63,289	4,07	63,285	4,07	0,006	100,00	O
C9#	63,280	4,08	63,280	4,08	0,000	100,00	O
C10#	63,331	4,08	63,328	4,08	0,005	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 4

附表 4

[illegible]

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 temperature stabilized so that its external case temperature reaches $55\pm 2^{\circ}\text{C}$ 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 $55\pm 2^{\circ}\text{C}$. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to $55\pm 2^{\circ}\text{C}$, the cell or battery must be observed for a further six hour for the test to be concluded. 保持试验环境温度稳定在 $55\pm 2^{\circ}\text{C}$，以使电芯或电池样品外表温度达到 $55\pm 2^{\circ}\text{C}$，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 $55\pm 2^{\circ}\text{C}$ 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。		
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 ($^{\circ}\text{C}$)	Test result 测试结果	Remark 备注
C1#	55,6	O	/
C2#	55,3	O	/
C3#	56,2	O	/
C4#	55,8	O	/
C5#	55,5	O	/
C6#	56,1	O	/
C7#	55,7	O	/
C8#	55,8	O	/
C9#	55,6	O	/
C10#	56,2	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	Impact 撞击		
1,1	Test procedure 测试步骤		
	The sample cell or component cell is to be placed on a flat smooth surface. A 15,8 mm ± 0,1mm 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 15,8mm ± 0,1mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact. 样品电芯或组成电芯被放置平坦表面上。一根直径为 15,8 ± 0,1 毫米, 长度至少 6 厘米(或该电芯的最大尺寸, 以较大者为准) 的 316 型不锈钢棒横放在样品的中心。一个重达 9,1 ± 0,1 千克的铁锤从 61 ± 2,5 厘米高处以几乎无摩擦和零拉力的姿态沿垂直轨道或通道跌落至不锈钢棒与样品的交结点上。用以引导跌落的垂直轨道或通道应与水平支撑面成 90°。 被撞击的圆柱形电池的纵轴应与不锈钢棒平面表面平行, 并与横放在样品中心直径为 15,8 毫米弯曲表面的纵轴垂直。每只样品只经受一次撞击。		
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 (°C)	Test result 测试结果	Remark 备注
C11#	99,5	O	/
C12#	89,3	O	/
C13#	79,8	O	/
C14#	75,4	O	/
C15#	84,8	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

Test Items 测试项目	Overcharge 过度充电			
1,1	Test procedure 测试步骤			
	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 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推荐的最大充电电压或者是 22V	The manufacturer's recommended maximum charge voltage is 4,24V. The manufacturer's recommended maximum continuous charge current is 1500mA.The voltage of the test is 8,48V. And the Current is 3000mA. 厂家推荐最大充电电压为 4, 24V，厂家推荐最大充电电流为 1500mA. 测试的电压为 8, 48V，电流为 3000mA。		
	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 如果厂家推荐的充电电压超过 18V，本测试的最小充电电压应该为 1, 2 倍的厂家推荐的最大充电电压	/		
1,2	Samplestatus 样品状态			
	C16#~C19#, at first cycle in fully charged states; C16#~C19#, 在第一个循环完全充电状态；			
	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；			
1,3	Result 测试结果			
Sample No. 样品编号	Voltage Before test (V) 测试前开路电压 (V)	Testresult 测试结果	Remark 备注	
C16#	4,19	O	/	
C17#	4,18	O	/	
C18#	4,18	O	/	
C19#	4,18	O	/	
C20#	4,18	O	/	
C21#	4,19	O	/	
C22#	4,18	O	/	
C23#	4,18	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 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#	3,166	O	C34#	3,185	O
C25#	3,169	O	C35#	3,190	O
C26#	3,182	O	C36#	3,188	O
C27#	3,179	O	C37#	3,169	O
C28#	3,191	O	C38#	3,179	O
C29#	3,180	O	C39#	3,189	O
C30#	3,189	O	C40#	3,190	O
C31#	3,190	O	C41#	3,191	O
C32#	3,191	O	C42#	3,182	O
C33#	3,169	O	C43#	3,179	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

Important

1. 本报告无检验单位检验专用章、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.

2. 未经本试验室书面同意，不得部分地复制本报告。

Nobody is allowed to photocopy or partly photocopy this test report without written permission of Guangzhou MCM Certification and Testing Co., Ltd.

3. 本报告无批准人、审核人及检测人签名无效。

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4. 本报告涂改无效。

The test report is invalid if altered.

5. 对检验报告若有异议，应于收到报告之日起十五天内向检验单位提出。

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

6. 本报告中以逗号代替小数点。

Throughout this report a comma is used as the decimal separator.

7. 本报告仅对来样负责。

The test report is valid for the tested samples only.

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