



检 测 报 告

TEST REPORT

Name of Sample:	Li-ion Cell	
产品名称 :	锂离子电芯	
Model Specification:		
产品型号:	ICR18650	
Client:	TOPA Technology Limited	
委托单位 :	深圳市特派科技有限公司	
Classification of Test:	Commission Test	
检测类别·	委托检测	

国家轻工业电池及储能材料质量监督检测中心 先进储能材料国家工程研究中心有限责任公司检测中心

National Light Industry Quality Supervision and Testing Center of Battery Energy Storage Materials

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".

检测单位地址:广东省深圳市宝安区新安街道宝石路29号蓝坤集团大厦B栋一楼B102

Lab Address: No.B102, 1/F., Lankun Group Building B, No.29, Baoshi Road, Xin'an Street,

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电话(TEL): 86-755-22678313 传真(FAX): 0755-22678299 邮政编码(Post Code): 518101 网址(Website): www.cescert.com

E-mail: service@cescert.com



TEST REPORT

Name of sample 样品名称	Li-ion Cell 锂离子电芯									
Model /Type 型号规格	ICR18650 (3.7V 200		7.4Wh)	Size 样品尺寸	68.0mm×18.5mm (H×D)					
Appearance 样品外观	Cylindrica 圆柱形, ī			Trade mark 商标	-					
Quantity 样品数量	40 cells 40 个电芯			Quality 样品质量	44.2g					
Receiving Date 接样日期	2019-10-1	4		Testing Date 测试日期	2019-10-14~2019-10-25					
Client	Name 名称		A Technology Li 市特派科技有限							
委托单位	Address 地址	Chin	a	l Park, Malan, Pi 道江岭社区香江	ngshan District, Shenzhen 518118 工业园					
	Name 名称		A Technology Li 市特派科技有限							
Manufacturer	Address 地址	Xiangjiang Industrial Park, Malan, Pingshan District, Shenzhen 51811 China 深圳市坪山区马峦街道江岭社区香江工业园								
生产单位	Tel 电话	0755	-28319595	E-mail 邮箱	cd2@ topabrands.com					
	Website 网址 www.topabrands.com									
Tested standard 测试标准	Transport (ST/SG/A	of Dai C.10/1	ngerous Goods, 1/Rev.6/Amend.	Manual of Test and 1/Section 38.3)	ion of the《Recommendations on the nd Criteria》 第六版修订一38.3节					
Test conclusion: 检测结论	TRANSPO ST/SG/AC 经测试,i	ORT O C.10/11 亥批样	F DANGEROUS /Rev.6/Amend.1 品符合联合国《	S GOODS" Manua //Section 38.3	NATIONS "Recommendations on the al of Tests and Criteria 输的建议书 试验和标准手册》。 能要求					
Issue date 签发日期	2019-11-0	_ _			CES *					
Tested by 主检	供多	M	Reviewed by 审核	神华	Approved by 批准					
陈其平 Cherry Cl 廖宇平 Richie Lia			技术负责人 Te 质量负责人 Qu	echnical Manager uality Manager						



TEST REPORT

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

The samples without protective devices, are not subject to the requirements of T7 test. The sample's status is good /此样品无保护装置,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 测试项目	Sample No. 样品编号	Verdict 判定
T.1 Altitude simulation 高度模拟	C1#~5#, C6#~C10#	Р
T.2 Thermal test 温度试验	C1#~5#, C6#~C10#	Р
T.3 Vibration 振动	C1#~5#, C6#~C10#	Р
T.4 Shock 加速度冲击	C1#~5#, C6#~C10#	Р
T.5 External Short Circuit 外部短路	C1#~5#, C6#~C10#	Р
T.6 Impact /Crush 撞击/挤压	C11#~15#, C16#~C20#	Р
T.8 Forced discharge 强制放电	C21# ~ C30#, C31# ~C40#	Р
Sample pretreatment/样品预处理: C1#~5#: Batter	ries at first cycle, in fully charged state.	

第1个充放电周期完全充电状态的电池。

C6# ~C10#:.... Batteries after 25th cycle, in fully charged state.

第25个充放电周期后完全充电状态的电池。

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.

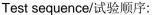
第25个充放电周期后充电到设计额定容量的50%的电芯。

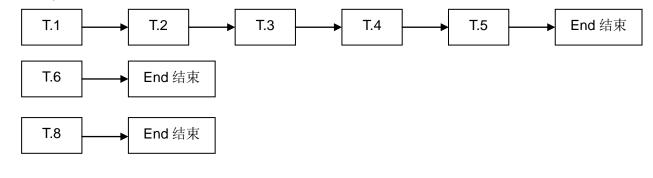
C21# ~ C30#:.... Cells at first cycle, in fully discharged state.

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。



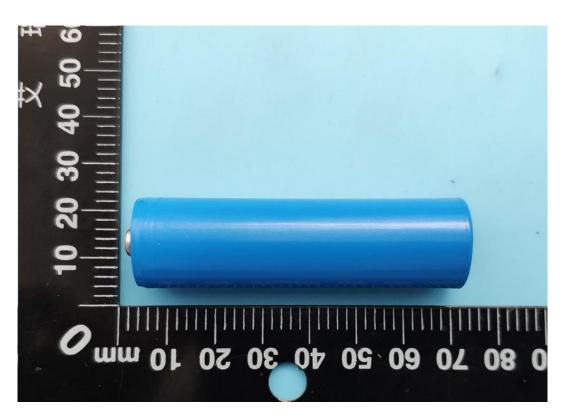




Photos of Samples and Labels/样品照片及标识

Samples /样品(ICR18650 3.7V 2000mAh 7.4Wh)







	ST/SG/AC.10/11/Rev.6/ Amend.1/Sect	ion 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								
	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#~10#:							
	1. Cells and batteries Mass loss limit: ≤0.2% /样品质量损	no leakage, no venting,							
	失≤0.2%。	no disassembly, no							
38.3.4.1	2. Open circuit voltage not less than 90%, The	rupture and no fire/编号	Р						
	requirement relating to voltage is not applicable to test	C1#~10#的样品: 无渗							
	cells and batteries at full discharged states/样品试验后开	漏、无排气、无解体、无							
	路电压应不低于试验前开路电压的90%,此要求不适用于	破裂以及无着火现象							
	完全放完电的电池和电池组。	The data see table1/数							
	3. No leakage, no venting, no disassembly, no rupture	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 2: Thermal test/测试 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: 75±2℃(6h) —-40±2℃(6h) /一次温度循环为75±2℃								
	(6h)—-40 \pm 2°C(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 fo								
	temperature (20±5℃)/循环结束后,电池和电池组在20±5								
	For large cells and batteries the duration of exposure to the	•							
	extremes should be at least 12 hours/对于大型电池和电池时间至少为12小时。	组,泰路丁似编试验温度的							
38.3.4.2	Requirement/标准要求:	The samples C1#~10#:	Р						
	1. Cells and batteries Mass loss limit: ≤0.2% /样品质量损	no leakage, no venting,							
	失≤0.2%。	no disassembly, no							
	Open circuit voltage not less than 90%, The	rupture and no fire/编号							
	requirement relating to voltage is not applicable to test	C1#~10#的样品: 无渗							
	cells and batteries at full discharged states/样品试验后开	漏、无排气、无解体、无							
	路电压应不低于试验前开路电压的90%,此要求不适用于	破裂以及无着火现象							
	完全放完电的电池和电池组。	The data see table1/数							
	3. No leakage, no venting, no disassembly, no rupture	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。								



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	ST/SG/AC.10/11/Rev.6/ Amend.1/Sect	ion 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								
38.3.4.3	1. Cells and batteries are firmly secured to the platform of the vibration machine /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 logarithmic sweep between 7Hz and 200Hz and back to 7Hz traversed in 15 minutes/振动以正弦波形式,以7Hz增加至200Hz,然后再回到7Hz为一个循环,时间跨度为15分钟。 3. The logarithmic frequency sweep is as follows/对数扫频为: (1)For cells and small batteries: from 7 Hz a peak acceleration of 1gn is maintained until 18 Hz is reached, The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8gn occurs (approximately 50Hz), A peak acceleration of 8gn is then maintained until the frequency is increased to 200Hz/对于电池和小型电池:从7赫兹开始保持1gn的最大加速度直到频率为18赫兹,然后将振幅保持在0.8毫米(总偏移1.6毫米)并增加频率直到最大加速度达到8gn(频率约为50赫兹),将最大加速度保持在8gn直到频率增加到200赫兹。 (2) For large batteries: from 7Hz to a peak acceleration of 1gn is maintained until 18Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2gn occurs (approximately 25Hz). A peak acceleration of 2gn is then maintained until the frequency is increased to 200Hz/对于大型电池组:从7赫兹开始保持1gn的最大加速度直到频率为18赫兹,然后将振幅保持在0.8毫米(总偏移1.6毫米)并增加频率直到最大加速度达到2gn(频率约为25赫兹),将最大加速度保持在2gn直到频率增加到200赫兹。 4.This cycle repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell /振动的其中一个方向必须是垂直于样品极性,对每个电池从三个互相垂直的方向上循环12 次,每个方向3个小时,共9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。	The samples C1#~10#: no leakage, no venting, no disassembly, no rupture and no fire/编号 C1#~10#的样品: 无渗 漏、无排气、无解体、无 破裂以及无着火现象 The data see table1/数 据见表1							



	ST/SG/AC.10/11/Rev.6/ Amend.1/Section 38.3									
Clause	Requirements	Result	Verdict							
章节	标准要求	测试结果	判定							
38.3.4.4	Test 4: Shock/测试 4: 加速度冲击 1. Test cells and batteries shall be secured to the testing m 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 and pulse duration of 6 milliseconds. Alternatively, large con half-sine shock of peak acceleration of 50gn and pulse dury 小型电池须经受峰值为150gn和脉冲持续时间6毫秒的半正弦波冲击。 3. Small batteries shall be subjected to a half-sine shock of peak acceleration (g _n) = √(100850 / mass) , which is smalle milliseconds. Large batteries shall be subjected to a half-sine shock of mass) , which is smalle milliseconds. Large batteries shall be subjected to a half-sine shock of mass) , which is smalle milliseconds. Large batteries shall be subjected to a half-sine shock of mass) , which is smalle milliseconds. Large batteries shall be subjected to a half-sine shock of mass) , which is smalle milliseconds. Large batteries shall be subjected to a half-sine shock of mass) , which is smalle milliseconds. Large batteries shall be subjected to a half-sine shock of mass) , which is smalle milliseconds. Large batteries which is smalle milliseconds. Jugas of mass) , which is smalle milliseconds. Large batteries which is smalle milliseconds. Jugas of mass] , which is smalle milliseconds. Jugas of mass 30000 / mass) , which is smalle milliseconds. Jugas of mass 30000 / mass) , which is smalle milliseconds. Jugas of mass 30000 / mass) , which is smalled milliseconds. Jugas of mass 30000 / ma	pachine/以稳固的托架固定 acceleration of 150gn ells may be subjected to a ration of 11 milliseconds./ 弦冲击,大型电池须经受最 f peak acceleration of r) and pulse duration of 6 ine shock of peak which is smaller) and pulse $(\vec{y} = \sqrt{\frac{100850}{mass}})$ 中的较 受最大加速度50gn(或与冲击。 In the positive direction mutually perpendicular ocks/每个电池或电池组须	P							



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	ST/SG/AC.10/11/Rev.6/ Amend.1/Sect						
Clause	Requirements	Result	Verdict				
章节	标准要求	测试结果	判定				
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 state case temperature reaches 57±4℃/保持试验环境温度稳定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 corresistance of less than 0,1 ohm at 57±4℃, This short circuit for at least one hour after the cell or battery external case to 57±4℃, or in the case of the large batteries, has decremaximum temperature increase observed during the test avalue/将电池或电池正负极用小于0.1Ω的总电阻回路进行短度恢复到57±4℃之后保持短路状态1小时以上,对于大型时大温升的一半即可。 3. the cell or battery must be observed for a further six hour concluded/对电池或电池必须进一步观察 6 个小时才能下经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、无破裂和无着火现象发生。	在57±4℃,以使电池或电 ndition with a total external alt condition is continued temperature has returned eased by half of the and remains below that 函路,电池或电池的外表温电池组其外壳温度下降至最 ur for the test to be	P				
	Test 6: Impact / Crush / 测试 6: 撞击/挤压		Р				
38.3.4.6							



-	ST/SG/AC.10/11/Rev.6/ Amend.1/Sec	1					
Clause	Requirements	Result	Verdict				
章节	标准要求	测试结果	判定				
	3. The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 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, no rupture and no fire/ C11#~C20#样品: 无解 体、无着火现象 The data see table2/数据 见表2	Р				
38.3.4.6	Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18mm in diameter)/挤压(适用于棱柱形、袋装、硬币/纽扣电池和直径小于18毫米的圆柱形电池) 1. 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/将电池或元件电池放在两个平面之间挤压,挤压力度逐渐加大,在第一个接触点上的速度大约为1.5厘米/秒。挤压持续进行,直到出现以下三种情况之一: (a) The applied force reaches 13kN ± 0.78kN /施加的力达到13千牛±0.78千牛 (b) The voltage of the cell drops by at least 100mV/电池的电压下降至少100毫伏 (c) The cell is deformed by 50% or more of its original thickness/电池变形达原始厚度的50%以上。 2. A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces/棱柱形或袋装电池应从最宽的一面施压。纽扣/硬币形电池应从其平坦表面施压。圆柱形电池应从与纵轴垂直的方向施压。						
	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。						
	Test 7: Overcharge/测试 7: 过充电						
38.3.4.7	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.6/ Amend.1/Sect	ion 38.3							
Clause	Requirements Result								
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								
	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。								
38.3.4.8	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对率的负载来获得,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)。								
	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 For voltage data before test, see table3. /试验前 电压见表3							



	Table1: T1~T5 / 表1, 试验1~试验5											
项目		C1#	C2#	C3#	C4#	C5#	C6#	C7#	C8#	C9#	C10#	
OCV pric 试验前		4.179	4.175	4.173	4.179	4.179	4.170	4.164	4.172	4.170	4.171	
Mass prid 试验前原		44.144	44.037	44.198	44.277	44.405	44.002	44.105	44.041	44.160	44.198	
Test 1: Altitude Simulation	Mass loss 质量损失 (%)	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.002	0.000	0.000	
测试1:高度模拟	Change ratio 电压比 (%)	99.952	99.952	99.952	99.976	99.976	99.928	100	99.976	99.928	99.976	
Test 2: Thermal test	Mass loss 质量损失 (%)	0.002	0.000	0.002	0.002	0.002	0.000	0.000	0.005	0.000	0.000	
测试 2: 温度试验	Change ratio 电压比 (%)	99.186	99.209	99.209	99.186	99.210	99.232	99.256	99.185	99.328	99.233	
Test 3: Vibration	Mass loss 质量损失 (%)	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.002	0.000	
测试 3: 振动	Change ratio 电压比 (%)	100	100	99.976	99.976	99.976	100	100	100	99.976	100	
Test 4: Shock	Mass loss 质量损失 (%)	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	
测试 4: 加速度冲击	Change ratio 电压比 (%)	100	100	99.976	99.976	100	100	100	100	99.976	100	
Test 5:External Short Circuit 测试 5 外 接短路	Temp, (℃) 温度 (℃)	77.8	76.5	77.7	76.4	74.8	78.1	80.3	81.9	73.9	76.1	



	Table2: Impact /表 2:撞击													
Test 6: Impact 测试 6: 撞击	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)	3.858	3.855	3.850	3.854	3.859	3.854	3.850	3.858	3.853	3.850			
	Temp, (℃) 温度 (℃)	99.79	128.84	119.07	121.68	119.12	117.50	116.84	95.6	104.26	121.13			

	Table 3: Forced discharge / 表 3: 强制放电													
Test 8: Forced discharge 测试8: 强 制放电	Sample No, 样品号	C16#	C17#	C18#	C19#	C20#	C21#	C22#	C23#	C24#	C25#			
	OCV prior to test 试验前电压(V)	3.261	3.235	3.229	3.340	3.306	3.240	3.229	3.238	3.266	3.255			
	Sample No, 样品号	C26#	C27#	C28#	C29#	C30#	C31#	C32#	C33#	C34#	C35#			
	OCV prior to test 试验前电压(V)	3.243	3.238	3.228	3.237	3.253	3.251	3.235	3.244	3.230	3.234			

-- End of Report --