中国认可
国际互认
检测
TESTING
CNAS L4065

Report No.:
报告编号：WTT20180816U01

检 测 报 告

TEST REPORT

NAME OF SAMPLE: Lithium Iron Phosphate Cell
产品名称：磷酸铁锂电芯

CLIENT: DONGGUAN FBTECH NEW ENERGY CO., LTD
委托单位：东莞市沃泰通新能源有限公司

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
检测专用章

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	Lithium Iron Phosphate Cell 磷酸铁锂电芯
Type/ Model 型号规格	32700 3,2V 6000mAh 19,2Wh
Trade mark 商标	
Commission by 委托单位	DONGGUAN FBTECH NEW ENERGY CO., LTD 东莞市沃泰通新能源有限公司
Commissioner address 委托单位地址	Building C&D, No.18 Zhongkeng Road, Sanzhong Village, Qingxi ,Dongguan, Guangdong, China 东莞市清溪镇三中村中坑路 18 号 C、D 栋
Manufacturer 制造商	DONGGUAN FBTECH NEW ENERGY CO., LTD 东莞市沃泰通新能源有限公司
Manufacturer address 制造商地址	Building C&D, No.18 Zhongkeng Road, Sanzhong Village, Qingxi ,Dongguan, Guangdong, China 东莞市清溪镇三中村中坑路 18 号 C、D 栋
Factory 生产厂	DONGGUAN FBTECH NEW ENERGY CO., LTD 东莞市沃泰通新能源有限公司
Factory address 生产厂地址	Building C&D, No.18 Zhongkeng Road, Sanzhong Village, Qingxi ,Dongguan, Guangdong, China 东莞市清溪镇三中村中坑路 18 号 C、D 栋
Appearance: 样品外观颜色	Blue 蓝色
Sample status 样品状态	Good 完好
Package of goods 样品外包装	—
Quantity of sample 样品数量	35pcs
Sample identification 样品标识序号	c1#～c35#
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	2018.08.16
Completing date 完成日期	2018.08.31

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		See Appendix 6 见附表 6	Passed 合格	/
	Crush 挤压		/	/	N/A 不适用
7	Overcharge 过度充电		/	/	N/A 不适用
8	Forced discharge 强制放电		See Appendix 7 见附表 7	Passed 合格	/

Conclusion/结论：

The Lithium Iron Phosphate Cells submitted by DONGGUAN FBTECH NEW ENERGY 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.

由东莞市沃泰通新能源有限公司送检的磷酸铁锂电芯符合联合国《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。

Seal/检测专用章：

Date of issue:/日期：Sept.3,2018

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）。

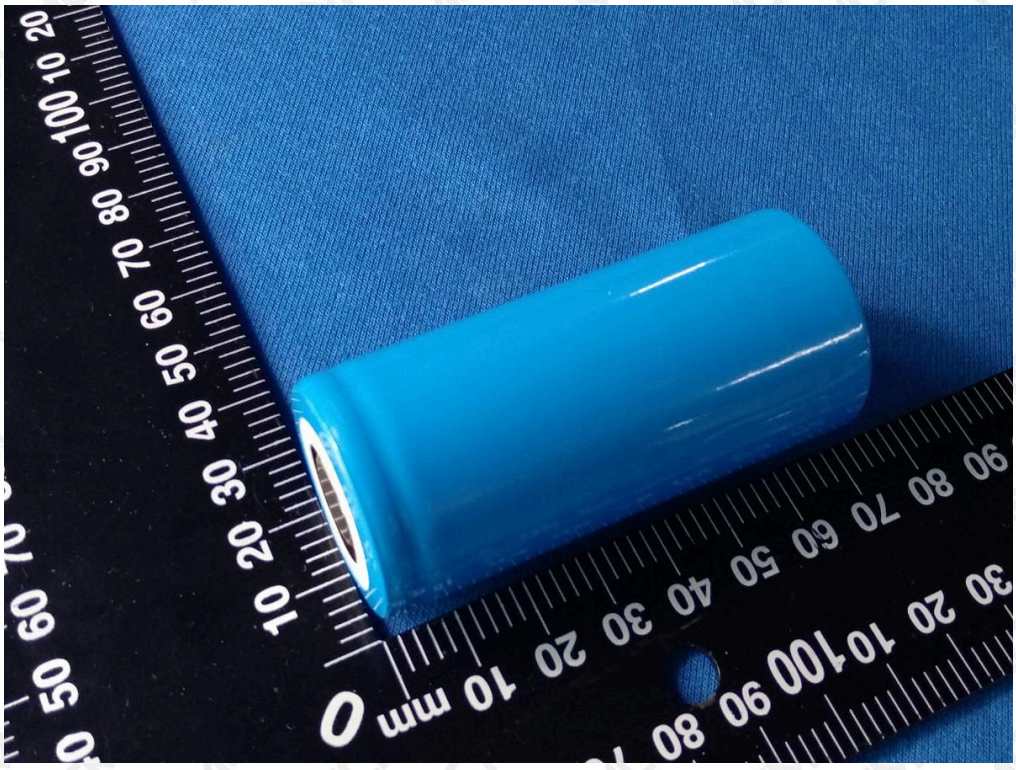
Approver: Xu Hongbin 批准：

Checker: Tang Mingtao 审核：

Tester: Chen Shude 测试：

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

Cell（32700 3,2V 6000mAh 19,2Wh）



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	**Samplestatus 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#	143,776	3,468	143,775	3,448	0,001	99,42	**O**
C2#	142,438	3,468	142,438	3,446	0,000	99,37	**O**
C3#	143,461	3,470	143,460	3,451	0,001	99,45	**O**
C4#	143,969	3,467	143,969	3,446	0,000	99,39	**O**
C5#	142,976	3,466	142,974	3,445	0,001	99,39	**O**
C6#	142,680	3,465	142,680	3,448	0,000	99,51	**O**
C7#	142,124	3,468	142,124	3,446	0,000	99,37	**O**
C8#	143,354	3,465	143,353	3,445	0,001	99,42	**O**
C9#	143,012	3,464	143,012	3,444	0,000	99,42	**O**
C10#	143,146	3,460	143,146	3,441	0,000	99,45	**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	**Samplestatus** **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#	143,775	3,448	143,756	3,346	0,013	97,04	**O**
C2#	142,438	3,446	142,424	3,349	0,010	97,19	**O**
C3#	143,460	3,451	143,443	3,348	0,012	97,02	**O**
C4#	143,969	3,446	143,959	3,344	0,007	97,04	**O**
C5#	142,974	3,445	142,961	3,342	0,009	97,01	**O**
C6#	142,680	3,448	142,668	3,351	0,008	97,19	**O**
C7#	142,124	3,446	142,108	3,348	0,011	97,16	**O**
C8#	143,353	3,445	143,341	3,346	0,008	97,13	**O**
C9#	143,012	3,444	143,001	3,342	0,008	97,04	**O**
C10#	143,146	3,441	143,131	3,342	0,010	97,12	**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	**Samplestatus 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#	143,756	3,346	143,754	3,346	0,001	100,00	**O**
C2#	142,424	3,349	142,424	3,348	0,000	99,97	**O**
C3#	143,443	3,348	143,443	3,346	0,000	99,94	**O**
C4#	143,959	3,344	143,957	3,343	0,001	99,97	**O**
C5#	142,961	3,342	142,961	3,340	0,000	99,94	**O**
C6#	142,668	3,351	142,668	3,349	0,000	99,94	**O**
C7#	142,108	3,348	142,108	3,348	0,000	100,00	**O**
C8#	143,341	3,346	143,341	3,346	0,000	100,00	**O**
C9#	143,001	3,342	143,002	3,342	0,000	100,00	**O**
C10#	143,131	3,342	143,129	3,342	0,001	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

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	**Samplestatus** **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#	143,754	3,346	143,754	3,346	0,000	100,00	**O**
C2#	142,424	3,348	142,424	3,348	0,000	100,00	**O**
C3#	143,443	3,346	143,443	3,346	0,000	100,00	**O**
C4#	143,957	3,343	143,957	3,343	0,000	100,00	**O**
C5#	142,961	3,340	142,961	3,340	0,000	100,00	**O**
C6#	142,668	3,349	142,667	3,349	0,001	100,00	**O**
C7#	142,108	3,348	142,108	3,348	0,000	100,00	**O**
C8#	143,341	3,346	143,341	3,346	0,000	100,00	**O**
C9#	143,002	3,342	143,001	3,341	0,001	99,97	**O**
C10#	143,129	3,342	143,130	3,342	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	**Samplestatus** **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#	108,3	**O**	/
C2#	106,7	**O**	/
C3#	104,1	**O**	/
C4#	105,5	**O**	/
C5#	108,1	**O**	/
C6#	102,7	**O**	/
C7#	106,8	**O**	/
C8#	104,7	**O**	/
C9#	106,2	**O**	/
C10#	102,9	**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；0-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 ofthe bar and sample in a controlled manner using a near rictionless, 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形 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 (℃)	Test result 测试结果	Remark 备注
C11#	24,6	**O**	/
C12#	24,2	**O**	/
C13#	24,3	**O**	/
C14#	24,5	**O**	/
C15#	24,3	**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	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	**Samplestatus** **样品状态**				
	C16#~C25#, at first cycle in fully discharged states; C16#~C25#, 在第一个循环完全放电状态；				
	C26#~C35#, after 50 cycles ending in fully discharged states; C26#~C35#, 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
C16#	2,588	**O**	C26#	2,588	**O**
C17#	2,586	**O**	C27#	2,587	**O**
C18#	2,592	**O**	C28#	2,595	**O**
C19#	2,593	**O**	C29#	2,599	**O**
C20#	2,579	**O**	C30#	2,593	**O**
C21#	2,597	**O**	C31#	2,589	**O**
C22#	2,592	**O**	C32#	2,599	**O**
C23#	2,588	**O**	C33#	2,589	**O**
C24#	2,584	**O**	C34#	2,600	**O**
C25#	2,590	**O**	C35#	2,591	**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.
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。
   The test report is invalid without the signatures of Approver, Checker and Tester.
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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