



Report No.:
报告编号: WK20140717UA501

检 验 报 告

TEST REPORT

NAME OF SAMPLE: Li-ion Battery

产品名称: 锂离子电池

CLIENT: NINGBO Veken Battery Co., LTD

委托单位: 宁波维科电池股份有限公司

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

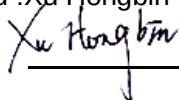


General information 基本资料	
Name of samples 样品名称	Li-ion Battery 锂离子电池
Type/ Model 型号规格	BL233 3,7V 1700mAh 6,29Wh
Trade mark 商标	Lenovo
Commission by 委托单位	NINGBO Veken Battery Co., LTD 宁波维科电池股份有限公司
Commissioner address 委托单位地址	No.5 Gangxi Road, West Zone, Ningbo Free Trade Zone, Ningbo, China 宁波保税区西区港西大道 5 号
Manufacturer 制造商	NINGBO Veken Battery Co., LTD\ 宁波维科电池股份有限公司
Manufacturer address 制造商地址	No.5 Gangxi Road, West Zone, Ningbo Free Trade Zone, Ningbo, China 宁波保税区西区港西大道 5 号
Factory 生产厂	SHENZHEN YONGWEI TECHNOLOGY CO., LTD. 深圳市甬维科技有限公司
Factory address 生产厂地址	A401-410,4th floor, 2nd building, Hisense Science Park Workshop, Ganli Industrial Park of middle ShengGang, LiLang Road BuJi Street LongGang District ShengZheng City. 深圳市龙岗区布吉街道李朗大道甘李工业园深港中海信科技园厂房第 2 栋第 4 层 A401-410
Appearance: 样品外观颜色	Black 黑色
Sample status 样品状态	Good 完好
Package of goods 样品外包装	K=K
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	2014.07.17
Completing date 完成日期	2014.07.30

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, amend1, 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, amend1, 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	/
9	Drop test 跌落测试	联合国《关于危险货物运输的建议书 规章范本》(Rev.17) 特殊规定 188 条款 UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations (17 th) special provisions 188	See Appendix 9 见附表 9	Passed 合格	/
Conclusion/结论: The Li-ion Batteries submitted by NINGBO Veken Battery 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.5 amend1, 38.3. The package was capable of withstanding 1,2m drop test of UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations (17 th) special provisions 188. 由宁波维科电池股份有限公司送检的锂离子电池符合联合国《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 amend1, 38.3 的要求。包装符合联合国《关于危险货物运输的建议书 规章范本》(Rev. 17) 特殊规定 188 条款 1, 2 米跌落测试要求。 Seal/公章:  Date of issue: /日期: Jul. 30, 2014					

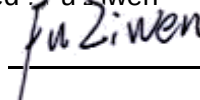
Approved : Xu Hongbin

批准:



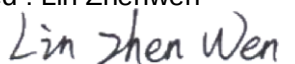
Reviewed : Fu Ziwen

审核:



Tested : Lin Zhenwen

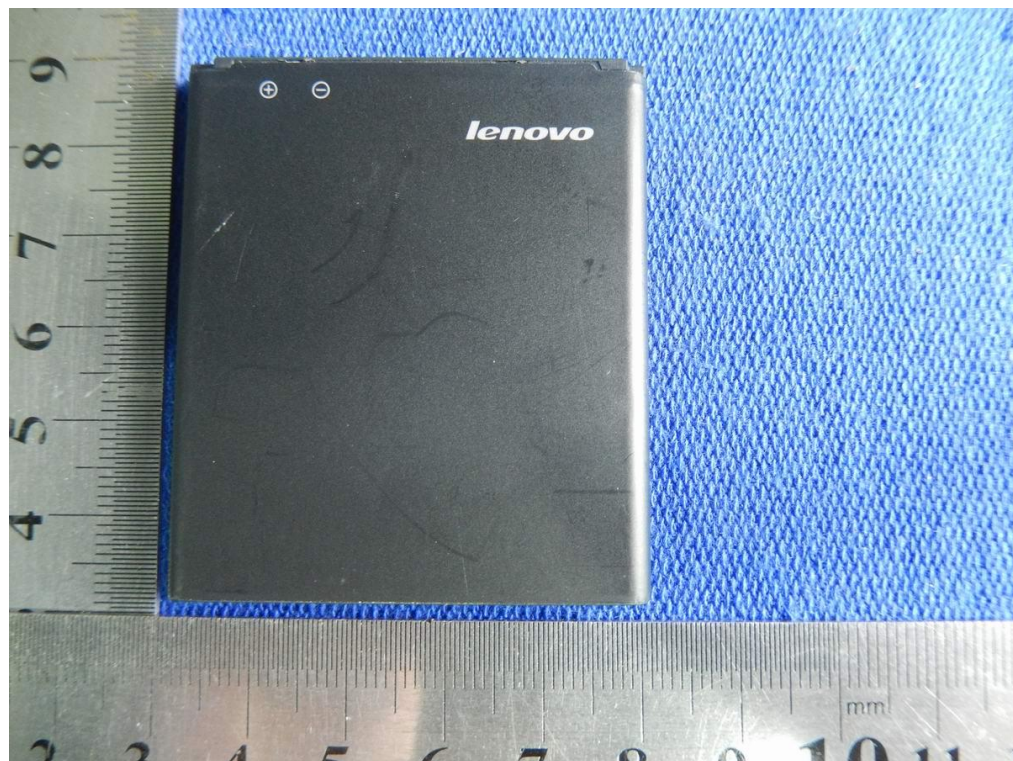
测试:



Photos of samples and markings

样品及标识照片

Battery (BL233 3,7V 1700mAh 6,29Wh)



Packing photos and markings 包装照片及标识

drop test (before test)



after test



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#	33,737	4,19	33,736	4,18	0,003	99,76	O
C2#	33,656	4,18	33,656	4,18	0,000	100,00	O
C3#	33,390	4,17	33,388	4,17	0,006	100,00	O
C4#	33,756	4,17	33,756	4,17	0,000	100,00	O
C5#	33,768	4,18	33,768	4,17	0,000	99,76	O
C6#	33,482	4,17	33,483	4,17	0,000	100,00	O
C7#	33,663	4,19	33,662	4,18	0,003	99,76	O
C8#	33,575	4,17	33,572	4,17	0,009	100,00	O
C9#	33,609	4,17	33,608	4,17	0,003	100,00	O
C10#	33,607	4,19	33,606	4,18	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 2

附表 2

Test Items 测试项目	Thermal test 温度测试						
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#	33,736	4,18	33,736	4,16	0,000	99,52	O
C2#	33,656	4,18	33,654	4,16	0,006	99,52	O
C3#	33,388	4,17	33,388	4,15	0,000	99,52	O
C4#	33,756	4,17	33,752	4,14	0,012	99,28	O
C5#	33,768	4,17	33,762	4,14	0,018	99,28	O
C6#	33,483	4,17	33,480	4,14	0,009	99,28	O
C7#	33,662	4,18	33,660	4,16	0,006	99,52	O
C8#	33,572	4,17	33,568	4,16	0,012	99,76	O
C9#	33,608	4,17	33,606	4,16	0,006	99,76	O
C10#	33,606	4,18	33,603	4,16	0,009	99,52	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

[illegible]

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 or battery shall be subjected to a half-sine shock of peak acceleration of 150gn and pulse duration of 6 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. 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 的半正弦的加速度撞击，脉冲持续 6 毫秒。按三个互相垂直轴向分别对其正负极各碰撞三次，每个电芯或电池碰撞总次数为 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#	33,733	4,16	33,733	4,15	0,000	99,76	O
C2#	33,654	4,15	33,654	4,15	0,000	100,00	O
C3#	33,386	4,15	33,386	4,15	0,000	100,00	O
C4#	33,748	4,14	33,748	4,13	0,000	99,76	O
C5#	33,760	4,14	33,760	4,13	0,000	99,76	O
C6#	33,480	4,14	33,480	4,14	0,000	100,00	O
C7#	33,658	4,15	33,658	4,14	0,000	99,76	O
C8#	33,568	4,16	33,568	4,15	0,000	99,76	O
C9#	33,606	4,16	33,606	4,15	0,000	99,76	O
C10#	33,603	4,16	33,603	4,15	0,000	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 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#	55,2	O	/
C2#	56,2	O	/
C3#	55,6	O	/
C4#	56,3	O	/
C5#	55,3	O	/
C6#	55,8	O	/
C7#	56,3	O	/
C8#	56,2	O	/
C9#	55,2	O	/
C10#	55,7	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 (°C)	Test result 测试结果	Remark 备注
C11#	24,6	O	/
C12#	25,0	O	/
C13#	25,5	O	/
C14#	26,2	O	/
C15#	24,9	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 4,20V. The manufacturer's recommended maximum continuous charge current is 850mA.The voltage of the test is 8,40V. And the Current is 1700mA. 厂家推荐最大充电电压为 4, 20V，厂家推荐最大充电电流为 850mA. 测试的电压为 8, 40V，电流为 1700mA。		
	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	Sample status 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)	Test result 测试结果	Remark 备注	
C16#	4,18	O	/	
C17#	4,18	O	/	
C18#	4,17	O	/	
C19#	4,17	O	/	
C20#	4,17	O	/	
C21#	4,18	O	/	
C22#	4,18	O	/	
C23#	4,17	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#	3,333	O	C34#	3,326	O
C25#	3,308	O	C35#	3,368	O
C26#	3,345	O	C36#	3,322	O
C27#	3,344	O	C37#	3,316	O
C28#	3,352	O	C38#	3,318	O
C29#	3,338	O	C39#	3,316	O
C30#	3,312	O	C40#	3,323	O
C31#	3,362	O	C41#	3,316	O
C32#	3,332	O	C42#	3,366	O
C33#	3,313	O	C43#	3,368	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 9

附表 9

Test Items 测试项目	Drop test 跌落测试		
1,1	Test procedure 测试步骤		
	The package of batteries is dropped from 1,2m in any orientation. The test floor is concrete floor. 电池的包装件以任意方向从 1, 2 米跌落至水泥地面。		
	Each package is capable of withstanding a 1,2m drop test in any orientation without damage to cells or batteries contained therein, without shifting of the contents so as to allow battery to battery(or cell to cell) contact and without release of contents. 每个电池的包装件以任意方向从 1, 2 米跌落，而没有造成包装件内的电池或电芯的损坏，也没有移动包装件内的电池或电芯使其相互接触以及包装件内的电池或电芯漏出。		
1,2	Package information 包装信息		
	Package weight (kg) 包装重量 (kg)	8,00	
	Package size(mm) 包装箱尺寸 (mm)	332×217×205	
	Net weight of batteries or cells per package (kg) 单个包装件内电池或电芯的净重量 (kg)	6,72	
	number of batteries or cells per package (pcs) 包装件内含电池或电芯的数量 (pcs)	200	
1,3	Result 测试结果		
	No battery is damaged or connected by neighbor, the battery should not be released from package. 包装件内的电池或电芯无损坏，无相互接触。包装件内的电池或电芯不能从包装件漏出。	Surface 面跌落	The package is not cracked, the contents are not damaged and not shifted. 包装未破裂，内装物完好。
		Arris 棱跌落	The package is not cracked, the contents are not damaged and not shifted. 包装未破裂，内装物完好。
		Angle 角跌落	The package is not cracked, the contents are not damaged and not shifted. 包装未破裂，内装物完好。

注 意 事 项

Important

1. 本报告无检验单位公章、骑缝章无效;

The test report is invalid without the official stamp 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。

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3. 本报告无批准人、审核人及检测人签名无效。

The test report is invalid without the signatures of Ratifier, Reviewer and Testing engineer.

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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