





中国认可 国际互认 检测 TESTING CNAS L5473

UN38.3

Report No.: CESUN221205011-M1

# 检测报告

### **TEST REPORT**

Name of Sam	ple: Rechargeable Li-ion Cell
产品名称 :	锂离子充电电池
Model Specifi	cation:
产品型号:	IFR18650E1500
Client:	BST POWER (SHENZHEN) LIMITED
委托单位 :	深圳市电科电源股份有限公司
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.

检测法人单位: 先进储能材料国家工程研究中心有限责任公司

Legal Entity: National Engineering Research Center of Advanced Energy Storage Materials Co., Ltd.

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### **TEST REPORT**

		1201	I VLI OI						
Name of sample 样品名称	Rechargeable Li-ion Cell 锂离子充电电池								
Model /Type 型号规格	IFR18650 (3.2V 150	DE1500 DomAh 4.8Wh)	Size 样品尺寸	65.0mm×18.3mm (H×D)					
Appearance 样品外观	Approxim 绿色近圆	nate Green Cylinder 柱体	Trade mark 商标						
Quantity 样品数量	40 cells 40 个电芯	ŝ	Mass 样品质量	约/Approx.: 41g					
Receiving Date 接样日期	2022-12-	05	Testing Date 测试日期	2022-12-05~2022-12-19					
	Name 名称	BST POWER (SHE 深圳市电科电源股份		ED					
Client 委托单位	Address 地址	Building C, D&3F Of Building A, No.37 Xinlong Road, Dakang Community, Henggang Street, Longgang District, Shenzhen City, Guangdong Province, P. R. China 深圳市龙岗区横岗街道大康社区新龙路 37 号 A 栋 3 楼 C、D 栋							
	Name 名称		Hengyang LC Energy Storage Limited 衡阳力赛储能有限公司						
Manufacturer	Address 地址	No. 2 Huagong Road, Songmu Economic Development Zone, Shigu District, Hengyang City, Hunan Province, P. R. China 湖南省衡阳市石鼓区松木经济开发区化工路 2 号							
生产单位	Tel. 电话	0734-8829000	E-mail 邮箱	csrz@bstbattery.com					
	Website 网址								
Tested standard 测试标准	Test and	8.3 of the Seventh Ro Criteria" (ST/SG/AC. 式验和标准手册》第一	10/11/Rev.7/Sec						
Test conclusion 检测结论	Edition of the ONLIED NATIONS Manual of Test and Official								
Issue date 签发日期	2023-12-0	023-12-05							
Tested by 主检	邻华	了 Reviewed by 审核	对其主	Approved by 批准					
1000-001-00-00-00-00-00-00-00-00-00-00-0	陈其平 Cherry Chen:								
				The automotive of the control of the					



### **TEST REPORT**

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

#### 报告说明:

本报告为报告 CESUN221205011 修改后报告,原报告的签发日期为 2022-12-26。 修改信息如下: 修改产品名称,由"锂离子电芯"改成"锂离子充电电池"。

自本报告签发之日起,原报告 CESUN221205011 作废。

#### Report Summary:

The original Test Report No. CESUN221205011, issued on 2022-12-26 was corrected on 2023-12-05. Due to: Change Name of Sample, from "Li-ion Cell" to "Rechargeable Li-ion Cell". This report supersedes the original report after issuance.

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。

测试项目及结论/ Test items and conclusion。

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:

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 capacity.

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。

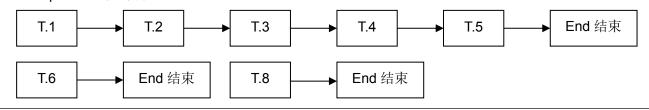
C21~C30:..... Cells at first cycle, in fully discharged state.

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。

#### Test sequence/试验顺序:

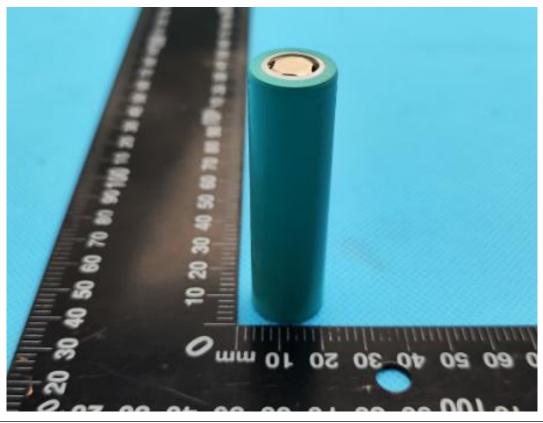




#### Photos of Samples and Labels/样品照片及标识

Cell /电芯(IFR18650E1500 3.2V 1500mAh 4.8Wh)







Report No.: CESUN221205011-M1 Page 4 of 11

	ST/SG/AC.10/11/Rev.7/Section 3	88.3							
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 T.1: Altitude simulation/测试 T.1: 高度模拟								
	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℃)/将电池和电池组在温度为 20±5℃,压力为不大于 11.6kpa 的环境中贮存不少于 6 个小时。								
	Requirement/标准要求:	The samples C1~C10:							
	1. Cells and batteries Mass loss limit: ≤0.2% /样品质	no leakage, no venting,							
	量损失≤0.2%。	no disassembly, no							
38.3.4.1	2. Open circuit voltage not less than 90%, The	rupture and no fire/样品	Р						
	requirement relating to voltage is not applicable to test	C1~C10: 无渗漏、无排							
	cells and batteries at full discharged states/样品试验	气、无解体、无破裂以							
	后开路电压应不低于试验前开路电压的90%,此要求不	及无着火现象							
	适用于完全放完电的电池和电池组。	The test data see							
	3. No leakage, no venting, no disassembly, no rupture	table1 /测试数据见表1							
	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。								
	Test T.2: Thermal test/测试 T.2: 温度试验								
	Test cells and batteries are to be stored for/电池和电池组存储条件如下:								
	1.one temperature cycle: 72±2℃(6h) —40±2℃(6h) /一次温度循环为72±2℃								
	(6h)—-40±2℃(6h)。								
	2.The maximum time interval between test temperature extremes is 30 minutes/ 温度转换最大间隔时间为30min。								
	3.This procedure is to be repeated 10 times/重复10次循环。								
	4.after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20±5℃)/循环结束后,电池和电池组在20±5℃的条件下搁置24小								
	时。								
38.3.4.2	For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours/对于大型电池和电池组,暴露于极端试验温度的时间至少为12小时。								
	Requirement/标准要求:	The samples C1~C10:							
	1. Cells and batteries Mass loss limit: ≤0.2% /样品质	no leakage, no venting,							
	量损失≤0.2%。	no disassembly, no							
	2. Open circuit voltage not less than 90%, The	rupture and no fire/样品							
	requirement relating to voltage is not applicable to test	C1~C10:无渗漏、无排							
	cells and batteries at full discharged states/样品试验	气、无解体、无破裂以							
	后开路电压应不低于试验前开路电压的 <b>90</b> %,此要求不	及无着火现象							
	适用于完全放完电的电池和电池组。	The test data see							
	3. No leakage, no venting, no disassembly, no rupture	table1 /测试数据见表1							
	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。								



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					
38.3.4.3 38.3.4.3	Test T.3: Vibration/测试 T.3: 振动  1. Cells and batteries are firmly secured to the platform /电池和电池组牢固地安装在振动台(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,时间跨度失3.The logarithmic frequency sweep is as follows/对数扫(1)For cells and small batteries: from 7 Hz a peak a maintained until 18 Hz is reached, The amplitude is the (1.6 mm total excursion) and the frequency increased u of 8gn occurs (approximately 50Hz), A peak acceleration maintained until the frequency is increased to 200Hz/对赫兹开始保持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 u of 2gn occurs (approximately 25Hz). A peak acceleration maintained until the frequency is increased to 200Hz/对开始保持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(频率线速度保持在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: ≤0.2% /样品质量损失≤0.2%。 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。 频为: acceleration of 1gn is n maintained at 0.8 mm intil 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 ation of 1gn is n maintained at 0.8 mm intil a peak acceleration on of 2gn is then 于大型电池组:从7赫兹。前时间,1十十十二十十十十二十十十十二十十十十二十十十十十十十十十十十十十十十十十十	P					





Report No.: CESUN221205011-M1 Page 7 of 11

	ST/SG/AC.10/11/Rev.7/Section 3	88.3						
Clause	Requirements	Result	Verdict					
章节	标准要求	测试结果	判定					
	Test T.5: External Short Circuit/测试 T.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 $^{\circ}$ C, This							
	continued for at least one hour after the cell or battery e	·						
	has returned to $57\pm4^{\circ}\mathrm{C}$ , or in the case of the large bath	<u>.</u>						
	half of the maximum temperature increase observed du	· ·						
	below that value/将电池或电池正负极用小于0.1Ω的总电							
38.3.4.5	电池的外表温度恢复到57±4℃之后保持短路状态1小时 外壳温度下降至最大温升的一半即可。	以上,对于人型电池组具	Р					
	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 <sup>-</sup>	下结论。						
	Requirements/标准要求:	The samples C1~C10:						
	During the test and within six hours after test ,the cells	no disassembly, no						
	or batteries/在测试过程中以及之后6个小时内,电池或	rupture and no fire/样品						
	电池组样品:	C1~C10: 无解体、无破						
	1. External temperature not exceed 170℃/外表温度	裂以及无着火现象						
	不超过170℃。	The test data see table1 /测试数据见表 1						
	2. No disassembly, no rupture and no fire/无解体、无破裂和无着火现象发生。	table I 7测试数据光衣 I						
	Test T.6: Impact / Crush / 测试 T. 6: 撞击/挤压		Р					
	Impact (applicable to cylindrical cells not less than 18mm in diameter) /撞击(适用于直径不小于18毫米的圆柱形电池)							
	This test sample cell or component cell is to be place	ed on a flat smooth						
	surface/将试验样品用的电池或组件电池放在一个平坦光	滑的平面上。						
	2. A 15.8±0.1mm diameter, at least 6 cm long, or the lo	ngest dimension of the						
	cell, whichever is greater, type 316 stainless bar is to b	•						
	center of the sample, A 9.1kg mass is to be dropped from	<u>-</u>						
38.3.4.6	at the intersection of the bar and sample in a controlled	J	Р					
	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 /将一根316型不锈钢棒横过电池中部放置,钢棒的直径为15.8毫米±0.1毫米,长度至少为6厘米,或							
	电池最长端的长度,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							
	撑表明呈90度落下。							
	3. The test sample is to be impacted with its longitudina	I axis parallel to the flat						



	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					
	surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact/接受撞击的试样,纵轴应与平坦的表面平行并与横放在试样中心的直径15.8±0.1毫米弯曲表面的纵轴垂直。每一个试样只经受一次撞击。							
	Requirements/标准要求:  1. Cells external temperature not exceed 170℃/电池的最高表面温度应不超过170℃。  2. 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。	The samples 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	Crush (applicable to prismatic, pouch, coin/button cell 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。挤压持约情况之一:  (a) The applied force reaches 13kN ± 0.78kN /施加的/(b) The voltage of the cell drops by at least 100mV/电池(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 棱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 of the three options 以挤压,挤压力度逐渐加大,连进行,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/电池变形达原始如g the force to the widest of force on its flat surfaces/	N/A					
38.3.4.7	From Fig. 1. The charge current shall be twice the manufacturer's recommended maximum continuous charge current/以2倍制造厂推荐的最大持续充电电流对样品充电  2. The minimum voltage of the test shall be as follows/本测试最小电压为:							



	ST/SG/AC.10/11/Rev.7/Section 3	88.3				
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。		N/A			
	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 T.8: Forced discharge/测试 T.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 by the initial test current (in ampere)/指定的放电电流通过串联在测试电池上的合适大小和功率的负载来获得,每个电池的强制放电时间(小时)为额定容量除以初始电流(安培)。					
	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: T.1~T.5 / 表1: T.1~T.5										
Item/项目		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
OCV pric 试验前		3.391	3.399	3.378	3.386	3.384	3.385	3.389	3.392	3.395	3.384
Mass prid 试验前点		40.761	40.569	40.885	40.386	40.674	40.912	40.668	41.003	40.789	40.691
T.1: Altitude	Mass loss 质量损失 (%)	0.002	0.000	0.002	0.002	0.002	0.002	0.000	0.002	0.002	0.002
Simulation 高度模拟	Change ratio 电压比 (%)	99.971	99.971	99.970	100	99.941	99.970	99.941	100	99.941	99.941
T.2: Thermal	Mass loss 质量损失 (%)	0.020	0.030	0.032	0.030	0.027	0.027	0.017	0.022	0.029	0.022
test 温度试验	Change ratio 电压比 (%)	99.027	98.823	99.023	98.907	99.024	99.025	98.878	98.939	98.939	98.817
T.3: Vibration	Mass loss 质量损失 (%)	0.005	0.005	0.000	0.000	0.000	0.005	0.002	0.000	0.005	0.005
振动	Change ratio 电压比 (%)	99.970	99.970	100	100	99.970	100	99.970	100	100	99.970
T.4: Shock	Mass loss 质量损失 (%)	0.000	0.002	0.002	0.002	0.000	0.002	0.002	0.000	0.002	0.000
加速度冲击	Change ratio 电压比 (%)	100	100	100	99.970	100	100	100	100	99.970	100
T.5: External Short Circuit 外接短路	Temp, (℃) 温度 (℃)	108.2	112.2	103.2	107.5	121.7	106.4	128.4	116.3	107.5	113.7



Table 2: Impact/表 2: 撞击											
	Sample No, 样品号	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
T.6: Impact/ 撞击	OCV prior to test 试验前电压(V)	3.301	3.301	3.300	3.300	3.300	3.301	3.299	3.301	3.302	3.301
	Temp, (℃) 温度 (℃)	97.6	123.5	117.5	103.6	118.4	121.4	117.4	118.6	112.8	108.5

	Table 3: Forced discharge /表 3: 强制放电											
	Sample No, 样品号	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	
T.8: Forced	OCV prior to test 试验前电压(V)	2.617	2.620	2.617	2.648	2.599	2.676	2.673	2.635	2.589	2.660	
discharge 强制放电	Sample No, 样品号	C31	C32	C33	C34	C35	C36	C37	C38	C39	C40	
	OCV prior to test 试验前电压(V)	2.593	2.650	2.636	2.587	2.634	2.663	2.650	2.650	2.592	2.650	

<sup>--</sup> End of Report --