



中国认可
国际互认
检测
TESTING
CNAS L7049



230020343561



检测报告

Test Report

样品名称:

锂离子电池组

Name of Sample

Rechargeable Li-ion Battery

委托单位:

东莞新能德科技有限公司

Client

Dongguan NVT Technology Co., Ltd.

报告编号:

DGT2403DT6001331Q

Report No.

签发日期:

2024-01-08

Issued Date



中国民用航空总局第二研究所

The Second Research Institute of CAAC



声明

STATEMENT

- 1、检测报告无本机构“检测专用章”及骑缝章无效；

The test report is invalid without the special seal for testing and paging seal of CAACSRI.

- 2、检测报告无本机构检测、审核、批准人签(章)字无效；

The test report is invalid without the signatures of Approver, Checker and Tester.

- 3、报告涂改无效。

The test report is invalid if altered.

- 4、未经本机构书面同意，不得复制或部分复制本报告；

Nobody is allowed to photocopy or partly photocopy this test report without written permission of CAACSRI.

- 5、对本报告若有异议，应于收到本报告之日起 15 天内向本机构提出，逾期不予受理；

Objection to the test report must be submitted to CAACSRI within 15 days from the date of receipt of this report.

- 6、本报告结果仅对来样负责；

The test report is valid for the tested samples only.

- 7、委托样品保存期限为 12 个月，超过此限，本机构不再留存样品。

The retention period of sample is 12 month, beyond which the agency will not retain sample.

地址 (Add): 成都双流西航港经济开发区腾飞路 765 号

No.765, Tengfei Road, Xihanggang Economic Development Zone, Shuangliu, Chengdu, Sichuan,
P. R. China

电话 (Tel): 86-028-64458195

传真 (Fax): 86-028-64458195

邮政编码(Postcode): 610200

报告查询网址: <http://service.caacdgt.com>

基本信息 General Information					
样品信息/Sample information					
样品名称 Sample Name	锂离子电池组 Rechargeable Li-ion Battery		样品类型 Sample Type	锂离子电池 Lithium-ion battery	
样品型号 Sample Model	BLPA51		标称电压 Normal Voltage	7.82V	
额定容量 Rated Capacity	2680mAh/20.96Wh(Rated) 2750mAh/21.51Wh(Typical)		锂金属含量 Metal Content	N/A 不适用	
样品质量 Mass	约 73.4g App.73.4g		样品描述 Description	黑色, 棱柱形 Black, Prismatic	
委托单位信息/ Client information					
委托单位 Client	东莞新能德科技有限公司 Dongguan NVT Technology Co., Ltd.				
单位地址 Client Address	中国广东省东莞市东坑镇角社村兴国中路 8 号 No. 8, Xingguo Middle Road, Jiaoshe Village, Dongkeng Town, Dongguan City, Guangdong Province, P.R.China				
生产单位信息/Manufacture information					
电芯生产单位 Cell Manufacture	宁德新能源科技有限公司 Ningde Amperex Technology Limited				
地址 Address	福建省宁德市蕉城区漳湾镇新港路 1 号 No.1 Xin Gang Road, Zhang Wan Town, Jiao cheng District, Ningde City, FuJian Province 352106, P.R.China				
电话 Tel	+86-(0)769-3882 6188 81510	邮箱 E-mail	chenmy@nvtpower.co m	网站 Website	www.nvtpower.com
电池生产单位 Battery Manufacture	东莞新能德科技有限公司 Dongguan NVT Technology Co., Ltd.				
地址 Address	中国广东省东莞市东坑镇角社村兴国中路 8 号 No. 8, Xingguo Middle Road, Jiaoshe Village, Dongkeng Town, Dongguan City, Guangdong Province, P.R.China				
电话 Tel	+86-(0)769-3882 6188 81510	邮箱 E-mail	chenmy@nvtpower.c om	网站 Website	www.nvtpower.com
*以上信息由委托单位提供。 The above information is provided by client.					
测试机构信息/Test Laboratory					
检测单位 Laboratory	中国民用航空总局第二研究所 The Second Research Institute of CAAC				
地址 Address	成都双流西航港经济开发区腾飞路 765 号 No.765, Tengfei Road, Xihanggang Economic Development Zone, Shuangliu, Chengdu, Sichuan, P. R. China				
电话 Tel	028-64458156	邮箱 E-mail	tantao@caacsri.com	网站 Website	www.caacdgt.com
样品数量 Quantity of Sample	16 个电池, 30 个电芯 16 lithium ion batteries, 30 cells				

测试结论 Test Conclusion					
序号 No.	测试项目名称 Name of Test	测试标准 Testing Standard	测试结果 Test Result	结论 Conclusion	备注 Remarks
1	高度模拟 Altitude simulation	联合国《试验和标准手册》第7修订版修正1 UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev7/Amend.1, Section 38.3	见附表1 See Appendix 1	合格	/
2	温度试验 Thermal test		见附表2 See Appendix 2	合格	/
3	振动 Vibration		见附表3 See Appendix 3	合格	/
4	冲击 Shock		见附表4 See Appendix 4	合格	/
5	外部短路 External Short-circuit		见附表5 See Appendix 5	合格	/
6	撞击 Impact		/	/	不适用 N/A
	挤压 Crush		见附表6 See Appendix 6	合格	/
7	过度充电 Overcharge		见附表7 See Appendix 7	合格	/
8	强制放电 Forced discharge	见附表8 See Appendix 8	合格	/	
接样日期 Receiving Date		2023-12-15			
测试日期 Test Date		2023-12-16~2024-01-05			
结论/Conclusion:					
经测试，送检样品符合联合国《试验和标准手册》第7修订版修正1第38.3节的测试要求。 The sample had passed the test items of UNITED NATIONS Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend.1,Section 38.3.					
检测单位盖章(Stamp) 签发日期(Issued Date): 2024-01-08					

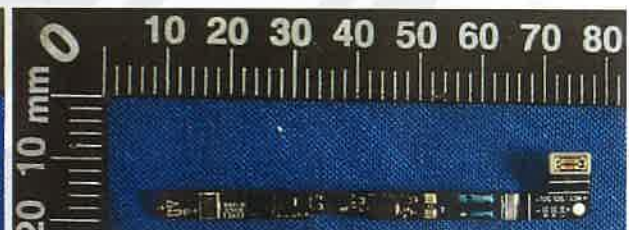
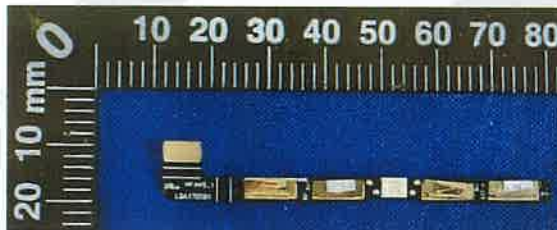
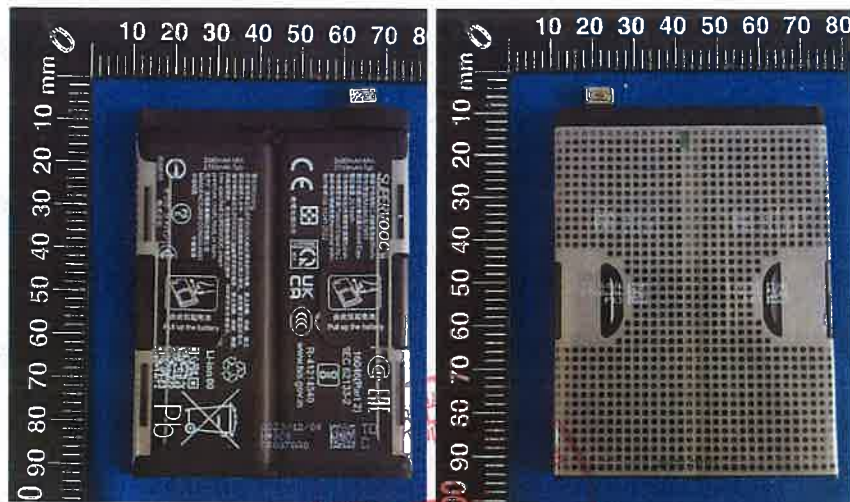
检测:
(Compiled by)

审核:
(Checked by)

批准:
(Approved by)



样品及标识照片
Photos of samples and markings



以下空白



附表 1
Appendix 1

[illegible]

附表 2
Appendix 2

[illegible]

附表 3
Appendix 3

[illegible]

附表 4
Appendix4

测试项目 Test Items	冲击 Shock						
1.1	测试步骤 Test procedure						
	将测试电芯和电池用坚硬支架紧固在试验装置上，支架支撑着每个试验样品的所有安装面。每个测试电芯和电池须经受最大加速度 150g _n 和脉冲持续时间 6 毫秒的半正弦波冲击。每个电芯和电池需在三个互相垂直的正方向经受三次冲击，然后在反方向经受三次冲击，总共 18 次。 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 test battery. Each cell shall be subjected to a half-sine shock of peak acceleration of 150 g _n and pulse duration of 6 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.						
1.2	样品状态 Sample status						
	B1#~B4#，在第一个循环完全充电状态； B1#~B4#， at first cycle in fully charged states.						
	B5#~B8#，在 25 个循环后完全充电状态 B5#~B8#， after 25 cycles ending in fully charged states						
1.3	测试结果 Result						
样品编号 Sample No.	测试前/Before		测试后/After		质量损失 Mass Loss (%)	剩余电压 Residual OCV (%)	测试结果 Test Result
	质量/Mass (g)	电压/Voltage (V)	质量/Mass (g)	电压/Voltage (V)			
B1#	73.2977	8.70	73.2974	8.70	0.0004	100.000	O
B2#	73.2769	8.70	73.2762	8.70	0.0010	100.000	O
B3#	73.4021	8.70	73.4020	8.70	0.0001	100.000	O
B4#	73.3418	8.69	73.3414	8.69	0.0005	100.000	O
B5#	73.1301	8.71	73.1300	8.71	0.0001	100.000	O
B6#	73.3633	8.71	73.3633	8.71	0.0000	100.000	O
B7#	73.3318	8.71	73.3313	8.71	0.0007	100.000	O
B8#	73.4140	8.71	73.4140	8.71	0.0000	100.000	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。							

附表 5
Appendix 5

测试项目 Test Items	外部短路 External short circuit	
1.1	测试步骤 Test procedure	
	测试电芯和电池应加热一段必要的时间, 使得电芯和电池外壳温度达到均匀稳定的 $57\pm4^{\circ}\text{C}$。这段加热时间的长短取决于电芯和电池的设计尺寸大小, 同时这段加热时间应加以评估和记录。若无法评估加热时间, 则小型电芯和电池需暴露至少 6 小时。然后, 测试电芯和电池应在 $57\pm4^{\circ}\text{C}$ 条件下经受总外电阻小于 0.1 欧姆的外短路。当小型电芯和电池的外壳温度降到 $57\pm4^{\circ}\text{C}$ 后应继续维持外短路状态至少 1 个小时。短路和降温阶段的温度应至少相当于环境温度。 The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of $57\pm4^{\circ}\text{C}$, 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 $57\pm4^{\circ}\text{C}$ 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 $57\pm4^{\circ}\text{C}$, 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. The short circuit and cooling down phase shall be conducted at least at ambient temperature.	
1.2	样品状态 Sample status	
	B1#~B4#, 在第一个循环完全充电状态; B1#~B4#, at first cycle in fully charged states. B5#~B8#, 在 25 个循环后完全充电状态 B5#~B8#, after 25 cycles ending in fully charged states	
1.3	测试结果 Result	
样品编号 Sample No.	样品表面最高温度 ($^{\circ}\text{C}$) Max. External Temperature	测试结果 Test Result
B1#	58.83	O
B2#	58.89	O
B3#	57.43	O
B4#	58.38	O
B5#	59.16	O
B6#	59.25	O
B7#	58.73	O
B8#	59.61	O
/	/	/
/	/	/
Note: D -Disassembly, R -Rupture, F-Fire, O-No leakage, no venting, no disassembly, no rupture, no fire. 注: 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。		

附表 6
Appendix 6

测试项目 Test Items	挤压 Crush				
1.1	测试步骤 Test procedure				
	将一块电芯或组成电池的电芯放置在挤压设备的两个挤压平面之间进行挤压。挤压在第一个接触点以约 1.5cm/s 的速度逐步进行，直到出现以下三种情况之一为止： 1) 挤压力达到 13KN±0.78KN； 2) 电芯电压下降了至少 100mV；或 3) 电芯厚度和最初比较，变形至少 50%。 一旦达到了最大压力或电芯的电压下降超过 100mV 或电芯变形超过 50%，应解除压力。对棱柱或袋形电芯，应对最宽面进行挤压；对钮扣电芯应对平面进行挤压；对圆柱形电芯，应在纵轴的垂直方向进行挤压。 每个电芯只接受一次挤压，并且用于测试的电芯应没有做过其它测试试验，试验结束后应继续观察 6h。 A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/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 13 kN ± 0.78 kN; (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 100 mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released. 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. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis. Each test cell or component cell is to be subjected to one crush only. The test sample shall be observed for a further 6h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests.				
1.2	样品状态 Sample status				
	C1#~C5#，在第一个循环后 50%的额定容量 C1#~C5#, at first cycle at 50% of the design rated capacity				
	C6#~C10#，在 25 个循环后 50%的额定容量 C6#~C10#, after 25 cycles ending at 50% of the design rated capacity.				
1.3	测试结果 Result				
样品编号 Sample No.	样品表面最高温度 (°C) Max. External Temperature	测试结果 Test result	样品编号 Sample No.	样品表面最高温度 (°C) Max. External Temperature	测试结果 Test result
C1#	14.4	O	C6#	13.9	O
C2#	14.5	O	C7#	12.7	O
C3#	13.7	O	C8#	12.8	O
C4#	14.3	O	C9#	13.1	O
C5#	13.9	O	C10#	13.0	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。

附表 7
Appendix 7

测试项目 Test Items	过度充电 Overcharge	
1.1	测试步骤 Test procedure	
	充电电流为制造商推荐的最大连续充电电流的两倍。 The charge current shall be twice the manufacturer's recommended maximum continuous charge current.	
	制造商建议的充电电压不大于 18V 时, 试验的最小电压应是电池组最大充电电压的两倍或 22 伏特两者中的较小者。 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.	
	制造商建议的充电电压大于 18V 时, 测试的最小电压应该为 1.2 倍的制造商标定的最大充电电压。 When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.	
	厂家推荐最大充电电压为 9V, 厂家推荐最大充电电流为 12.06A。测试电压为 18V, 电流为 24.12A。 The manufacturer's recommended maximum charge voltage is 9V. The manufacturer's recommended maximum continuous charge current is 12.06A. The voltage of the test is 18V, and the current is 24.12A.	
1.2	样品状态 Sample status	
	B9#~B12#, 在第一个循环完全充电状态; B9#~B12#, at first cycle in fully charged states.	
	B13#~B16#, 在 25 个循环后完全充电状态 B13#~B16#, after 25cycles ending in fully charged states.	
1.3	测试结果 Result	
样品编号 Sample No.	测试前开路电压 Voltage Before Test (V)	测试结果 Test Result
B9#	8.93	O
B10#	8.93	O
B11#	8.92	O
B12#	8.93	O
B13#	8.93	O
B14#	8.90	O
B15#	8.92	O
B16#	8.92	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。					
附表 8 Appendix8					
测试项目 Test Items	强制放电 Forced discharge				
1.1	测试步骤 Test procedure				
	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。 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).				
1.2	样品状态 Sample status				
	C11#~C20#,在第一个循环完全放电状态; C11#~C20#, at first cycle in fully discharged states;				
	C21#~C30#,在 25 个循环后完全放电状态; C21#~C30#, after 25cycles ending in fully discharged states;				
1.3	测试结果 Result				
样品编号 Sample No.	测试前开路电压 Voltage Before Test (V)	测试结果 Test Result	样品编号 Sample No.	测试前开路电压 Voltage Before Test (V)	测试结果 Test Result
C11#	3.692	O	C21#	3.697	O
C12#	3.692	O	C22#	3.696	O
C13#	3.692	O	C23#	3.696	O
C14#	3.692	O	C24#	3.696	O
C15#	3.692	O	C25#	3.695	O
C16#	3.692	O	C26#	3.697	O
C17#	3.692	O	C27#	3.695	O
C18#	3.693	O	C28#	3.697	O
C19#	3.692	O	C29#	3.696	O
C20#	3.693	O	C30#	3.696	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。					

——以下无内容——

