





中国认可 国际互认 检测 TESTING CNAS L5473

UN38.3

Report No.:CESUN210714010

检测报告

TEST REPORT

Name of Sampl	e: lithium iron phosphate cell
产品名称 : _	磷酸铁锂电芯
Model Specifica	tion:
产品型号:	IFR 32650
Client: Zhejia	ing Jingnuo Photoelectric Technology Co.,Ltd
委托单位 :	浙江晶诺光电科技有限公司
Classification of	Test: Commission Test
检测类别:	委托检测

先进储能材料国家工程研究中心有限责任公司检测中心
Test Center of National Engineering Research Center of Advanced Energy Storage Materials Co., Ltd.

说明

Marking

1. 报告无"报告专用章"无效。

The test report is invalid without "Special seal for report".

2. 报告无批准人、审核人和主检人签名无效。

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

3. 报告涂改无效。

The test report is invalid if altered.

4. 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 Test Center within15 days.

5. 报告仅对送检样品负责。

The test report is Valid for the tested samples only.

- 6. 本报告检测结论中"N/A"表示"不适用", "P"表示"符合标准要求", "F"表示"不符合标准要求"。 As for test result, "N/A" means is "not applicable", "P" means "pass", "F" means "fail".
- 7. 未经实验室书面批准,不得部分复制本报告书。

The partial replica of this report is prohibited without the written approval of CES.

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TEST REPORT

Name of sample 样品名称	lithium iron phosphate cell 磷酸铁锂电芯							
Model /Type 型号规格	IFR 3265 (3.2V 550	0 00mAh 17.6Wh)	Size 样品尺寸	32.3mm×65.2mm (D×H)				
Appearance 样品外观	Cylindrica 圆柱形,		Trade mark 商标					
Quantity 样品数量	40 cells 40 个电芯		Mass 样品质量	约/Approx.: 135g				
Receiving Date 接样日期	2021-07-	14	Testing Date 测试日期	2021-07-14~2021-07-27				
Client	Name 名称	Zhejiang Jingnuo Ph 浙江晶诺光电科技有		nology Co.,Ltd.				
委托单位	Address 地址	Avenue, Taozhu Stre	Building 49, China Energy Conservation Industrial Park, 78 Zhancheng Avenue, Taozhu Street, Zhuji City, Zhejiang Province, China 浙江省诸暨市陶朱街道展诚大道 78 号中节能产业园 49 栋					
	Name 名称	Yingshang northern 颖上北方动力新能源	power New Energy Co., Ltd. 有限公司					
Manufacturer	Address 地址	The northern power Li-ion Battery industrial park, Yingshang, Anhui province. 安徽省阜阳市颖上县工业园区						
生产单位	Tel. 电话	+86-558-8528529	E-mail 邮箱	262855840@qq.com				
	Website 网址							
Tested standard 测试标准	(ST/SG/A	8.3 of the Seventh Re .C.10/11/Rev.7/Sectio 标准手册》第七修订版	n 38.3)	the "Manual of Test and Criteria"				
Test conclusion: 检测结论	Criteria "	ST/SG/AC.10/11/Rev	.7/Section 38.3	ST/SG/AC.10/11/Rev.7/Section 38.3				
Issue date 签发日期	2021-07-2	28		英 报告专用章 应				
Tested by 主检	邻华	了 Reviewed by 审核	到其	Approved by 批准				
陈其平 Cherry Ch 廖宇平 Richie Liad			chnical Manager puty Centre Direc	ctor				



TEST REPORT

Description and illustration of the sample/样品说明及描述:

The sample is lithium ion cell, and without protective devices, are not subject to the requirements of T7 test. The sample's status is good /样品为锂离子电芯,无保护装置,无须做 T7 测试。样品状况良好。

则试项目及结论/ Test items and conclu		Vardiet
Test item	Sample No.	Verdict
测试项目	样品编号	判定
T.1 Altitude simulation 高度模拟	C1#~C5#, C6#~C10#	Р
T.2 Thermal test 温度试验	C1#~C5#, C6#~C10#	Р
T.3 Vibration 振动	C1#~C5#, C6#~C10#	Р
T.4 Shock 加速度冲击	C1#~C5#, C6#~C10#	Р
T.5 External Short Circuit 外部短路	C1#~C5#, C6#~C10#	Р
T.6 Impact /Crush 撞击/挤压	C11#~C15#, C16#~C20#	Р
T.7 Overcharge 过充电		N/A
T.8 Forced discharge 强制放电	C21# ~ C30#, C31# ~C40#	Р
Sample pretreatment/样品预处理:	<u>'</u>	1
C1#~C5#:	Cells at first cycle, in fully charged state.	
	第1个充放电周期完全充电状态的电芯。	
C6# ~C10#:	Cells after 25th cycle, in fully charged state.	
	第25个充放电周期后完全充电状态的电芯。	
C11# ~ C15#:	Cells at first cycle at 50% of the design rated	d capacity.
	第 1 个	%的由芯

第 1 个充放电周期充电到设计额定容量的 50%的电芯。 C16# ~ C20#:.... Cells after 25th cycle at 50% of the design rated capacity.

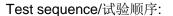
第25个充放电周期后充电到设计额定容量的50%的电芯。

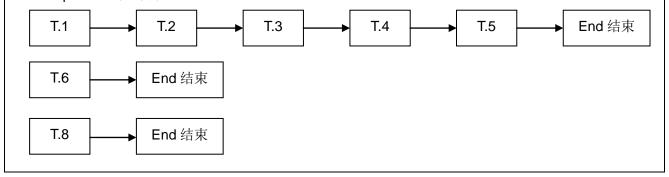
C21# ~ C30#:.... Cells at first cycle, in fully discharged state.

第1个充放电周期完全放电状态的电芯。

C31# ~C40#:.... Cells after 25th cycles, ending in fully discharged state.

第25个充放电周期完全放电状态的电芯。

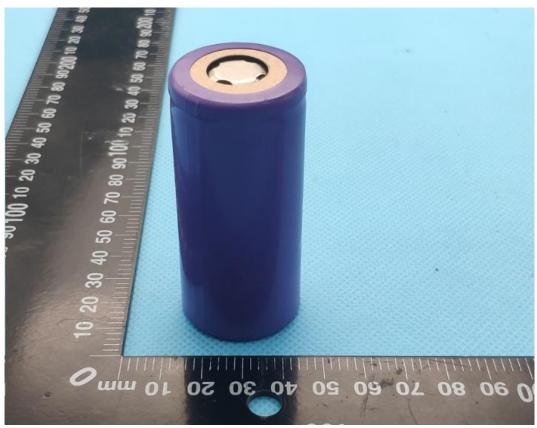






Photos of Samples and Labels/样品照片及标识







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	ST/SG/AC.10/11/Rev.7/Section 3	38.3							
Clause	Requirements	Result	Verdict						
章节	标准要求	测试结果	判定						
38.3.4	Procedure/测试步骤								
	Test 1: Altitude simulation/测试 1: 高度模拟								
38.3.4.1	Test cells and batteries shall be stored at a pressure of least six hour at ambient temperature (20±5℃)/ 将电池5℃,压力为不大于 11.6kpa 的环境中贮存不少于 6 个小	也和电池组在温度为 20 ±							
	Requirement/标准要求: 1. Cells and batteries Mass loss limit: ≤0.1% /样品质量损失≤0.1%。 2. Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states/样品试验后开路电压应不低于试验前开路电压的90%,此要求不适用于完全放完电的电池和电池组。 3. No leakage, no venting, no disassembly, no rupture and no fire /样品(电池)应无渗漏、无排气、无解体、无破裂table 1/测试数据见表1								
38.3.4.2	Test 2: Thermal test/测试 2: 温度试验 Test cells and batteries are to be stored for/电池和电池 1.one temperature cycle: 72±2℃(6h) —-40±2℃(6h) / (6h)—-40±2℃(6h)。 2. The maximum time interval between test temperature 温度转换最大间隔时间为30min。 3. This procedure is to be repeated 10 times/重复10次循4.after which all test cells and batteries are to be stored temperature (20±5℃)/循环结束后,电池和电池组在20时。 For large cells and batteries the duration of exposure to extremes should be at least 12 hours/对于大型电池和电度的时间至少为12小时。 Requirement/标准要求: 1. Cells and batteries Mass loss limit: ≤0.1% /样品质量损失≤0.1%。 2. Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states/样品试验后开路电压应不低于试验前开路电压的90%,此要求不适用于完全放完电的电池和电池组。	一次温度循环为72±2℃ e extremes is 30 minutes/ f环。 I for 24 hours at ambient 0±5℃的条件下搁置24小 o the test temperature	P						
	3. No leakage, no venting, no disassembly, no rupture and no fire /样品(电池)应无渗漏、无排气、无解体、无破裂以及无着火现象的发生。	The test data see table1 /测试数据见表1							



	ST/SG/AC.10/11/Rev.7/Section 3	38.3	
Clause	Requirements	Result	Verdict
章节	标准要求	测试结果	判定
38.3.4.3	Test 3: Vibration/测试 3: 振动 1. Cells and batteries are firmly secured to the platform /电池和电池组率固地安装在振动台(的台面)上。 2. The vibration :a sinusoidal waveform with a logarithm and 200Hz and back to 7Hz traversed in 15 minutes/振增加至200Hz,然后再回到7Hz为一个循环,时间跨度光 3. The logarithmic frequency sweep is as follows/对数柱 (1)For cells and small batteries: from 7 Hz a peak maintained until 18 Hz is reached, The amplitude is the (1.6 mm total excursion) and the frequency increased to 8gn occurs (approximately 50Hz), A peak acceleration maintained until the frequency is increased to 200Hz/疾 赫兹开始保持1gn的最大加速度直到频率为18赫兹,然后偏移1. 6毫米)并增加频率直到最大加速度达到8gn(频:加速度保持在8gn直到频率增加到200赫兹。 (2) For large batteries: from 7Hz to a peak acceler maintained until 18Hz is reached. The amplitude is the (1.6 mm total excursion) and the frequency increased to 200Hz/疾 开始保持1gn的最大加速度直到频率为18赫兹,然后将排移1.6毫米)并增加频率直到最大加速度达到2gn(频率速度保持在2gn直到频率增加到200赫兹。 4.This cycle repeated 12 times for a total of 3 hours for perpendicular mounting position of the cell /振动的其中品极性,对每个电池从三个互相垂直的方向上循环12 次小时。 Requirement/标准要求: 1. Cells and batteries Mass loss limit: ≤0.1% /样品质量损失≤0.1%。 2. Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states/样品试验后开路电压应不低于试验前开路电压的90%,此要求不适用于完全放完电的电池和电池组。 3. No leakage, no venting, no disassembly, no rupture and no fire /样品(电池)应无渗漏、无排气、无解体、无破裂以及无着火现象的发生。	of the vibration machine nic sweep between 7Hz 动以正弦波形式,以7Hz 对15分钟。 加频为: acceleration of 1gn is n maintained at 0.8 mm antil a peak acceleration on of 8gn is then 于电池和小型电池:从7 将振幅保持在0.8毫米(总率约为50赫兹),将最大 ration of 1gn is n maintained at 0.8 mm antil a peak acceleration on of 2gn is then 于大型电池组:从7赫兹最幅保持在0.8毫米(总偏约为25赫兹),将最大加 each of three mutually 一个方向必须是垂直于样	判定 P



ST/SG/AC.10/11/Rev.7/Section 38.3									
Clause	Requirements	Result	Verdict						
章节	标准要求	测试结果	判定						
	Test 4: Shock/测试 4: 加速度冲击								
	1.Test cells and batteries shall be secured to the testing	g machine/以稳固的托架							
	固定住每个电池和电池组样品的全部配件表面。								
	2. Each cell shall be subjected to a half-sine shock of peak acceleration of								
	150gn and pulse duration of 6 milliseconds. Alternative	•							
	subjected to a half-sine shock of peak acceleration of 56 11 milliseconds./小型电池须经受峰值为150gn和脉冲持	•							
	击,大型电池须经受最大加速度50gn和脉冲持续时间11								
	3. Small batteries shall be subjected to a half-sine shoc								
	150gn (or Acceleration(g _n) = $\sqrt{\frac{100850}{mass}}$, which is small	ller)and pulse duration of							
	6 milliseconds. Large batteries shall be subjected to a h	nalf-sine shock of peak							
	acceleration of 50gn (or Acceleration(g _n) = $\sqrt{\frac{30000}{mass}}$,which is smaller)and								
	pulse duration of 11 milliseconds./小型电池须经受峰值为150gn(或与								
	$\sqrt{\left(\frac{100850}{mass}\right)}$ 中的较小值)和脉冲持续6毫秒的半正弦波	冲击,大型电池组须经受							
38.3.4.4	最大加速度 $50gn$ (或与 $\sqrt{\left(\frac{30000}{mass}\right)}$ 中较小值)和脉冲持	续时间11毫秒的半正弦波	Р						
	冲击。								
	3 .Each cell or battery shall be subjected to three shock								
	followed by three shocks in the negative direction of thr								
	perpendicular mounting positions of the cell or battery f								
	个电池或电池组须在三个互相垂直的电池安装方位的正定在反方向经受三次冲击,总共经受 18 次冲击。	刀門空文二次件击,接有							
	Requirement/标准要求:	The samples							
	1. Cells and batteries Mass loss limit: ≤0.1% /样品质	C1#~C10# :							
	量损失≤0.1%。	Acceleration=150g _n							
	2. Open circuit voltage not less than 90%, The	No leakage, no venting,							
	requirement relating to voltage is not applicable to test	no disassembly, no							
	cells and batteries at full discharged states/样品试验	rupture and no fire/样品							
	后开路电压应不低于试验前开路电压的90%,此要求不适用于完全放完电的电池和电池组。	C1#~C10#: 峰值加速度-150g							
	应用于元至成元电的电池和电池组。 3. No leakage, no venting, no disassembly, no rupture	峰值加速度=150 g n 无渗漏、无排气、无解							
	and no fire /样品(电池)应无渗漏、无排气、无解体、	体、无破裂以及无着火							
	无破裂以及无着火现象的发生。	现象。The test data see							
		table1 /测试数据见表1							



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	ST/SG/AC.10/11/Rev.7/Section 3	38.3								
Clause	Requirements Result									
章节	标准要求	测试结果	判定							
享节 38.3.4.5	Test 5: External Short Circuit/测试 5:外部短路 1.The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 57±4℃/保持试验环境温度稳定在57±4℃,以使电池或电池样品外表温度稳定达到57±4℃。 2. the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0,1 ohm at 57±4℃, This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57±4℃, 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/将电池或电池正负极用小于0.1Ω的总电阻回路进行短路,电池或电池的外表温度恢复到57±4℃之后保持短路状态1小时以上,对于大型电池组其外壳温度下降至最大温升的一半即可。 3. the cell or battery must be observed for a further six hour for the test to be concluded/对电池或电池必须进一步观察 6 个小时才能下结论。 Requirements/标准要求: During the test and within six hours after test ,the cells or batteries/在测试过程中以及之后6个小时内,电池或电池组样品: 1. External temperature not exceed 170℃/外表温度不超过170℃。 2. No disassembly, no rupture and no fire/无解体、无被裂以及无着火现象 The test data see									
	破裂和无着火现象发生。 Test 6: Impact / Crush / 测试 6: 撞击/挤压	table1 /测试数据见表 1	Р							
38.3.4.6	Impact (applicable to cylindrical cells not less than 18mm用于直径不小于18毫米的圆柱形电池) 1. This test sample cell or component cell is to be place surface/将试验样品用的电池或组件电池放在一个平坦光2. A 15.8±0.1mm diameter, at least 6 cm long, or the locell, whichever is greater, type 316 stainless bar is to be center of the sample, A 9.1kg mass is to be dropped froat the intersection of the bar and sample in a controlled frictionless, vertical sliding track or channel with minimal mass. The vertical track or channel used to guide the factoriented 90 degrees from the horizontal supporting surfe 基础最长端的长度,取二者之长着。将一质量为9.1千克2.5厘米的高度落向钢棒与试样的交叉处,使用一个几乎没阻力最小的垂直轨道或管道加以控制。垂直轨道或管道加以控制。垂直轨道或管道加以控制。垂直轨道或管道加以控制。垂直轨道或管道加以控制。垂直轨道或管道加以控制。垂直轨道或管道加以控制。垂直轨道或管道加以控制。	ed on a flat smooth 清別的平面上。 ngest dimension of the e placed across the om a height of 61±2.5cm manner using a near al drag on the falling alling mass shall be face /将一根316型不锈钢,长度至少为6厘米,或生0.1千克的重锤从61±2有摩擦的、对落体重锤用于引导落锤沿与水平支	P							



	ST/SG/AC.10/11/Rev.7/Section	38.3					
Clause	Requirements	Result	Verdict				
章节	Requirements						
	diameter curved surface lying across the centre of the is to be subjected to only a single impact/接受撞击的设平行并与横放在试样中心的直径15.8±0.1毫米弯曲表面	test sample. Each sample 《样,纵轴应与平坦的表面					
	 Cells external temperature not exceed 170℃/电池的最高表面温度应不超过170℃。 No disassembly, no rupture and no fire within six hours of this test./试验结束后6 个小时之内,电池应无解体和无着火现象发生。 	C11#~C20#: no disassembly and no fire/样品C11#~C20#: 无解体、无着火现象The test data see table2/测试数据见表2	Р				
38.3.4.6	than 18mm in diameter)/挤压(适用于棱柱形、袋装、18毫米的圆柱形电池) 1. A cell or component cell is to be crushed between to crushing is to be gradual with a speed of approximatel of contact. The crushing is to be continued until the first below is reached/将电池或元件电池放在两个平面之间在第一个接触点上的速度大约为1.5厘米/秒。挤压持续情况之一: (a) The applied force reaches 13kN ± 0.78kN /施加的分(b) The voltage of the cell drops by at least 100mV/电影(c) The cell is deformed by 50% or more of its original 厚度的50%以上。 2. A prismatic or pouch cell shall be crushed by applying side. A button/coin cell shall be crushed by applying the 枝柱形或袋装电池应从最宽的一面施压。纽扣/硬币形电圆柱形电池应从与纵轴垂直的方向施压。	wo flat surfaces. The y 1.5cm/s at the first point at of the three options 目挤压,挤压力度逐渐加大,读进行,直到出现以下三种力达到13千牛±0.78千牛也的电压下降至少100毫伏thickness/电池变形达原始的g the force to the widest er force on its flat surfaces/	N/A				
38.3.4.7	Test 7: Overcharge/测试 7: 过充电 1. The charge current shall be twice the manumaximum continuous charge current/以2倍制造厂推荐品充电 2.The minimum voltage of the test shall be as follows/	存的最大持续充电电流对样	N/A				



	ST/SG/AC.10/11/Rev.7/Section 3	38.3				
Clause	Requirements	Result	Verdict			
章节	标准要求	测试结果	判定			
38.3.4.7	a) 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 battery 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是厂家标定最大充电电压的两倍或者是22V之中的较小者。b) When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be1.2 times the 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是厂家标定最大充电电压的1.2倍。C)Tests are to be conducted at ambient temperature 20±5℃, The duration of the test shall be 24 hours/20 ±5℃的环境温度下,试验持续24小时。					
	Requirements/标准要求: No disassembly and no fire within seven days of this test/试验样品在试验中和试验后7天内,应无解体和无着火现象发生。					
	Test 8: Forced discharge/测试 8: 强制放电					
38.3.4.8	Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12 V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer/20±5℃的环境温度下,将单个电池连接在12V 的直流电源上进行强制放电,此直流电源提供给每个电池初始电流为制造厂指定的最大放电电流。 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					
	初始电流(安培)。 Requirements/标准要求: No disassembly and no fire within seven days of this test/试验样品在试验中和试验后7天内,应无解体和无着火现象发生。 **The samples C21#~C40#: no disassembly and no fire /编号为C21#~C40#无解体、无着火现象 The test data see table3 /测试数据见表3					



Table1: T1~T5 / 表1: 试验1~试验5											
项		C1#	C2#	C3#	C4#	C5#	C6#	C7#	C8#	C9#	C10#
OCV pric 试验前		3.403	3.398	3.425	3.416	3.408	3.416	3.423	3.406	3.396	3.394
Mass prid		130.45	132.56	131.51	135.02	134.52	133.00	132.15	131.65	133.85	135.11
试验前原	质量(g)	6	1	2	4	1	5	6	4	4	5
Test 1: Altitude Simulation	Mass loss 质量损失 (%)	0.002	0.002	0.004	0.003	0.004	0.004	0.002	0.002	0.001	0.001
测试1:高度模拟	Change ratio 电压比 (%)	100	100	100	99.971	100	100	99.942	99.971	100	99.941
Test 2: Thermal test	Mass loss 质量损失 (%)	0.019	0.016	0.014	0.016	0.012	0.019	0.013	0.016	0.018	0.012
测试 2: 温度试验	Change ratio 电压比 (%)	98.237	98.411	98.307	98.594	98.445	98.683	98.802	98.443	98.704	98.290
Test 3: Vibration	Mass loss 质量损失 (%)	0.000	0.000	0.001	0.000	0.001	0.001	0.001	0.002	0.001	0.000
测试 3: 振动	Change ratio 电压比 (%)	100	100	99.941	99.970	99.940	100	99.970	99.970	99.970	99.970
Test 4: Shock	Mass loss 质量损失 (%)	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001
测试 4: 加速度冲击	Change ratio 电压比 (%)	100	100	100	100	99.970	100	99.970	99.970	99.970	99.970
Test 5:External Short Circuit 测试 5 外 接短路	Temp, (℃) 温度 (℃)	88.6	109.4	92.6	93.6	103.2	115.4	106.4	109.4	116.4	103.8



	Table2: ☑ Impact 撞击/ □Crush 挤压												
Test 6: Impact	Sample No, 样品号	C11#	C12#	C13#	C14#	C15#	C16#	C17#	C18#	C19#	C20#		
	OCV prior to test 试验前电压(V)	3.300	3.300	3.301	3.302	3.299	3.299	3.298	3.299	3.300	3.301		
	Temp, (℃) 温度 (℃)	24.5	24.5	24.1	24.2	24.6	24.3	24.5	24.5	24.4	24.3		

	Table 3: Forced discharge / 表 3: 强制放电												
Test 8:	Sample No, 样品号	C21#	C22#	C23#	C24#	C25#	C26#	C27#	C28#	C29#	C30#		
	OCV prior to test 试验前电压(V)	2.693	2.636	2.656	2.727	2.748	2.671	2.627	2.684	2.616	2.742		
discharge 测试8: 强 制放电	Sample No, 样品号	C31#	C32#	C33#	C34#	C35#	C36#	C37#	C38#	C39#	C40#		
刺放电	OCV prior to test 试验前电压(V)	2.628	2.681	2.645	2.693	2.690	2.589	2.752	2.760	2.719	2.621		

⁻⁻ End of Report --