中国认可
国际互认
检测
TESTING
CNAS L4595

Lithium Battery UN38.3 Test Report

锂电池UN38.3 测试报告

Sample name	:	**Lithium Ion Battery**
样品名称	:	**锂离子电池**
Model	:	**BR 18650**
型号	:	
Applicant	:	**Shenzhen Bangrong Electronic Technology Co., Ltd**
申请商	:	**深圳市邦荣电子科技有限公司**

深圳立讯检测股份有限公司
Shenzhen LCS Compliance Testing Laboratory Ltd.

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

UN38.3 Test Report
UN38.3测试报告

Report No .....: 报告号.....:	LCSA12104158SA
Tested by (+ signature) .....: 测试(签名) .....:	Daisy/Testing Engineer 罗纯君/测试工程师
Checked by (+ signature) .....: 审核(签名) .....:	Doris Ye /Project Manager 叶妙婷/项目经理
Approved by (+ signature) .....: 批准(签名) .....:	Hart Qiu/Technical Manager 邱文才/技术总监
Contents.....: 页数.....:	19 pages
Date of issue .....: 签发日期.....:	2024.12.27
Testing Laboratory Name .....: 测试实验室.....:	Shenzhen LCS Compliance Testing Laboratory Ltd. 深圳立讯检测股份有限公司
Address .....: 地址.....:	Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China 广东省深圳市宝安区沙井街道衙边学子围巨基工业园A栋101、201，C栋301 Room 101, Building C, Xueziwei Creative Park, Yabian Community, Shajing Street, Bao'an District, Shenzhen, Guangdong, China 广东省深圳市宝安区沙井街道衙边社区学子围创意园C 栋101 单元
Applicant's Name .....: 申请商.....:	Shenzhen Bangrong Electronic Technology Co., Ltd 深圳市邦荣电子科技有限公司
Address .....: 地址.....:	3rd Floor, Building 2,Aerospace Science and Technology P ark,No.10 industrial Zone, Pinus tabulaeformis, Longhua N ew District, Shenzhen 深圳市龙华新区油松第十工业区航天科工苑 2 栋 3 楼
Manufacturer .....: 制造商.....:	Shenzhen Bangrong Electronic Technology Co., Ltd 深圳市邦荣电子科技有限公司
Address .....: 地址.....:	3rd Floor, Building 2,Aerospace Science and Technology P ark,No.10 industrial Zone, Pinus tabulaeformis, Longhua N ew District, Shenzhen 深圳市龙华新区油松第十工业区航天科工苑 2 栋 3 楼
Telephone Number.....: 联系电话.....:	13713992261
Email address.....: 邮件地址.....:	precious521@126.com
Website.....: 网址.....:	/
Standard .....: 标准.....:	UN "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.8/Subsection 38.3 联合国《试验和标准手册》（第8版）38.3节

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Sample name .....: 样品名称.....:	Lithium Ion Battery 锂离子电池
Trade Mark .....: 商标.....:	N/A
Model .....: 型号.....:	BR 18650
Ratings.....: 额定值.....:	3.7V, 4000mAh, 14.8Wh
Classification.....: 类别.....:	Li-ion Battery 锂离子电池
Appearance.....: 外观.....:	Blue Cuboid 蓝色 长方体

Details information of the battery and the cell built in the battery, as following:
电池和电芯的详细信息见下表：

Product 产品	Cell 电芯	Battery 电池
Model 型号	18650	BR 18650
Nominal voltage 标称电压	3.7V	3.7V
Rated capacity 额定容量	2000mAh	4000mAh
Standard charge current 标准充电电流	1000mA	2000mA
Standard discharge current 标准放电电流	1000mA	2000mA
Maximum continuous charging current 最大连续充电电流	2000mA	4000mA
Maximum continuous discharge current 最大连续放电电流	2000mA	4000mA
Limited charge voltage 充电限制电压	4.2V	4.2V
End of discharge voltage 放电终止电压	2.75V	2.75V
End of charge current 充电截止电流	20mA	40mA
Cell numbers 电芯个数	2PCS (1S2P)	
Dimension 尺寸	Φ18.3*65.0(mm)	66.0*36.8*18.2(mm)
Weight 重量	43.5g	89.33g

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Possible test case verdicts: 报告中可能用到的结论标识：	
Test case does not apply to the test object.....: 测试项目不适用于该产品.....:	N/A 不适用
Test item does meet the requirement 测试项目符合标准的要求.....:	P(ass) 合格
Test item does not meet the requirement .....: 测试项目不符合标准的要求.....:	F(ail) 不合格
Testing: 测试：	
Date of sample received.....: 样品接收日期.....:	2024.12.10
Date(s) of performance of test.....: 测试执行日期.....:	2024.12.11 ~ 2024.12.24

Test result: Pass
检验结果: 通过
Remark:
T3 Vibration and T4 Shock test place in the Room 101, Building C, Xueziwei Creative Park, Yabian Community, Shajing Street, Bao'an District, Shenzhen, Guangdong, China;
T1 Altitude simulation, T2 Thermal test, T5 External short circuit, T6 Crush/Impact, T7 Overcharge, T8 Forced discharge test place in the Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China.
备注：
T3 振动，T4 冲击测试地点在广东省深圳市宝安区沙井街道衙边社区学子围创意园 C 栋 101 单元；
T1 高空模拟，T2 耐热测试，T5 外部短路，T6 挤压/撞击，T7 过充电， T8 强制放电测试地点在广东省深圳市宝安区沙井街道衙边学子围巨基工业园 A 栋 101、201，C 栋 301.

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Ⅰ、CONCLUSION 结论

Item 项目	Sample Number 样品号	Standard 标准	Conclusion 结论
Altitude simulation 高空模拟	B01-B08	UN "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.8/ Subsection 38.3 联合国《试验和标准手册》（第8版）38.3节	PASS 合格
Thermal test 耐热测试			PASS 合格
Vibration 振动测试			PASS 合格
Shock 冲击测试			PASS 合格
External short circuit 外部短路			PASS 合格
Crush/ Impact 挤压/撞击	C01-C10		PASS 合格
Overcharge 过充电测试	B09-B16		PASS 合格
Forced discharge 强制放电测试	C11-C30		PASS 合格

Notes备注:

The conditions of the battery of sample No. B01 to B04, B09-B12 are at first cycle, in fully charged state;

样品编号B01-B04, B09-B12的状态为第一个交替充电放电周期完全充电状态的电池；

The conditions of the cells of sample No. C01 to C05 are at first cycle at 50% of the design rated capacity, in fully charged state;

样品编号C01-C05的状态为第一个交替充电放电周期完全充电状态电芯容量设计值的50%的电芯；

The conditions of the cells of sample No. C06 to C10 are after 25 cycles at 50% of the design rated capacity, in fully charged state;

样品编号C06-C10的状态为在二十五个交替充电放电周期完全充电状态电芯容量设计值的50%的电芯；

The conditions of the battery of sample No.B05 to B08, B13 to B16 are after 25 cycles, in fully charged state;

样品编号B05-B08, B13-B16的状态为在二十五个交替充电放电周期结束后完全充电状态的电池；

The conditions of the cells of sample No.C11 to C20 are at first cycle, in fully discharged state;

样品编号C11-C20的状态为第一个交替充电放电周期完全放电状态的电芯；

The conditions of the cells of sample No.C21 to C30 are after 25 cycles ending in fully discharged state.

样品编号C21-C30的状态为在二十五个交替充电放电周期结束后完全放电状态的电芯。

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Ⅱ、MAIN TEST EQUIPMENT 主要测试设备

Instrument Name 仪器名称
Battery charge tester 电池充放电测试仪
Battery low press tester 高空模拟试验箱
Rapid temperature rise tester 快速温变试验机
Vibration tester 振动台
Vertical shock Tester 垂直冲击台
Battery external short-circuit tester 电池短路试验机
DC source 直流稳压电源
Battery crush tester 电池挤压试验机
Battery impact tester 电池重物冲击试验机
Scales 天平
Digital multimeter 万用表
Temperature recorder 温度记录仪
Temp.& Humi. Meter 温湿度计

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Ⅲ、TEST METHOD AND DATA测试方法和数据

Tests T.1 to T.5 shall be conducted in sequence on the same cell or battery. Tests T.6 and T.8 shall be conducted using not otherwise tested cells or batteries. Test T.7 may be conducted using undamaged batteries previously used in tests T.1 to T.5 for purposes of testing on cycled batteries.

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

小型电池或电池组必须按顺序进行试验T1至T5。试验T6和T8应使用未试验过的电池或电池组。试验T7可以使用原先在试验T1至T5中使用过的未损坏的电池组进行，以便测试交替充电放电的电池组。

要求电池和电池组无渗漏、无漏气、无解体、无破裂和无起火并且每个电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的90%。有关电压的要求不适用于完全放电状态的电池和电池组。

In order to quantify the mass loss, the following procedure is provided.

$$\text{mass loss} = (M_1 - M_2)/M_1 \times 100\%$$

Where M_1 is the mass before the test and M_2 is the mass after the test, when mass loss does not exceed the values in Table below, it shall be considered as “no mass loss”.

质量损失依照下式计算：

$$\text{质量损失} = (M_1 - M_2)/M_1 \times 100\%$$

式中M_1是试验前的质量，M_2是试验后的质量。如质量损失不超过下表所列数值，即视为“无质量损失”。

Mass M of cell or battery 电池或电池组质量M	Mass lost limited 质量损失限值
M＜1g	0.5%
1g≤M≤75g	0.2%
M＞75g	0.1%

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Test T1: Altitude simulation 高度模拟

Test procedure 试验程序：

Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature (20 ± 5 °C). 试验样品在压力不大于11.6kPa和温度20℃±5°C的环境下存放至少6小时。

Requirement 要求：

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.

要求样品无漏液、无漏气、无解体、无破裂以及无起火, 且样品试验后开路电压应不低于试验前开路电压的90％。

Data数据：

No. 编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltage after test/Voltage pre-test 试验后电压/试验前电压(%)	Verdict# （判定#）
	Mass(g) 质量(g)	Voltage(V) 电压(V)	Mass(g) 质量(g)	Voltage(V) 电压(V)			
B01	89.324	4.16	89.322	4.16	0.002	100.00	PASS/合格
B02	89.327	4.17	89.325	4.17	0.002	100.00	PASS/合格
B03	89.322	4.18	89.322	4.18	0.000	100.00	PASS/合格
B04	89.318	4.17	89.318	4.17	0.000	100.00	PASS/合格
B05	89.321	4.16	89.321	4.16	0.000	100.00	PASS/合格
B06	89.317	4.18	89.317	4.17	0.000	99.76	PASS/合格
B07	89.314	4.17	89.314	4.17	0.000	100.00	PASS/合格
B08	89.318	4.17	89.318	4.16	0.000	99.76	PASS/合格

#：No leakage, No venting,No disassembly No rupture and no fire

#：无漏液、无漏气、无解体、无破裂以及无起火现象

Test T.2: Thermal test 耐热测试

Test procedure 测试程序：

Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72 ± 2 °C, followed by storage for at least six hours at a test temperature equal to - 40 ± 2 °C. 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 °C). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

试验样品在试验温度等于72℃±2℃下存放至少6小时，然后在试验温度等于-40℃±2℃下存放至少6小时。两个极端温度之间的最大时间间隔为30分钟。这一过程须重复10次，接着将所有样品在环境温度20℃±5℃下存放24小时。对于大型电池和电池组，暴露于极端试验温度的时间至少应为12小时。

Requirement 要求

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.

要求样品无漏液、无漏气、无解体、无破裂以及无起火, 且样品试验后开路电压应不低于试验前开路电压的90％。

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Data数据：

No. 编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltage after test/Voltage pre-test 试验后电压/试验前电压(%)	Verdict# （判定#）
	Mass(g) 质量(g)	Voltage(V) 电压(V)	Mass(g) 质量(g)	Voltage(V) 电压(V)			
B01	89.322	4.16	89.275	4.11	0.053	98.80	PASS/合格
B02	89.325	4.17	89.280	4.10	0.050	98.32	PASS/合格
B03	89.322	4.18	89.269	4.12	0.059	98.56	PASS/合格
B04	89.318	4.17	89.272	4.13	0.052	99.04	PASS/合格
B05	89.321	4.16	89.278	4.11	0.048	98.80	PASS/合格
B06	89.317	4.17	89.272	4.10	0.050	98.32	PASS/合格
B07	89.314	4.17	89.276	4.11	0.043	98.56	PASS/合格
B08	89.318	4.16	89.274	4.12	0.049	99.04	PASS/合格

#：No leakage, No venting,No disassembly No rupture and no fire

#：无漏液、无漏气、无解体、无破裂以及无起火现象

Test T.3: Vibration 振动

Test procedure测试程序：

1. Cells and batteries are firmly secured to the platform of the vibration machine /样品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，对数扫描频率从7Hz增加至200Hz，然后再回到7Hz，一个循环持续15分钟。

3. The logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached, The amplitude is then maintained at 0,8mm (1,6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50Hz), A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz/对数扫频为: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。

4. This cycle repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell /每个样品从三个互相垂直的方向上循环12 次，共3 个小时。

Requirement 要求

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire during the test and after the test and if the open circuit voltage of each test cell or battery directly after testing in its third perpendicular mounting position is not less than 90% of its voltage immediately prior to this procedure.
要求样品无漏液、无漏气、无解体、无破裂以及无起火, 且样品试验后开路电压应不低于试验前开路电压的90％。

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Data数据：

No. 编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltage after test/Voltage pre-test 试验后电压/试验前电压(%)	Verdict# （判定#）
	Mass(g) 质量(g)	Voltage(V) 电压(V)	Mass(g) 质量(g)	Voltage(V) 电压(V)			
B01	89.275	4.11	89.275	4.11	0.000	100.00	PASS/合格
B02	89.280	4.10	89.277	4.10	0.003	100.00	PASS/合格
B03	89.269	4.12	89.269	4.12	0.000	100.00	PASS/合格
B04	89.272	4.13	89.272	4.12	0.000	99.76	PASS/合格
B05	89.278	4.11	89.275	4.11	0.003	100.00	PASS/合格
B06	89.272	4.10	89.272	4.10	0.000	100.00	PASS/合格
B07	89.276	4.11	89.276	4.11	0.000	100.00	PASS/合格
B08	89.274	4.12	89.274	4.11	0.000	99.76	PASS/合格

#：No leakage, No venting,No disassembly No rupture and no fire

#：无漏液、无漏气、无解体、无破裂以及无起火现象

Test T4: Shock 冲击

Test procedure测试程序:

1. 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.

2. Each cell or battery shall be subjected to a half sine shock of peak acceleration of 150gn and pulse duration of 6 milliseconds. Alternatively, large cells and large batteries may be subjected to a half-sine shock of peak acceleration of 50gn and pulse duration of 11 milliseconds.

3. Each cell or battery shall be subjected to a half-sine shock of peak acceleration depending on the mass of the battery. The pulse duration shall be 6 milliseconds for small batteries and 11 milliseconds for large batteries. The formulas below are provided to calculate the appropriate minimum peak accelerations

以稳固的托架固定住每个样品的安装表面。对每个电样品以峰值为150gn 的半正弦的加速度冲击，脉冲持续6 毫秒，大型电池和大型电池组须经受最大加速度50gn 和脉冲持续时间11 毫秒的半正弦波冲击。每个样品必须经受根据其质量峰值加速度的半正弦震荡。小型电池脉冲持续时间应为6毫秒为和大容量电池脉冲持续时间应为11毫秒。下面的公式供计算相应最小峰值加速度，每个样品须在三个互相垂直的样品安装方位的正方向经受三次冲击，接着在反方向经受三次冲击，总共经受18次冲击。

Battery	Minimum peak acceleration	Pulse duration
Small batteries	150 g_n or result of formula Acceleration(g_n) = $\sqrt{\left(\frac{100850}{\text{mass}*}\right)}$ whichever is smaller	6 ms

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Large batteries	50 g_n or result of formula Acceleration(g_n) = $\sqrt{\left(\frac{30000}{\text{mass}^*}\right)}$ whichever is smaller	11 ms

Requirement 要求:

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.

要求样品无漏液、无漏气、无解体、无破裂以及无起火, 且样品试验后开路电压应不低于试验前开路电压的90％。

Data数据：

No. 编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltage after test/Voltage pre-test 试验后电压/试验前电压(%)	Verdict# （判定#）
	Mass(g) 质量(g)	Voltage(V) 电压(V)	Mass(g) 质量(g)	Voltage(V) 电压(V)			
B01	89.275	4.11	89.273	4.11	0.002	100.00	PASS/合格
B02	89.277	4.10	89.277	4.10	0.000	100.00	PASS/合格
B03	89.269	4.12	89.269	4.11	0.000	99.76	PASS/合格
B04	89.272	4.12	89.272	4.12	0.000	100.00	PASS/合格
B05	89.275	4.11	89.275	4.11	0.000	100.00	PASS/合格
B06	89.272	4.10	89.270	4.10	0.002	100.00	PASS/合格
B07	89.276	4.11	89.276	4.10	0.000	99.76	PASS/合格
B08	89.274	4.11	89.274	4.11	0.000	100.00	PASS/合格

#：No leakage, No venting,No disassembly No rupture and no fire

#：无漏液、无漏气、无解体、无破裂以及无起火现象

Test T.5: External short circuit 外短路测试

Test method 测试方法:

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.

测试样品的外壳温度达到恒温 57 ± 4 °C 后，再进行外部短路。短路的时间取决于样品的尺寸和设计，并需被评估和记录。如果这个评估无法进行，那么小电芯和小电池短路时间至少 6 小时，大电芯和大电池短路时间至少 12 小时。然后样品在 57±4℃环境下经受一个阻值小于 0.1Ω的外部电路短路。

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.

样品温度到 57±4℃之后,短路时间需持续 1 小时，大型电池短路温度下降到最大温升的一半或低于 57±4℃。

Requirement 要求：

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Cells and batteries meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire during the test and within six hours after the test.
要求样品外表面温度不超过170℃, 且试验后6 小时内无解体, 无破裂, 无起火。

Data数据：

No. 编号	Peak temperature(℃) 最高温度	No disassembly, No rupture and no fire 无解体、无破裂和无起火
B01	57.3	PASS/合格
B02	57.1	PASS/合格
B03	57.5	PASS/合格
B04	57.4	PASS/合格
B05	57.6	PASS/合格
B06	57.8	PASS/合格
B07	57.7	PASS/合格
B08	57.9	PASS/合格

Test T.6: Impact (applicable to cylindrical cells not less than 18 mm in diameter) / Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18 mm in diameter)撞击(适用于直径不小于18 毫米的圆柱形电池)/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)

Test procedure 测试程序– Impact撞击：

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 of the bar and sample in a controlled manner using a near 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.

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.

将试验样品放在平坦光滑平面上，将一根长度不少于7cm的316型不锈钢棒横放在试样中心后，将一质量为9.1kg的物体从61±2.5cm 的高度落向样品。待测试电池纵轴与平面平行，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。每个样品只经受一次撞击。

Test Procedure测试程序– Crush挤压：

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;

Example: The force shall be applied by a hydraulic ram with a 32 mm diameter piston until a pressure of 17

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

MPa is reached on the hydraulic ram.

(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.

将样品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)施加的力量达到13KN± 0.78KN；

(b)样品的电压下降至少100毫伏；

(c)样品变形达原始厚度的50%或以上。

棱柱形或袋装样品应从最宽的一面施压，纽扣/硬币形样品应从其平坦表面施压，圆柱形样品应从与纵轴垂直的方向施压。每个样品只经受一次挤压。

Requirement 要求:

Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.

要求样品的最高表面温度不超过170℃，且试验后6个小时之内试验样品无解体和无起火。

Data数据（Impact撞击）：

No.编号	Peak temperature 最高温度(℃)	No disassembly, No fire 无解体、无起火
C01	96.5	PASS/合格
C02	98.1	PASS/合格
C03	97.4	PASS/合格
C04	99.0	PASS/合格
C05	100.5	PASS/合格
C06	101.3	PASS/合格
C07	99.9	PASS/合格
C08	98.5	PASS/合格
C09	96.7	PASS/合格
C10	97.6	PASS/合格

Test T.7: Overcharge 过度充电

Test procedure 测试程序：

The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows:

(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.

(b)when the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

shall be 1.2 times the maximum charge voltage.

Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.

以2 倍制造厂推荐的最大持续充电电流对样品充电，本测试最小电压为:

(a)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该是厂家标定最大充电电压的两倍或者22V之中的较小者。

(b)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该1.2 倍的厂家标定最大充电电压。

20±5℃的环境温度下，试验持续24 小时。

Requirement 要求：

Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.

要求样品在试验中和试验后7 天内无解体和无起火。

Data数据:

No. 编号	No disassembly, No fire 无解体、无起火
B09	PASS/合格
B10	PASS/合格
B11	PASS/合格
B12	PASS/合格
B13	PASS/合格
B14	PASS/合格
B15	PASS/合格
B16	PASS/合格

Test T.8: Forced discharge (for cell)强制放电

Test procedure测试程序：

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).

20±5℃的环境温度下，将样品连接在12V 的直流电源上进行强制放电，此直流电源提供给每个试验样品初始电流为制造商指定的最大放电电流。

对于指定的放电电流则需要和测试样品串联一个匹配的电阻，每一个样品的强制放电时间等于额定容量除以初始的测试电流。

Requirement要求

Primary or rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.

要求样品在试验中和试验后7 天内无解体和无起火。

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Data数据：

No. 编号	No disassembly and no fire 无解体、无起火
C11	PASS/合格
C12	PASS/合格
C13	PASS/合格
C14	PASS/合格
C15	PASS/合格
C16	PASS/合格
C17	PASS/合格
C18	PASS/合格
C19	PASS/合格
C20	PASS/合格
C21	PASS/合格
C22	PASS/合格
C23	PASS/合格
C24	PASS/合格
C25	PASS/合格
C26	PASS/合格
C27	PASS/合格
C28	PASS/合格
C29	PASS/合格
C30	PASS/合格

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Ⅳ、THE PHOTO OF SAMPLE 样品图片

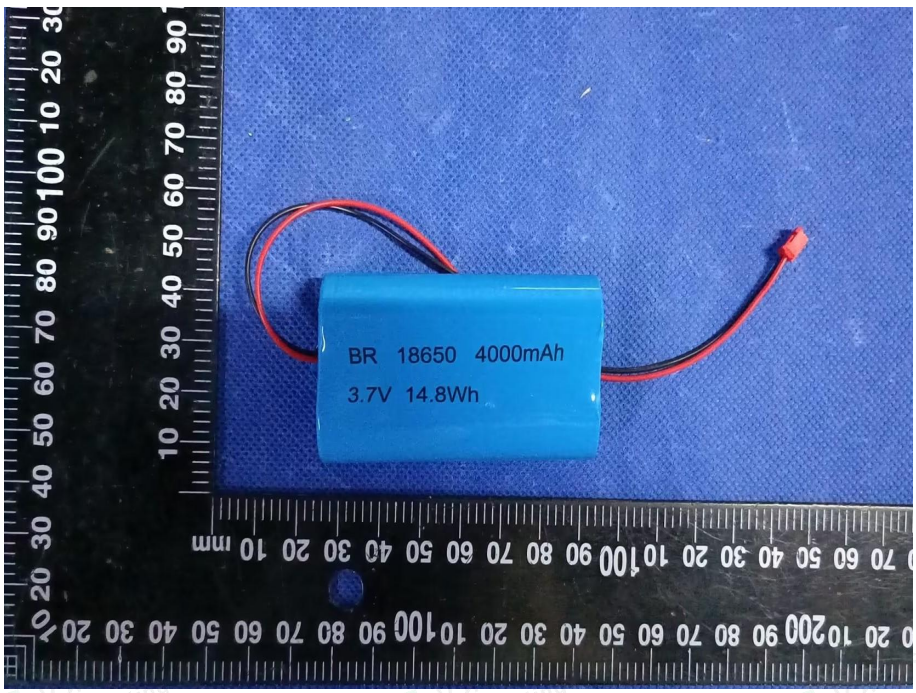


Figure 1

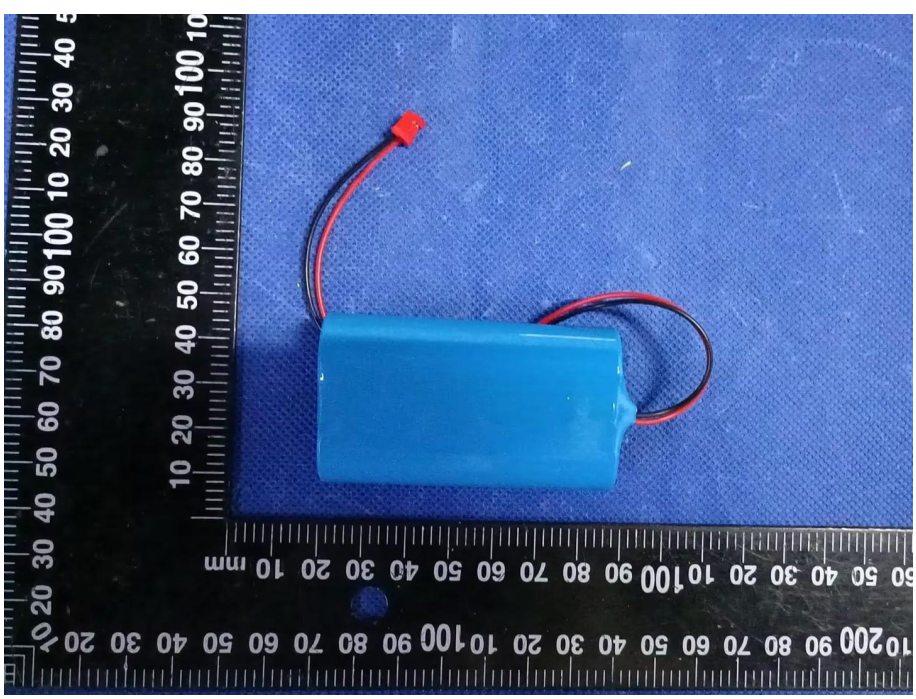


Figure 2

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

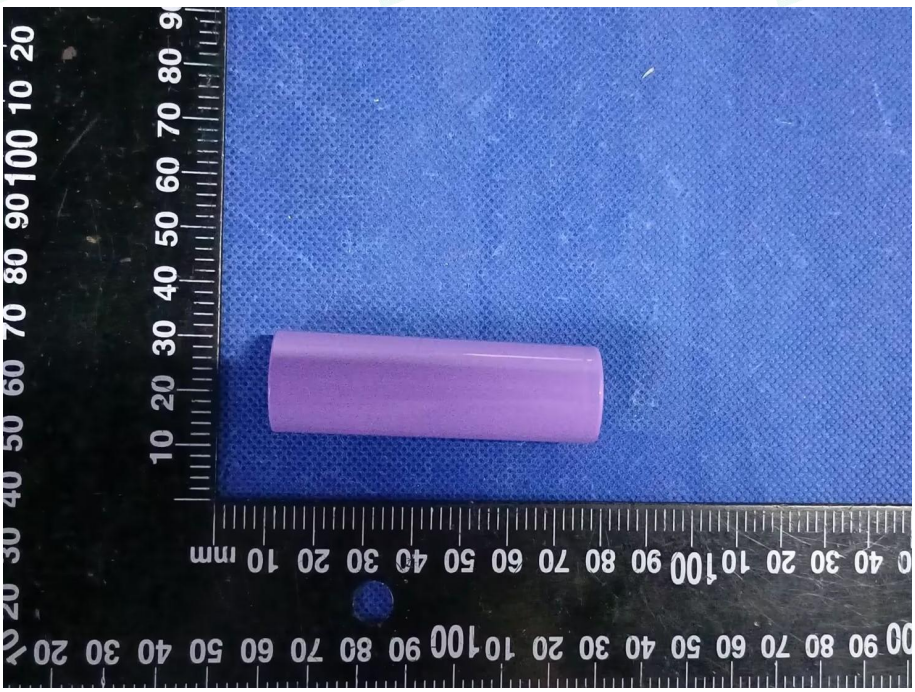


Figure 3

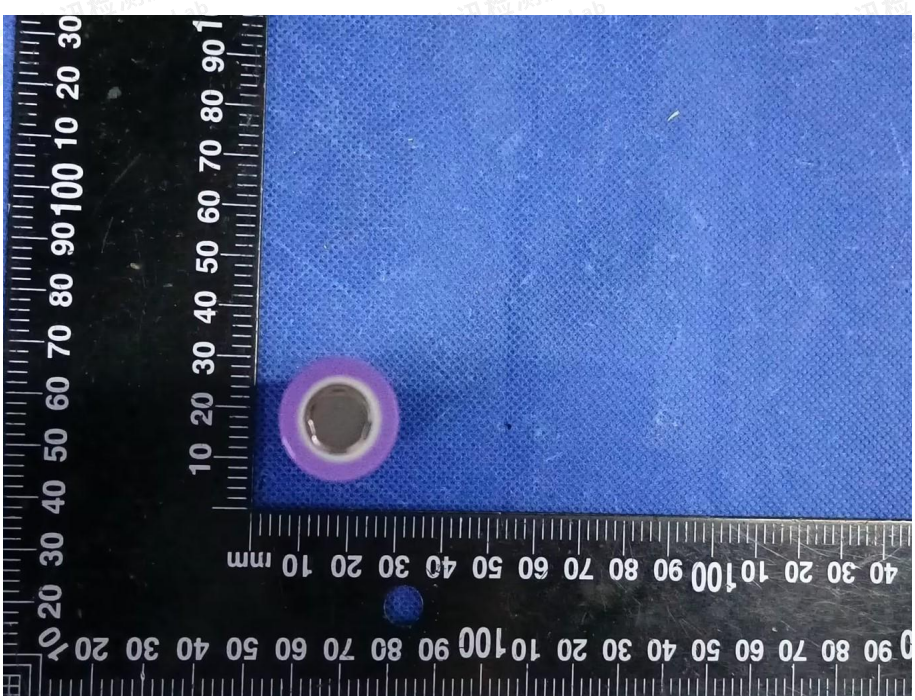


Figure 4

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

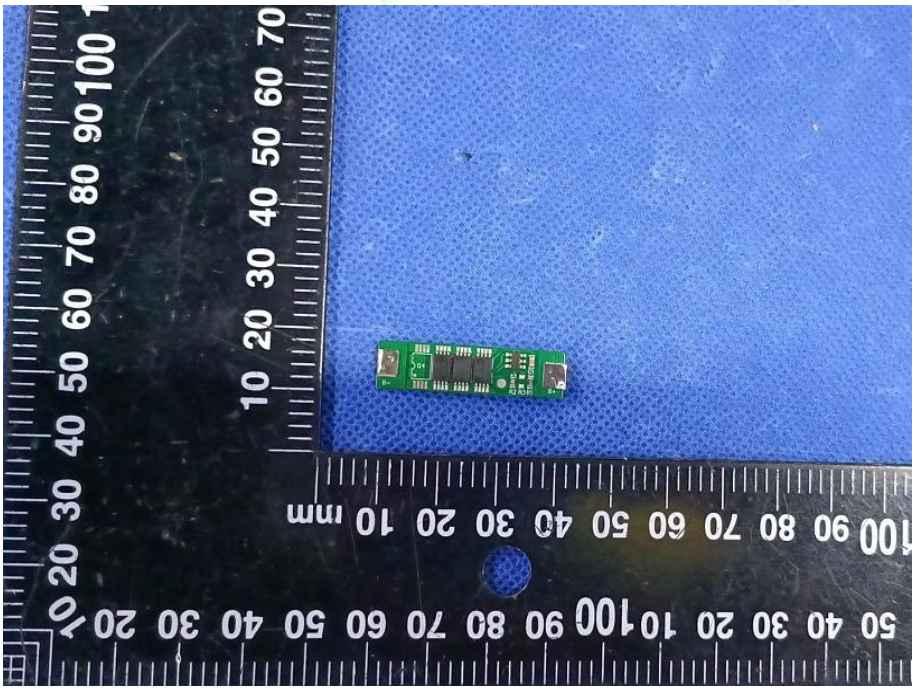


Figure 5

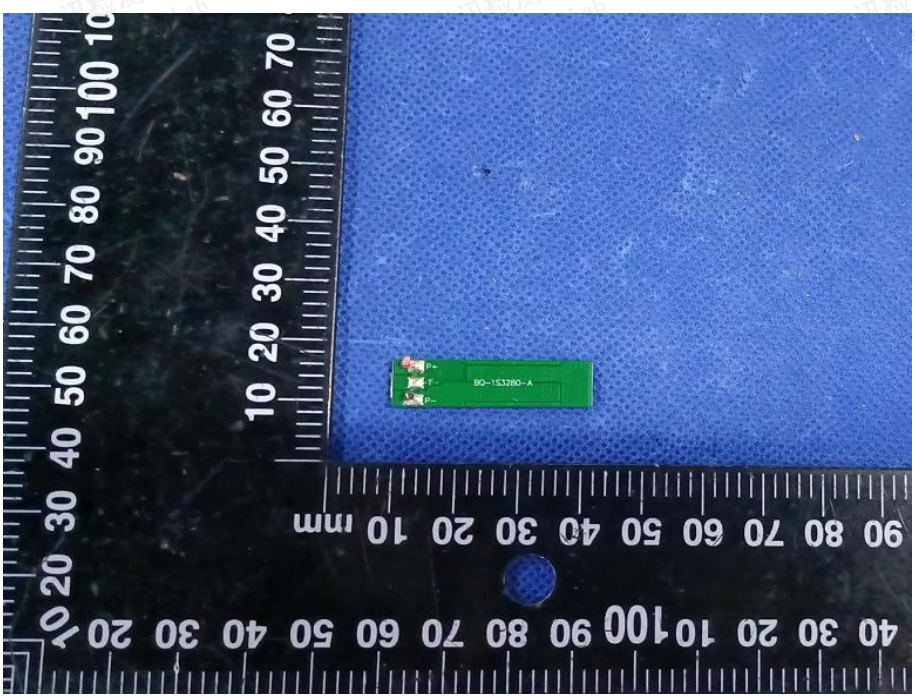


Figure 6

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity

Important Notice

注意事项

1. The test report is invalid without the official stamp of LCS.

本报告书无LCS盖章无效。

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

本报告书无批准人、审核人、及主检人签名无效。

3. Nobody is allowed to partly photocopy this test report without written permission of LCS.

未经LCS书面同意，不得部分地复制本报告书。

4. The report is invalid when anything of following happens – illegal transfer, reproduce, embezzlement, imposture, modification or tampering in any media form.

私自转让、复制、盗用、冒用、涂改、或以任何媒体形式篡改的报告书无效。

5. Product information and customer information provided by the applicant, we are not responsible for its authenticity.

产品信息和客户信息由申请人提供，我们不对其真实性负责。

6. The test report is valid for the tested samples only.

本报告仅对本次测试样品有效。

7. The Chinese contents in this report are only for reference.

本报告中的中文内容仅供参考。

8. Objections to the test report must be submitted to LCS within 15 days.

对报告书若有异议，应于收到报告之日起15天内向本公司提出。

End of report

深圳立讯检测股份有限公司 | 地址：深圳市宝安区沙井街道衙边社区衙边学子围巨基工业园 A 栋 101、201，C 栋 301
Shenzhen LCS Compliance Testing Laboratory Ltd. | Add: 1-2F, Building A&3F, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
电话 Tel: +(86) 0755-82591330 | 邮箱 E-mail: webmaster@lcs-cert.com | 网址 Web: www.lcs-cert.com
扫码查询真伪 Scan code to check authenticity