



中国认可  
检验  
INSPECTION  
CNAS IB0078

危险物品  
DANGEROUS GOODS

仅限货机运输

# 航空运输条件鉴别报告书

## Identification and Classification Report for Air Transport of Goods

报告编号:

PEKSZ202212315084PXY370001

此报告本年度有效  
有效期至2023年12月31日

Issued No.:

生效日期:

2023. 01. 04

Effective Date:

委托单位:

云南路飞新能源材料有限公司

Applicant:

Yunnan Road Fei New Energy Materials Co., Ltd.

物品名称:

锂离子电芯 645464 3.85V 4000mAh 15.4Wh

Name of Goods:

Lithium ion cell 645464 3.85V 4000mAh 15.4Wh

北京迪捷姆空运技术开发有限公司

Beijing DGM Air Transport Technology Development Co., Ltd.



# 报告书使用约定

## Terms of the Using of the Report

1. 本公司依据本年度国际航协《危险品规则》以及委托人（托运人或其代理人）提供的物品及其运输信息，确定货物的航空运输条件并出具此报告书。

The report is issued by DGM China according to IATA *Dangerous Goods Regulations* published in the current year and the information of the goods and the information of its shipping provided by the applicant (shipper or his agent).

2. 依据鉴别的需要，本公司要求委托人提供真实、完整的货物样品及资料。

According to the demand of identification and classification, DGM China requires the applicant to provide true and exact sample and data of the cargo.

3. 委托人保证申报的物品和/或提供的样品与交运的货物是同一种物质。

The applicant guarantees that the declared goods and/or the sample who provides should be identical with the contents of cargo that is to be transported.

4. 本公司仅对样品的鉴别结果负责。

DGM China is only responsible for the identification and classification of the sample provided by the applicant.

5. 本报告书经主检员、审核人和批准人签字并加盖本公司印章后生效。

This report will be effective only after it is signed by the inspector, checker and approver, and stamped by DGM China.

6. 未经本公司书面批准，不得复制本报告书。

The duplicating of this report is prohibited without the written approval of DGM China.

7. 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。

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

8. 为适应国际航协《危险品规则》的年度变化，报告书仅在本年度内有效。

This report is only valid within the year in which the IATA *Dangerous Goods Regulations* is effective.

地址：北京首都国际机场货运北路天竺综合保税区BGS货运楼249室

邮编：101300

电话：010-69479673

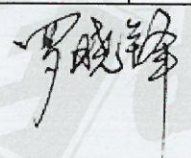
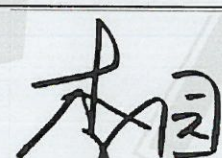

传真：010-69479621

网址：[www.dgmchina.com.cn](http://www.dgmchina.com.cn)

E-mail：[test@dgmchina.com.cn](mailto:test@dgmchina.com.cn)





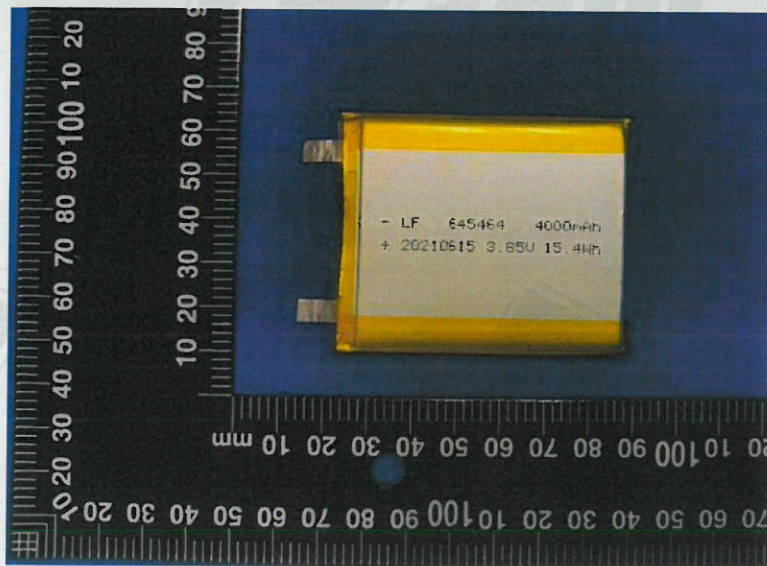
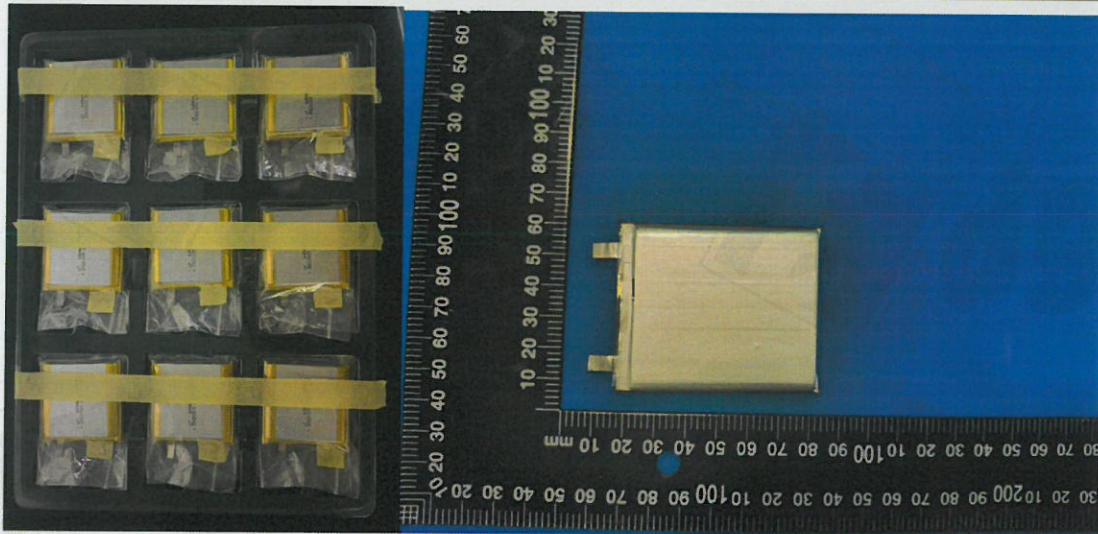
项目编号 Item No.		PEKSZ202212315084		
物品名称 Name of Goods	中文 Chinese	锂离子电芯 645464 3.85V 4000mAh 15.4Wh		
	英文 English	Lithium ion cell 645464 3.85V 4000mAh 15.4Wh		
鉴别结论 Conclusions		<p>该货物为锂离子/聚合物电芯，单独包装。额定瓦特小时为15.4Wh。已通过 UN38.3 测试，已通过包装件1.2米跌落试验，包装件通过3米堆码试验，每个包装件上均有锂电池标记。</p> <p>参考有关资料，根据DGR有关规定，该物质分类识别为第9类（或项）危险品，UN3480。 This goods is lithium ion/polymer cell,packed individually.Watt-hour rating is 15.4Wh.Each battery is of a type proved to meet the Requirements of each test in the UN MANUAL OF TESTS AND CRITERIA, Part III, sub-section 38.3,Each package is capable of withstanding a 1.2m drop test in any orientation without damage to the cells contained therein, without shifting of the contents so as to allow cell to cell contact and without release of contents,The package is capable of withstanding the 3m stack test,Each package is marked with lithium battery mark.</p> <p>According to IATA DGR this substance is classified as dangerous goods Class (or division)9,UN3480.</p>		
建议运输条件 Suggestion for Transport Condition	UN/ID 编号 UN/ID No.	运输专用名称 Proper Shipping Name		类或项 Class or Div. (次要危险性) (Subsidiary Risk)
	UN3480	Lithium ion batteries		9
	包装说明 Packing Inst.	客货机 Passenger and Cargo Aircraft	Forbidden	
		仅限货机 Cargo Aircraft only	965 IB	
	注意事项 Remarks	<p>每一单电芯必须做好防短路措施，并装入坚固外包装内。 each single cell must be packed in such a way as to prevent short circuits under the normal conditions and packed in strong outer packing.</p>		
主检员 Prepared by:	审核人 Checked by:	批准人 Approved by:	报告单位（盖章） Stamp	
				

制单： 彭新玉



# 锂离子电芯 645464 3.85V 4000mAh 15.4Wh

PEKSZ202212315084



# 锂电池 UN38.3 试验概要 Lithium Battery Test Summary

项目编号: PEKSZ202212315084

单位信息 Company Information					
委托单位 Consignor	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd. 云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province 电话/Tel: 0875-5189928 邮箱/Mail: 2411318566@qq.com				
生产单位 Manufacturer	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd. 云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province 电话/Tel: 0875-5189928 邮箱/Mail: 2411318566@qq.com				
测试单位 Test Lab	深圳市优瑞特检测技术有限公司 深圳市龙岗区龙岗街道南联第六工业区方兴科技园 C 区 15 栋一楼 电话/Tel: 0086-755-27817553 邮箱/Mail: battery@ort-ts.com 网址/Website: http://www.ort-ts.com				
电池信息 Battery Information					
名称 Name	锂离子电芯 Lithium ion cell	电池/电芯类别 Battery/Cell Classification		锂离子电芯 Li-ion Cell	
型号 Type	645464	商标 Trademark		/	
额定电压 Normal Voltage	3.85V	额定容量 Rated Capacity		4000mAh	
额定能量 Watt-hour rating	15.4Wh	外观/Appearance		银色长方体 Silver Cuboid	
质量/Mass	51.9g	锂含量/Li Content		不适用 N/A	
测试信息 Test Information					
测试报告编号 Test Report Number	ORTSZB01210601025		测试报告签发日期 Date of Test Report	2021-08-02	
测试标准 Edition of UN Manual of Tests and Criteria Used	联合国《关于危险货物运输的建议书-试验和标准手册》(第 6 版修订 1) 38.3 节 UN Recommendations on the Transport of Dangerous Goods Manual of Tests and Criteria ST/SG/AC.10/11/Rev.6/Amend 1/Subsection 38.3				
T.1: 高度模拟 Altitude Simulation	通过 Pass	T.2: 温度试验 Thermal Test	通过 Pass	T.3: 振动 Vibration	通过 Pass
T.4: 冲击 Shock	通过 Pass	T.5: 外部短路 External Short Circuit	通过 Pass	T.6: 撞击/挤压 Impact/Crush	通过 Pass
T.7: 过度充电 Overcharge	不适用 N/A	T.8: 强制放电 Forced Discharge	通过 Pass	/	
UN38.3.3(f)	不适用 N/A		UN38.3.3(g)		不适用 N/A
签名 Signatory	 检验员		签发日期 Issued Date	 2022.12.31	
职务 Title					



中国认可  
检验  
INSPECTION  
CNAS IB0396

# 货物运输条件鉴定报告

Certificate for Safe Transport of Goods

(空运/By Air)

危险物品  
DANGEROUS GOODS

## 锂电池-符合包装说明 965 第 IB 部分

物品名称: 锂离子电芯 645464 3.85V, 4000mAh, 15.4Wh  
Goods Name Lithium ion cell 645464 3.85V, 4000mAh, 15.4Wh

委托单位: 云南路飞新能源材料有限公司  
Client Yunnan Lufei New Energy Materials Co., Ltd.

报告编号: DGT2021DL0812F  
Report No. \_\_\_\_\_

签发日期: 2021-07-06  
Issued Date \_\_\_\_\_

中国民用航空总局第二研究所  
The Second Research Institute of CAAC



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## 声 明

### STATEMENT

1.本《鉴定报告》依据本年度国际航协《危险品规则》、委托人（托运人或代理人）提供的物品及其运输信息出具。

The certificate is issued by The Second Research Institute of CAAC according to IATA DGR published in the current year and the information of the goods and its shipment provided by the client (shipper or its agent).

2.本《鉴定报告》的鉴定结论仅对样品负责。

The certificate is only responsible for the sample provided by the client.

3.客户必须如实提供样品及资料，并保证申报品名和样品与运输货物相同。

The client should provide samples and relevant data, at the same time, and they should guarantee that the name they declared is the same as the samples they provided and the goods to be transported.

4.本《鉴定报告》经检验人、审核人、批准人签字并加盖检验印章后生效。

The certificate will be effective only after it is signed by the inspector, checker, and approver, and stamped.

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The certificate must not be copied wholly or partly. The certificate is invalid if anything of the following happens, such as illegal transfer, reproduction, embezzlement, imposture, modification or tampering in any media form.

6.本《鉴定报告》不考虑国家及经营人差异。

The certificate takes no account of the State and Operator Variations.

7.为适应国际航协《危险品规则》的年度变化，本《鉴定报告》仅在本年度内有效。

This certificate is only valid within the year in which the IATA Dangerous Goods Regulations is effective.

8.对《鉴定报告》若有异议，应于收到报告之日起十五日内向本机构提出。

Objections to the certificate must be submitted to The Second Research Institute of CAAC within 15 days.

地址：成都双流西航港经济开发区腾飞路 765 号

Address: No.765, Tengfei Road, Xihanggang Economic Development Zone, Shuangliu, Chengdu, Sichuan

电话(Tel): 028-64458155 028-64458195

传真(Fax): 028-64458195

邮编(Post Code): 610200

报告查询网址: <http://www.caacdgt.com>

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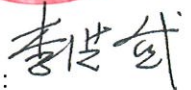
### 货物运输条件鉴定报告

### Certificate for Safe Transport of Goods

<b>鉴定目的</b> <b>Inspection Purpose</b>	是否属于航空运输危险品 Dangerous Goods or not restricted		
<b>样品编号</b> <b>Sample No.</b>	DGT2021DL0812	<b>接样日期</b> <b>Receiving Date</b>	2021-07-5
<b>鉴定依据</b> <b>Criteria</b>	国际航空运输协会《危险品规则》62版 IATA Dangerous Goods Regulations (DGR) 62nd Edition		
<b>样品名称</b> <b>Sample Name</b>	锂离子电芯 645464 3.85V, 4000mAh, 15.4Wh Lithium ion cell 645464 3.85V, 4000mAh, 15.4Wh		
<b>委托单位</b> <b>Client</b>	云南路飞新能源材料有限公司 Yunnan Lufei New Energy Materials Co., Ltd.		
<b>电池生产商</b> <b>Manufacturer</b>	云南路飞新能源材料有限公司 Yunnan Lufei New Energy Materials Co., Ltd.		
<b>物品信息</b> <b>Sample Information</b>	<p><b>-电池信息/Battery information:</b> 型号/Model: 645464 3.85V, 4000mAh, 15.4Wh 类型/Type: 锂离子电芯/lithium ion cell 商标/Mark brand: /</p> <p><b>-包装信息/Package information:</b> 每个包装件中锂电池净重不超过 10.0kg。 Net quantity of lithium battery per package is no more than 10.0kg. 包装件内含 189 个锂电池。 The package contains 189 lithium batteries.</p>		
<b>鉴定结论</b> <b>Conclusion</b>	<p>1.危险性识别 (Hazards Identification) 危险类别/Class: 9 UN Number: UN 3480 Proper Shipping Name: Lithium ion batteries</p> <p>2.按照 IATA DGR 办理的类型 (Suggestion according to IATA DGR) 该样品满足包装说明 965 一般要求和第 IB 部分的规定。 The sample meets the requirements in General Requirements and section IB of Packing Instruction 965.</p> <p>3.包装要求(Packing requirements) 按包装说明 965 第 IB 部分要求办理。 The sample is packaged according to the Packing Instruction 965 section IB.</p> <p>4.仅限货机运输 Cargo Aircraft Only.</p> <p style="text-align: right;">鉴定单位盖章(Stamp) 签发日期(Issued Date): 2021-07-06</p>		
<b>备注 (Comment)</b>	/		

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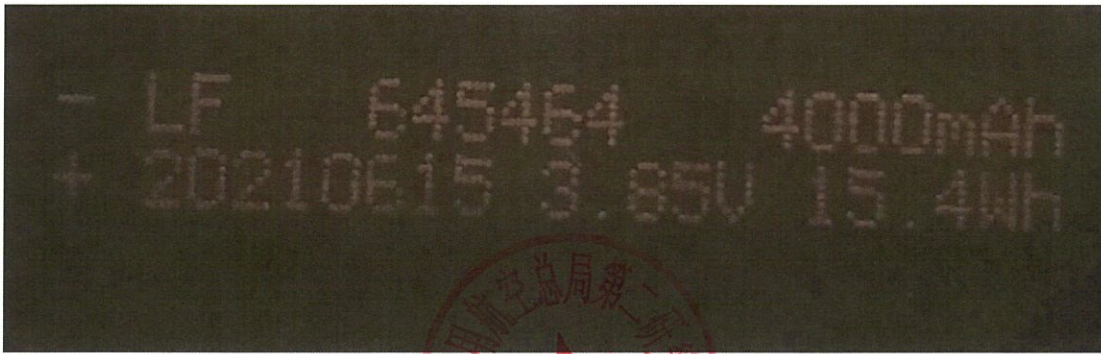
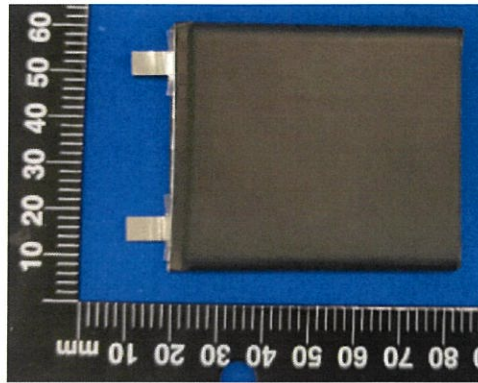
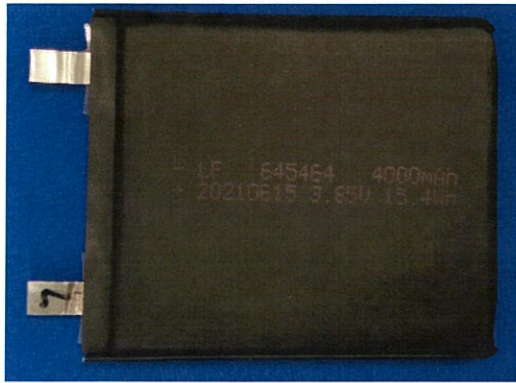
检验 (Inspected by): 
 审核 (Checked by): 
 批准 (Approved by): 

## 货物运输条件鉴定报告

### Certificate for Safe Transport of Goods

检验结果及其他事项 Inspection results and other information	
1	<p>本报告所述锂电池按照《危险品规则》（62版）3.9.2.6.1（e）规定的质量管理体系进行制造。 Lithium batteries listed in this report are manufactured under the quality management program as described in IATA DGR 62nd Edition 3.9.2.6.1（e）.</p> <p>本报告所述锂电池不属于有缺陷和因安全原因而召回的锂电池。 Lithium batteries listed in this report are not defective and returned to the manufacturer for safety reasons.</p> <p>本报告所述锂电池不属于以回收或处置为目的的航空运输，不属于废弃锂电池。 Lithium batteries listed in this report are not waste, shipped for recycling or disposal ones.</p>
2	<p>本报告所述锂电池已经通过联合国《试验与标准手册》第III部分第 38.3 节的测试。测试摘要详见附件。 Lithium batteries listed in the report are of type proved to meet the requirements of each test of the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. The test summary is attached.</p> <p>本报告所述锂电池包装件能够承受 1.2 米跌落试验。 The package is capable of withstanding a 1.2 m drop test.</p>
3	<p>根据委托人声明，本报告所述锂电池的荷电量不超过其设计容量的 30%。 According to the statement from the client, the state of charge (Soc) of Lithium cells and batteries listed in this report is not exceeding 30% of their rated design capacity.</p>
4	<p>本报告所述锂电池放在完全封闭的内包装中，然后再放在坚固的外包装内。 Lithium batteries must be placed in inner packaging that completely enclose the cell or battery then placed in strong outer packaging.</p> <p>本报告所述锂电池具有适当的防外部短路措施。 Lithium batteries are equipped with an effective means of preventing external short circuits.</p>
5	<p>电池已固定不能移位。 The battery is fixed and can't move.</p>
6	<p>本报告所述锂电池不得与第1类爆炸品（1.4S项除外），2.1项易燃气体，第3类易燃液体，4.1项易燃固体和5.1项氧化性物质包装在同一个外包装中。 Lithium batteries must not be packed in the same outer packaging with dangerous goods classified in Class 1(explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).</p>
7	<p>每个包装件必须耐久清晰的标识第9类锂电池危险性标签、锂电池标记及仅限货机标签。包装件必须有足够的位置使得所要求的标记贴在包装件的同一面，而不使标记折叠。 Each package must be durably and legibly marked with the Class 9-Lithium Battery hazard label, the lithium battery mark and the Cargo Aircraft Only label. The package must be of such size that there is adequate space to affix the mark on one side of the package without the mark being folded.</p>
8	<p>附图</p>

电池/Battery



包装件/Package:



以下无正文内容



附件:

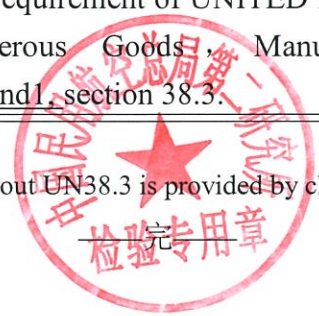
## 测试摘要 TEST SUMMARY

电池生产商信息/Manufacturer information			
电池生产商 Manufacturer	云南路飞新能源材料有限公司 Yunnan Lufei New Energy Materials Co., Ltd.		
生产商地址 Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园1号 No.1 high tech Industrial Park, Tengchong border economic development and cooperation zone, Baoshan City, Yunnan Province		
联系电话 Tell	0875-5189928	电子邮箱 E-mail	13530940968@163.com
网站地址/website	/		
电池信息/Battery information			
电池类型 Type	锂离子电芯 Lithium ion cell	型号 Model	645464
额定能量 Capacity	3.85V, 4000mAh, 15.4W	电池质量 Mass	约 52.0g
物理形状说明 Physical description	黑色长方体 Black cuboid		
测试机构信息/Test laboratory information			
测试机构 test laboratory	深圳市优瑞特检测技术有限公司 Shenzhen ORT Technical Services Co., Ltd.		
机构地址 Address	广东省深圳市龙岗区龙岗街道南联第六工业园方兴科技园C区15栋一楼 1/F, Building 15, Fangxing Science and Technology Park, Nanlian No. 6 Industrial Zone, Longgang Street, Longgang District, Shenzhen, Guangdong, China		
联系电话/Tell	0755-27817553	电子邮箱 E-mail	battery@ort-ts.com
网站地址/website	http://www.ort-ts.com		
测试报告信息/Test report information			
报告编号/Test report ID	ORTSZ210520010212		
接样日期 Receiving date	2021-05-31	测试日期 Test date	2021-05-31 至 2021-06-15
测试人员 Tester	刘文威	批准人员 Approver	周志强

测试项目及结论/Test item and result			
条款/Clause	测试项目/Test Item	结论/Result	备注/Remark
38.3.3(f)	小型集成电池 small battery assemblies	不适用 N/A	/
38.3.3(g)	大型集成电池 Large battery assemblies	不适用 N/A	/
38.3.4.1	高度模拟/Altitude simulation	通过/Pass	/
38.3.4.2	温度试验/Thermal test	通过/Pass	/
38.3.4.3	振动/Vibration	通过/Pass	/
38.3.4.4	冲击/Shock	通过/Pass	/
38.3.4.5	外部短路/External short circuit	通过/Pass	/
38.3.4.6	重物冲击/Impact	不适用 N/A	/
	挤压/Crush	通过/Pass	/
38.3.4.7	过度充电/Overcharge	不适用 N/A	/
38.3.4.8	强制放电/Forced discharge	通过/Pass	/
<p><b>结论/Result:</b></p> <p>样品满足联合国《关于危险货物运输的建议书—试验与标准手册》第6修订版修正1第38.3节的测试要求。</p> <p>The sample meets the requirement of UNITED NATION Recommendation on the Transport of Dangerous Goods, Manual of Test and Criteria ST/SG/AC.10/11/Rev.6,amend1, section 38.3.</p>			

\*测试摘要信息由委托客户提供。

The information of Test Summary about UN38.3 is provided by client.







云南路飞新能源材料有限公司  
Yunnan Road Fei New Energy Materials Co.,Ltd.

版本: A.0

电芯型号: 645464/4.4V

日期: 2021-4-29

# Product Specification

## for Polymer Lithium-ion Batteries

### 聚合物锂离子电芯产品规格书

Model Number: 645464-4000mAh

产品型号: 645464-4000mAh

Prepared By 编制	Verified By 审核	Approved By 批准

	Signature 签署	Date 日期
Customer 客户方确认		
Approval 客户方确认	Company name: 公司名称	
	Company Stamp: 盖章	
客户代码		



云南路飞新能源材料有限公司  
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PRODUCT SPECIFICATION FOR **645464-4000mAh**

版本: A.0

电芯型号: 645464/4.4V

日期: 2021-4-29

版本号	内容描述	修改人	生效日期
A.0	新版发行		2021-4-29





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版本: A.0

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PRODUCT SPECIFICATION FOR 645464-4000mAh

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1. SCOPE

范围

This document describes the performance characteristics and testing methods for Polymer Li ion batteries produced by Yunnan Road Fei New Energy Materials Co.,Ltd.

本文件描述了云南路飞新能源材料有限公司出品的聚合物锂离子电池的产品规格、性能测试方法

2. PRODUCT TYPE AND MODEL NUMBER

产品类别和产品型号

2.1 PRODUCT TYPE

类别

Polymer Lithium-ion Battery

聚合物锂离子电池

2.2 MODEL NUMBER

产品型号: 645464

3. SPECIFICATION

产品基本特性

No. 序号	Item 项目	Characteristics 特性	Remarks 备注
3.1	Capacity 容量	Minimum: 4000mAh 最小: 4000mAh 典型: 4020mAh Typical:4020mAh	According to the standard charging after full charge, constant current discharge 0.2C to 3.0V. 按标准充电方式充满电后, 以 0.2C 恒流放电到 3.0V
3.2	Nominal Voltage 工作电压	3.85V	
3.3	Charging Cut-off Voltage 最大充电终止电压	4.4V	
3.4	Discharge Cut-off Voltage 最小放电终止电压	3.0V	
3.5	Max. Constant Charge Current 最大持续充电电流	2000mA (0.5C)	
3.6	Max. Continuous Discharge Current 最大持续放电电流	2000mA (0.5C)	
3.7	Operating Temperature 工作温度范围 (不可在极限温度下长时间持续充放电)	Charging/充电	5~15°C: 0.2C CCCV to 4.4V
			15~45°C: 0.5C CCCV to 4.4V
		Discharging/放电	-20~10°C: 0.2C DC to 3.0V
			11~50°C: 0.5C DC to 3.0V



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3.8	Storage Condition ( 50% of fully charge state ) 存储条件 (带电量 50%)	1 个月内 -10~45°C -10~45°C for 1Month 6 个月内 -10~35°C -10~35°C for 6Months
3.9	Weight 重量	Approximate value 约 51g
3.10	Storage Voltage 存储电压	3.70-4.00V
3.11	Environmental request 环保要求	the materials of the product and packaging accord with RoHS standard, there will be a RoHS Id on the box. 满足 ROHS 要求

4. Dimensions

外形尺寸

Please refer the drawing in appendix.

见附图

5. Appearance

外观

No scratches, dirt, defect, leakage of electrolyte or gassing should be observed as a new product.

电池表面无划伤、脏点、变形、漏液、鼓气等缺陷。

6. Characteristics

特性

6.1 Electrochemical performance characteristics

电性能

No. 序号	Item 项目	Testing Method 测试方法	Requirements 标准
1	Standard Charge 标准充电	0.2C constant current charge to 4.4V, then constant Voltage until the charge current decrease to 0.01C. 0.2C 恒流充电至 4.4V, 再 4.4V 恒压至 0.01C	Charge Time ≤6.5hrs 充电时间 ≤6.5 小时
2	Rapid Charge 快速充电	0.5C constant current charge to 4.4V, then constant Voltage until the charge current decrease to 0.01C. 0.5C 恒流充电至 4.4V, 再 4.4V 恒压至 0.01C	Charge Time ≤3.5hrs 充电时间 ≤3.5 小时
3	Nominal Capacity 标称容量	(per 6.1.1) at room temp. (23±2 °C ), rest for 0.5-1 hrs then discharge at a constant current of 0.2C to 3.0V. 在环境温度为(23±2)°C的条件下按 6.1.1 完全充电后静置 0.5~1 小时, 以 0.2C 放电至 3.0V。	≥4000mAh



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4	Cycle (23°C) 循环寿命 (23°C)	<p>At 23 ± 2 °C ambient temperature, With 0.2C charging and discharging, between each cycle for 10 minutes, in this way for 300C.</p> <p>在 23°C ± 2°C 的环境温度下, 用 0.2C 充电和放电, 每次循环之间搁置 10 分钟, 循环 300 周。</p>	<p>Remaining capacity ≥ 85% Nominal capacity.</p> <p>剩余容量 ≥ 85% 标称容量</p>															
5	Internal Impedance 内阻	<p>Internal impedance is measured on a 50% charged battery at 1KHz AC at ambient temperature (23 ± 2) °C.</p> <p>环境温度 (23 ± 2) °C, 电池荷电 50% 状态时以 1KHz 交流电测得的内部阻抗。</p>	≤ 45m Ω															
6	Capacity Retention 荷电保持能力	<p>After fully charged (23 ± 2) in the 28 days of storage environment temperature, discharge at 0.2C<sub>5</sub>A to 3.0V. Then according to the standard charging mode, and then discharge at 0.2C<sub>5</sub>A to 3.0V. 完全充电后在 (23 ± 2) °C 的环境中储存 28 天, 以 0.2C<sub>5</sub>A 放电至 3.0V。然后按标准充电方式充电后, 再以 0.2C<sub>5</sub>A 放电至 3.0V。</p>	<p>Remaining capacity ≥ 85% initial capacity.</p> <p>放电容量 ≥ 85% 标称容量</p> <p>recovery capacity ≥ 90% initial capacity</p> <p>恢复容量 ≥ 90% 标称容量</p>															
7	Discharge Rate Characteristic 倍率放电特性	<table border="1" style="width: 100%; text-align: center;"> <tr> <th style="text-align: left;">Charge current/ 充电电流</th> <th colspan="3" style="text-align: left;">Discharge current/放电电流</th> </tr> <tr> <td style="text-align: center;">(0.2C)</td> <td style="text-align: center;">(0.2C)</td> <td style="text-align: center;">(0.5C)</td> <td style="text-align: center;">(1.0C)</td> </tr> <tr> <td style="text-align: center;">(0.2C)</td> <td style="text-align: center;">100%</td> <td style="text-align: center;">95%</td> <td style="text-align: center;">90%</td> </tr> </table> <p>Cell shall be charged according to Per.6.1.1, and discharged with different current respectively to 3.0V. The cells should be performed at 23°C ± 2 °C</p> <p>电芯按 6.1.1 充满电, 分别以不同的倍率放电到 3.0V。电芯必须在 23°C ± 2 °C 的温度下进行充放电。</p>	Charge current/ 充电电流	Discharge current/放电电流			(0.2C)	(0.2C)	(0.5C)	(1.0C)	(0.2C)	100%	95%	90%				
Charge current/ 充电电流	Discharge current/放电电流																	
(0.2C)	(0.2C)	(0.5C)	(1.0C)															
(0.2C)	100%	95%	90%															
8	Temperature Characteristic 温度特性	<table border="1" style="width: 100%; text-align: center;"> <tr> <th style="text-align: left;">Discharge current/放电电流</th> <th colspan="4" style="text-align: left;">Discharge temperature/放电温度</th> </tr> <tr> <td style="text-align: center;">(0.2C)</td> <td style="text-align: center;">-20°C</td> <td style="text-align: center;">0°C</td> <td style="text-align: center;">25°C</td> <td style="text-align: center;">50°C</td> </tr> <tr> <td style="text-align: center;">(0.2C)</td> <td style="text-align: center;">30%</td> <td style="text-align: center;">85%</td> <td style="text-align: center;">100%</td> <td style="text-align: center;">95%</td> </tr> </table> <p>Cell shall be charged according to Per.6.1.1, and discharged with different temperature respectively to 3.0V at 0.2C. The cells must be stored for two hours at the corresponding temperature before discharge.</p> <p>电芯按 6.1.1 充满电, 分别在不同温度放电到 3.0V。在放电前电芯必须在对应温度下储存 2 小时。</p>	Discharge current/放电电流	Discharge temperature/放电温度				(0.2C)	-20°C	0°C	25°C	50°C	(0.2C)	30%	85%	100%	95%	
Discharge current/放电电流	Discharge temperature/放电温度																	
(0.2C)	-20°C	0°C	25°C	50°C														
(0.2C)	30%	85%	100%	95%														
9	The factory voltage 出厂电压	<p>Check open circuit voltage (OCV) of cells prior to the delivery to customers</p> <p>出货之后检验</p>	3.8 ~ 3.95V															



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6.2 Safety characteristic

安全特性

No. 序号	Item 项目	Test Method 测试方法	Requirements 标准
1	Overcharge 过充	Discharge cells to 3.0V at 0.2C <sub>5</sub> A, then charge to 4.6V at 3C <sub>5</sub> A and rest for 7 hours. 电池以 0.2C <sub>5</sub> A 电流恒流放电至 3.0V, 以电流 3 C <sub>5</sub> A 限制电压 4.6V 的制式充电 7 小时。	No fire No explosion 不爆炸、不起火
2	Over Discharge 过放	Fully charge cells per 6.1.1, then discharge the battery to 3.0V with 0.2C <sub>5</sub> A mA at room temperature, connect with external load of 30 Ω for 7hours. 将电池按 6.1.1 充满电后, 在环境温度 23±2°C 的条件下, 以 0.2C <sub>5</sub> A 放电至终止电压后, 外接 30 Ω 负载电阻放电 7h.	No fire No explosion 不爆炸、不起火
3	Heat Cycle 温度循环	The cell is fully charged with standard charging method, and then it is to be stored for 6 hour at a test temperature equal to 75±2 °C, followed by a storage for 6 hour at a test temperature equal to -40±2 °C, the maximum time interval between test temperature extremes is 30 min, this procedure is to be repeated for 10 times, after which all test cells are to be stored for 6 hours at ambient temperature (23±2 °C). 将用标准充电方法充满电的电芯放入 75±2°C 的环境中搁置 6h, 再在 -40±2°C 条件下搁置 6h, 两个极端温度的变化时间间隔最长为 30min, 如此循环 10 次, 试验结束后将电芯取出, 在 23±2°C 环境中搁置 6h.	No leakage, no fire and no explosion 不泄露、不起火、不爆炸
4	Mechanical shock 机械冲击	The battery is fixed on the test equipment. Each in three perpendicular directions under the impact of an equivalent. At least one direction perpendicular to the width of the battery. Each shock according to the following method: within the first 3 ms, minimum average speed of 735 m/s <sup>2</sup> , peak acceleration should be between 1225 m/s <sup>2</sup> and 1715 m/s <sup>2</sup> , pulse duration for ms to 6 ms + 1. 将电池固定在试验设备上。在三个相互垂直的方向上各承受一次等值的冲击。至少一个方向垂直于电池的宽面。 每次冲击按下述方法进行: 在最初的 3ms 内, 最小平均加速为 735m/s <sup>2</sup> , 峰值加速应该在 1225m/s <sup>2</sup> 和 1715 m/s <sup>2</sup> 之间, 脉冲持续时间为 6ms±1ms。	No leakage, no fire and no explosion, 不泄露、不起火、不爆炸



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**6.3 Reliability**

环境适应性

No. 序号	Item 项目	Test Method 测试方法	Requirements 标准
1	Humidity Test 高温高湿	Fully charge cells per 6.1.1, stored them at $40 \pm 2^\circ\text{C}$ with 90%~95RH% for 48 hours. Then the cells are placed at room temperature to "dry out" for 2 hours. then discharge the cells to 3.0V at 0.2C <sub>5</sub> A. 将按 6.1.1 充满电的电池放入 $40 \pm 2^\circ\text{C}$ 、相对湿度为 90%~95% 的恒温湿箱中搁置 48h 后, 取出电池在环境温度 $20 \pm 5^\circ\text{C}$ 的条件下搁置 2h。以 0.2C <sub>5</sub> A 电流放电至 3.0V	No deformation, no corrosion, no leakage, no rupture, no fire and no explosion, discharge time shall not be less than 3h. 无变形、无锈蚀、不泄漏、不泄气、不破裂、不起火和不爆炸, 放电时间应不低于 3h。
2	Low Pressure Test 低压测试	The fully charged cell is to be stored for 6 hours at an absolute pressure of 11.6kpa and a temperature of $23 \pm 2^\circ\text{C}$ . 将充满电的电芯在绝对压力为 11.6kpa、 $23 \pm 2^\circ\text{C}$ 条件下贮存 6 小时。	No explosion, no fire and no leakage 不爆炸、不起火、不泄露
3	Drop Test 跌落测试	The cell is fully charged with standard charging method, standby for one hour and then it is submitted to free fall at a height of 1.0m down to one solid board with thickness of 20mm. It should be fallen for 2 times on each direction. 将电芯用标准充电方法充满电, 放置 1h, 将电芯从 1.0m 高度自由落到 20mm 厚的硬木板上。每个方向上各试验 2 次。	No leakage, no smoke, no explosion and no fire 不泄露、不冒烟, 不起火, 不爆炸
4	Vibration 振动	Battery charged by the regulation, after the battery is fixed on the vibration table, don't make the battery out of shape, with sinusoidal vibration, and within 15 min in logarithmic sweep from 7 hz frequency sweep to 200 hz and return to the 7 hz. Vibration along three mutually perpendicular direction of sample (one direction is perpendicular to the plane of the cathode) must match the sample, according to the logarithmic sweep in each direction way to 12 repetitions, vibration 3h. Logarithmic frequency sweeping method is as follows: 7 hz ~ 18 hz maintain peak acceleration of 9.8 m/s <sup>2</sup> . Hold the amplitude at 0.8 mm (displacement of 1.6 mm) until the peak acceleration of 78.4 m/s <sup>2</sup> (frequency is about 50 hz). Keep 78.4 m/s <sup>2</sup> peak acceleration until the frequency increased to 200 hz. 电池按规定充满电后, 将电池固定在振动台上, 不可使电池变形, 采用正弦波进行振动, 并以对数扫频方式在 15min 内从 7Hz 扫频到 200Hz 并返回到 7Hz。振动沿样品互相垂直的三个方向(其中一个方向必须与样品正负极所在平面垂直)进行, 每个方向按上述对数扫	No leakage, no fire and no explosion. 不泄露、不起火、不爆炸。



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频方式重复 12 次, 振动 3h。  
对数扫频方式如下: 7Hz~18Hz 保持 9.8m/s<sup>2</sup> 的峰值加速度。将振幅保持在 0.8mm (位移为 1.6mm) 直至峰值加速度达到 78.4m/s<sup>2</sup> (频率约为 50Hz)。保持 78.4m/s<sup>2</sup> 的峰值加速度直到频率增长到 200Hz。

7. Standard Testing Environment

标准测试环境

Temperature : 23 ± 2°C

温度: 23 ± 2°C

Relative humidity : 45 ± 20% (unless specially requested)

相对湿度: 45 ± 20% (除非另外要求)

8. Warranty

保质期

Warranty period for this product is 12 months starting from the date when the products left the door of manufacturer.

保质期是从出厂日期(喷码)开始起十二个月。

9. Liability

产品责任

The user has to operate the products according to the instructions printed on the battery label or follow the advice described in this "Product Specification for Polymer Lithium Ion Batteries published by Yunnan Road Fei New Energy Materials Co.,Ltd. In case the battery were overheated or even catch fire or explosion caused by mishandling of the user side, Yunnan Road Fei New Energy Materials Co.,Ltd. will not be liable for the lose caused by any of such mishandling.

Yunnan Road Fei New Energy Materials Co.,Ltd.will notify the users in written form if any modifications in specification, raw material, production process control.

您必须严格遵守云南路飞新能源材料有限公司规格书和文件后面的注释使用电池, 由于误用会引起电池过热, 发生火灾或爆炸。对于没有按照规格书进行操作所造成的任何以外事故, 云南路飞新能源材料有限公司不承担任何责任。如果规格书、原材料、生产过程或生产控制系统发生改变, 改变的信息将会随质量和可靠性数据以书面形式通知消费者。

10. Battery Packing Label

包装电池上的标示

The following warnings should be indicated on the battery pack labels.

以下警告应注明在包装后的电池上

Use a specified charger.

使用规定的充电器。

Do not throw the battery into fire, or heat.

不要将电池投入火中或加热。

Do not short-circuit the battery terminals.

不要将电池两端短路。



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Do not disassemble the battery.

不要将电池分解拆散。

11. Warnings and Cautions in Handling the Lithium-ion Battery

电池使用时警告事项及注意事项

To prevent potential leaking, overheating or explosion of batteries please be advised to take following precautions:

为防止电池可能发生泄漏,发热、爆炸,请注意以下预防措施

WARNINGS!

警告!

Do not immerse the battery in water or seawater, and keep the battery in a cool dry environment during stands by period.

严禁将电池浸入海水或水中,保存不用时,应放置于阴凉干燥的环境中。

Do not use or leave the battery near a heat source such as fire or heater.

禁止将电池在热高温源旁,如火、加热器等使用和留置。

When recharging, use the battery charger specifically for that purpose.

充电时请选用锂离子电池专用充电器。

Do not reverse the position (+) and negative (-) terminals.

严禁颠倒正负极使用电池。

Do not connect the battery to an electrical outlet.

严禁将电池直接接入电源插座。

Do not dispose the battery in fire or heat.

禁止将电池丢于火或加热器中。

Do not short-circuit the battery by directly connecting the positive (+) and negative (-) terminal with metal objects such as wire.

禁止用金属直接连接电池正负极短路

Do not transport or store the battery together with metal objects such as necklaces, hairpins etc.

禁止将电池与金属,如发夹、项链等一起运输或贮存。

Do not strike or throw the battery against hard surface.

禁止敲击或抛掷、踩踏电池等。

Do not directly solder the battery and pierce the battery with a nail or other sharp object.

禁止直接焊接电池或用指甲或其它尖锐物体刺穿电池。

Outer metal conduct can not contact the aluminum layer in AL laminate film, especially with electrification, which will be "black spot" and swelling easily.

禁止外层金属导体与铝塑膜中的铝层接触,尤其是带电情况,易产生“黑点”现象,引起鼓胀。

Do not use sharp things to hit the battery.

禁止用尖锐部件碰撞电池。



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CAUTIONS!

注意

Do not use or leave the battery at very high temperature (for example, at strong direct sunlight or in a vehicle in extremely hot weather). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be shortened.

禁止在高温下(炙热的阳光下或很热的汽车中)使用或放置电池,可能会引起电池过热、起火或功能失效、寿命减短。

Do not use it in a location where static electricity is rich, otherwise, the safety devices may be damaged, causing a harmful situation.

禁止在强静电和强磁场的地方使用,否则易破坏电池安全保护装置,带来不安全的隐患。

In case the electrolyte get into the eyes due to the leakage of battery, do not rub the eyes! Rinse the eyes with clean running water, and seek medical attention immediately. Otherwise, it may injure eyes or cause a loss of sight.

如电池泄露,电解液进入眼睛,请不要揉擦,用清水冲洗眼睛,立即送医治疗,否则会伤害眼睛

If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charger and place it in a contained vessel such as a metal box.

如果电池发出异味、发热、变色、变形或使用、贮存,充电过程中出现任何异常,立即将电池从装置或充电器中移除并停用。

In case the battery terminals are contaminated, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection between the battery and the electronic circuitry of the instrument.

如果电池发出异味、发热、变色、变形或使用、贮存,充电过程中出现任何异常,立即将电池从装置或充电器中移除并停用。

Be aware discarded batteries may cause fire, tape the battery terminals to insulate them before disposal.

废弃之电池应用绝缘纸包住电极,以防起火、爆炸。





云南路飞新能源材料有限公司  
Yunnan Road Fei New Energy Materials Co.,Ltd.

PRODUCT SPECIFICATION FOR 645464-4000mAh

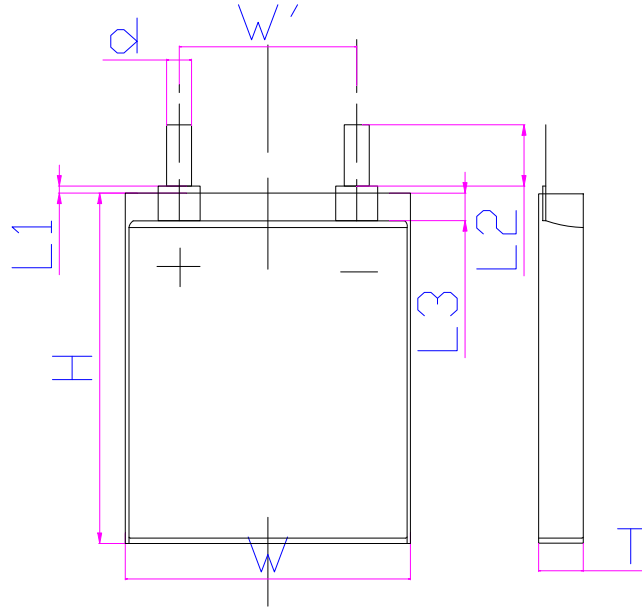
版本: A.0

电芯型号: 645464/4.4V

日期: 2021-4-29

附图: 单位: mm

Attachment: Unit: mm



项目 Items	描述 Description	技术规格 Dimension and Spec
T	厚度 (不含膜) /thickness before shipping	≤ 6.5 mm
W	宽度/width	≤ 55.0 mm
H	高度 (不含极耳胶) /length	≤ 65.0 mm
L1	极耳胶外漏长度/sealant length	0.2-2.0 mm
L2+L1	极耳外露长度 (含极耳胶) /tab length	6.0±1.0 mm
L3	顶封高度/sealing height	3.5±0.5 mm
d	极耳宽度/ tab width	5.0±0.2 mm
W'	极耳中心距/distance between center of 2 tabs	36.0±2.0 mm
备注	单折边, 顶边茶色胶纸, 两侧 L 型茶色胶纸	

备注:1.正极本司使用直转镍铝极耳无需弯折

另注: 您还有任何疑问, 请在 48H 内告知我们, 否则我们将认为您已经同意以上标准, 谢谢!

深圳市优瑞特检测技术有限公司  
Shenzhen ORT Technical Services Co., Ltd.  
UN38.3 检测报告 Test Report

Report Number ORTSZB01210601025					
样品名称 Sample name:	锂离子电芯 Lithium ion cell	型号 Model:	645464		
商标 Brand:	/	检测类别 Test Classification	委托测试 COMMISSION TEST		
委托单位 Applicant	云南路飞新能源材料有限公司 Yunnan Lufei New Energy Materials Co., Ltd. 云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 No.1 high tech Industrial Park, Tengchong border economic development and cooperation zone, Baoshan City, Yunnan Province				
生产单位 Manufacturer	云南路飞新能源材料有限公司 Yunnan Lufei New Energy Materials Co., Ltd. 云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 No.1 high tech Industrial Park, Tengchong border economic development and cooperation zone, Baoshan City, Yunnan Province				
收样日期 Received date:	2021-05-31	试验时间 Detection date:	2021-05-31 to 2021-06-15	报告日期 Report date:	2021-08-02
试验依据 Test Method	联合国《关于危险货物运输的建议书-试验和标准手册》(第 6 版) 38.3 节修订 1 UN Recommendations on the Transport of Dangerous Goods Manual of Tests and Criteria ST/SG/AC.10/11/Rev.6/Subsection 38.3 Amend 1				
试验结论 Test Conclusion:	该电池样品通过所有项目检测, 符合该条款的性能要求。 The samples have passed all test items.				
主检 Tested by:	刘文威 	日期 Date:	2021-06-15		
审核 Checked by:	吴雄 	日期 Date:	2021-08-02		
批准 Approved by:	周志强 	日期 Date:	2021-08-02		
			深圳市优瑞特检测技术有限公司 Shenzhen ORT Technical Services Co., Ltd.  (盖章 stamp) 2021-08-02		

声明:本测试报告无检测报告专用章, 签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可, 不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目, 仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时, 须在收到报告之日起 15 日内对提出投诉或要求进行复测。

**I 电池描述 Battery Description**

电池信息 Information for Battery			
型号 Model	--	额定能量 Rated Energy	--
额定容量 Rated Capacity	--	标称电压 Nominal Voltage	--
充电限制电压 Max. Charging Voltage	--	充电电流 Charging Current	--
放电电流 Discharge current	--	最大连续充电电流 Max. Charging Current	--
最大放电电流 Max. Discharging Current	--	充电截至电流 Charge Cut-off Current	--
放电终止电压 Discharge Cut-off Voltage	--	电芯组合方式 Cell Combination Mode	--
外观形状 Appearance	--	电芯生产厂家 Manufacturer of cell	--

电芯信息 Information for Cell			
型号 Model	645464	额定能量 Rated Energy	15.4Wh
额定容量 Rated Capacity	4000mAh	标称电压 Nominal Voltage	3.85V
充电限制电压 Max. Charging Voltage	4.4V	充电电流 Charging Current	800mA
放电电流 Discharge current	800mA	最大连续充电电流 Max. Charging Current	2000mA
最大放电电流 Max. Discharging Current	2000mA	充电截至电流 Charge Cut-off Current	40mA
放电终止电压 Discharge Cut-off Voltage	3.0V	外观形状 Appearance	银色长方体 Silvery cuboid

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起 15 日内对提出投诉或要求进行复测。

**II 试验记录 Test Records**

序号 No.	测试项目 Test Items	标准要求或标准条款号 Standard requirement or the clause number of standard	测试结果 Test result	本项结论 conclusion	备注 Remarks
1	高度模拟 Altitude simulation	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.1 Test T.1	见附表 1 See Appendix 1	合格 Passed	/
2	温度试验 Thermal test	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.2 Test T.2	见附表 2 See Appendix 2	合格 Passed	/
3	振动 Vibration	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.3 Test T.3	见附表 3 See Appendix 3	合格 Passed	/
4	冲击 Shock	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.4 Test T.4	见附表 4 See Appendix 4	合格 Passed	/
5	外部短路 External short circuit	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.5 Test T.5	见附表 5 See Appendix 5	合格 Passed	/
6	撞击 Impact	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.6 Test T.6	见附表 6 See Appendix 6	合格 Passed	/
7	过度充电 Overcharge	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.7 Test T.7	见附表 7 See Appendix 7	不适用 N/A	
8	强制放电 Forced discharge	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.8 Test T.8	见附表 8 See Appendix 8	合格 Passed	/

备注 Remark:

测试样品已按 UN38.3 经过循环处理, 由客户提供.

Before the samples were sent for testing, the client has already carried out cyclic tests according to the requirements of UN38.3.

声明: 本测试报告无检测报告专用章, 签名无效; 本测试报告检测结果仅对被测样品负责; 未经优瑞特检测书面许可, 不得部分复制本报告; 报告中带“\*”的项目为分包检验项目; 未取得资质认定或认可的检测项目, 仅作为科研、教学或内部质量控制之用; 委托方对检测结果有异议时, 须在收到报告之日起 15 日内对提出投诉或要求进行复测。



附表 2  
 Appendix 2

序号 No.	2	测试项目名称 Name of Test Items				温度试验 Thermal test		
编号 No	样品状态 Sample status	测试前 Before		测试后 After		质量损失	电压损失	测试结果 result
		电池质量 $m_1$ (g)	开路电压 $V_1$ (V)	电池质量 $m_2$ (g)	开路电压 $V_2$ (V)	Mass loss (%)	Voltage loss (%)	
C01	首次完全充电 1st CYC Fully Charged	51.415	4.379	51.409	4.308	0.012	1.621	O
C02	首次完全充电 1st CYC Fully Charged	51.952	4.381	51.947	4.311	0.010	1.598	O
C03	首次完全充电 1st CYC Fully Charged	51.596	4.382	51.591	4.306	0.010	1.734	O
C04	首次完全充电 1st CYC Fully Charged	52.033	4.382	52.028	4.307	0.010	1.712	O
C05	首次完全充电 1st CYC Fully Charged	51.784	4.378	51.778	4.314	0.012	1.462	O
C06	第 25 次完全充电 25th CYC Fully Charged	51.541	4.379	51.536	4.310	0.010	1.576	O
C07	第 25 次完全充电 25th CYC Fully Charged	51.377	4.380	51.372	4.306	0.010	1.689	O
C08	第 25 次完全充电 25th CYC Fully Charged	51.845	4.382	51.839	4.309	0.012	1.666	O
C09	第 25 次完全充电 25th CYC Fully Charged	51.736	4.381	51.730	4.304	0.012	1.758	O
C10	第 25 次完全充电 25th CYC Fully Charged	51.938	4.381	51.933	4.307	0.010	1.689	O
以下空白								
注: L-泄露; V-排气; D-解体; R-破裂; F-起火; O-无泄露、无排气、无解体、无破裂、无起火 Note: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire O-No leakage, no venting, no disassembly, no rupture, no fire.								

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起 15 日内对提出投诉或要求进行复测。

附表 3  
 Appendix 3

序号 No.	3	测试项目名称 Name of Test Items				振动 Vibration		
编号 No	样品状态 Sample status	测试前 Before		测试后 After		质量损失 Mass loss (%)	电压损失 Voltage loss (%)	测试结果 result
		电池质量 $m_1$ (g)	开路电压 $V_1$ (V)	电池质量 $m_2$ (g)	开路电压 $V_2$ (V)			
C01	首次完全充电 1st CYC Fully Charged	51.409	4.308	51.408	4.306	0.002	0.046	O
C02	首次完全充电 1st CYC Fully Charged	51.947	4.311	51.945	4.310	0.004	0.023	O
C03	首次完全充电 1st CYC Fully Charged	51.591	4.306	51.589	4.304	0.004	0.046	O
C04	首次完全充电 1st CYC Fully Charged	52.028	4.307	52.027	4.305	0.002	0.046	O
C05	首次完全充电 1st CYC Fully Charged	51.778	4.314	51.776	4.311	0.004	0.070	O
C06	第 25 次完全充电 25th CYC Fully Charged	51.536	4.310	51.534	4.308	0.004	0.046	O
C07	第 25 次完全充电 25th CYC Fully Charged	51.372	4.306	51.371	4.305	0.002	0.023	O
C08	第 25 次完全充电 25th CYC Fully Charged	51.839	4.309	51.837	4.307	0.004	0.046	O
C09	第 25 次完全充电 25th CYC Fully Charged	51.730	4.304	51.728	4.302	0.004	0.046	O
C10	第 25 次完全充电 25th CYC Fully Charged	51.933	4.307	51.931	4.305	0.004	0.046	O
以下空白								

注: L-泄露; V-排气; D-解体; R-破裂; F-起火; O-无泄露、无排气、无解体、无破裂、无起火  
 Note: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire  
 O-No leakage, no venting, no disassembly, no rupture, no fire.

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起 15 日内对提出投诉或要求进行复测。











附表 8

Appendix 8

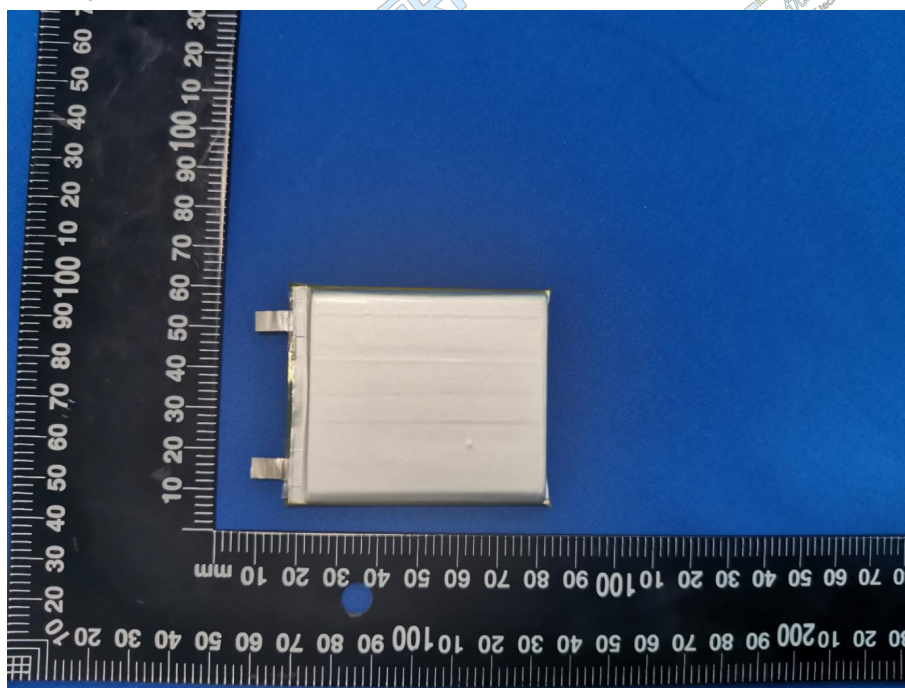
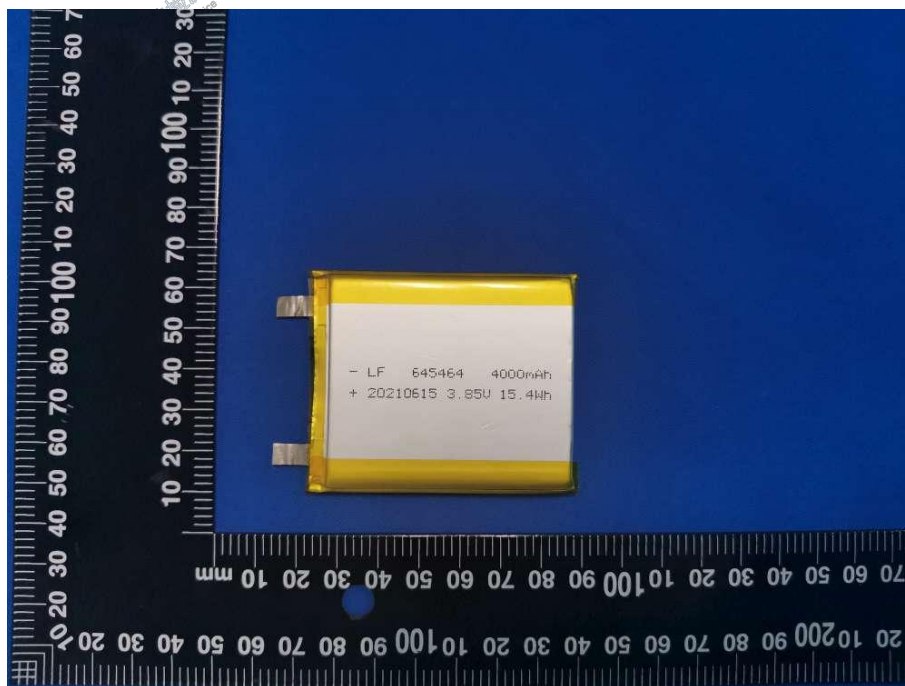
序号 No.	8	测试项目名称 Name of Test Items	强制放电 Forced discharge
编号 No	样品状态 Sample status	测试结果 Test result	备注 Remark
C21	首次完全放电 1st CYC Fully Discharged	O	/
C22	首次完全放电 1st CYC Fully Discharged	O	/
C23	首次完全放电 1st CYC Fully Discharged	O	/
C24	首次完全放电 1st CYC Fully Discharged	O	/
C25	首次完全放电 1st CYC Fully Discharged	O	/
C26	首次完全放电 1st CYC Fully Discharged	O	/
C27	首次完全放电 1st CYC Fully Discharged	O	/
C28	首次完全放电 1st CYC Fully Discharged	O	/
C29	首次完全放电 1st CYC Fully Discharged	O	/
C30	首次完全放电 1st CYC Fully Discharged	O	/
C31	第 25 次完全放电 25th CYC Fully Discharged	O	/
C32	第 25 次完全放电 25th CYC Fully Discharged	O	/
C33	第 25 次完全放电 25th CYC Fully Discharged	O	/
C34	第 25 次完全放电 25th CYC Fully Discharged	O	/
C35	第 25 次完全放电 25th CYC Fully Discharged	O	/
C36	第 25 次完全放电 25th CYC Fully Discharged	O	/
C37	第 25 次完全放电 25th CYC Fully Discharged	O	/
C38	第 25 次完全放电 25th CYC Fully Discharged	O	/
C39	第 25 次完全放电 25th CYC Fully Discharged	O	/
C40	第 25 次完全放电 25th CYC Fully Discharged	O	/

注：D-解体；F-起火；O-无解体、无起火  
 Note: D-Disassembly, F-Fire, O- No disassembly, no fire.

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起 15 日内对提出投诉或要求进行复测。

### III 样品图片 Sample Photo

电芯 Cell



备注 note: 仅对原报告照片中的样品负责 Authenticate the photo on original report only

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起 15 日内对提出投诉或要求进行复测。

**IV 试验设备 Test Equipment**

编号 No	名称 Name	规格参数 Model specifications	设备编号 Device No.	有效期至 Calibration validity
1	电池低压高空模拟试验机 Battery low pressure high altitude simulation testing machine	GX-3020-ZC80	ORT-DQY-01	2021-07-18
2	电子天平 Electronic balance	HZK-JA510S	ORT-DZTP-02	2021-07-18
3	振动试验台 Electromagnetic vibration tester	MPA406/M232A	ORTZD2000-01	2022-01-03
5	万用表 Multimeter	17B+	ORT-WYB-01	2021-07-20
6	快速温变试验箱 Rapid temperature change test chamber	F15H1000-70W	ORTKWB1000-0 2	2022-03-03
7	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-21	2021-07-20
8	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-22	2021-07-20
9	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-23	2021-07-20
10	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-24	2021-07-20
11	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-25	2021-07-20
12	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-26	2021-07-20
13	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-27	2021-07-20
14	冲击试验台 Mechanical Shock tester	IS500	ORTCJ-01	2022-05-27
15	数据采集仪 Data acquisition instrument	DC5508U	ORT-CJY-01	2022-05-27
16	温控型电池短路试验机 Temperature controlled External short-circuit testing system	GX-6055-B	ORT-WDL-01-01	2021-07-18
17	温控型电池短路试验机 Temperature controlled External short-circuit testing system	GX-6055-B	ORT-WDL-01-02	2021-07-20
18	电池挤压针刺试验机 Crush / needle tester	GX-5067-BM3T	ORT-JYZC-01	2022-05-27
19	电子负载 Electronic load	EL160LB	ORT-DZFF-03	2021-07-20
20	直流电源 DC power supply	IT6723	ORT-DY-03	2022-05-27

\*\*\* End of Report \*\*\*

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Shenzhen ORT Technical Services Co., Ltd.

# TEST REPORT

<b>Report Number</b> <b>ORTSZB01210602002</b>					
Sample name:	Li-ion Cell	Model:	645464		
Ratings	3.85V, 4000mAh, 15.4Wh	Sample status	Received intact		
Brand:	N/A	Sample source:	Submitted by applicant		
Testing Laboratory	Shenzhen ORT Technical Services Co., Ltd. F1, Building 15, Fangxing Science and Technology Park, Nanlian No. 6 Industrial Zone, Longgang Street, Longgang District, Shenzhen				
Applicant and address	Yunnan Lufei New Energy Materials Co., Ltd. No.1 high tech Industrial Park, Tengchong border economic development and cooperation zone, 678000 Baoshan City, Yunnan Province, PEOPLE'S REPUBLIC OF CHINA				
Manufacturer and Address	Yunnan Lufei New Energy Materials Co., Ltd. No.1 high tech Industrial Park, Tengchong border economic development and cooperation zone, 678000 Baoshan City, Yunnan Province, PEOPLE'S REPUBLIC OF CHINA				
Received date:	2021-07-06	Testing date:	2021-07-06 to 2021-07-19	Report date:	2021-07-19
Test Requirement:	IEC 62133-2:2017 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems				
Tested by:	Jeff Liu	Date:	 Shenzhen ORT Technical Services Co., Ltd. (stamp) 2021-07-19		
Signature:		2021-07-19			
Checked by:	Gary Wu	Date:			
Signature:		2021-07-19			
Approved by:	Leo Zhou	Date:			
Signature:		2021-07-19			

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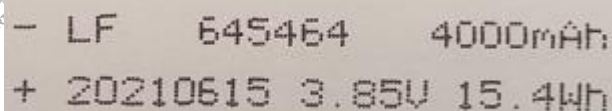
<p><b>Test specification</b></p> <p>Standard..... IEC 62133-2:2017</p> <p>Test procedure ..... Test report</p> <p>Procedure deviation..... N/A</p> <p>Non-standard test method..... N/A</p>	
<p><b>Test Report Form/blank test report</b></p> <p>Test Report Form No..... ORT62133-2-2017A</p> <p>Test Report Form(s) Originator..... ORT</p> <p>Master TRF..... Dated 2019-05</p>	
<p><b>Summary of testing:</b></p>	
<p><b>Tests performed (name of test and test clause):</b></p> <p>cl.7.1 Charging procedure for test purposes (for cells)</p> <p>cl.7.2.1 Continuous charging at constant voltage (cells)</p> <p>cl.7.3.1 External short circuit (cells)</p> <p>cl.7.3.3 Free fall (cells)</p> <p>cl.7.3.4 Thermal abuse (cells)</p> <p>cl.7.3.5 Crush (cells)</p> <p>cl.7.3.7 Forced discharge (cells)</p> <p>cl.7.3.9 Forced internal short-circuit (cell)</p>	<p><b>Testing location:</b></p> <p>Shenzhen ORT Technical Services Co., Ltd. F1, Building 15, Fangxing Science and Technology Park, Nanlian No. 6 Industrial Zone, Longgang Street, Longgang District, Shenzhen</p>

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**Copy of marking plate**

This is reference label, final label should be including the content of it.



- LF 645464 4000mAh  
+ 20210615 3.85V 15.4Wh

Remark: By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked.

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**Test item particulars**

Classification of installation and use..... Build-in and use in portable applications

Supply connection..... Supply by Tap

Recommend charging method declared by the manufacturer..... Charging the battery with 800mA constant current and 4.4V constant voltage until the current reduces to 40mA at ambient 20°C±5°C.

Discharge current(0.2I<sub>A</sub>)..... 800mA

Specified final voltage ..... 3.0V

Upper limit charging voltage per cell..... 4.4V

Maximum charging current..... 2000mA

Charging temperature upper limit..... 45°C

Charging temperature lower limit..... 5°C

Polymer cell electrolyte type.....  gel polymer  solid polymer  N/A

**Test case verdicts**

Test case does not apply to the test object..... N/A

Test item does meet the requirement..... P (Pass)

Test item does not meet the requirement..... F (Fail)

**List of Attachments**

Appendix 1..... Photos of product

Appendix 2..... Test Equipments

**General remarks**

This report shall not be reproduced except in full without the written approval of the testing laboratory.

The test results presented in this report relate only to the item tested.

“(See remark #)” refers to a remark appended to the report.

“(See appended table)” refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

The product fulfils the requirements of EN 62133-2: 2017

**Report Revise Record:**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2021-07-19	Valid	Original report

Name and address of factory (ies): Same as manufacturer

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### General product information

The product covered by this report is Li-ion Cell.

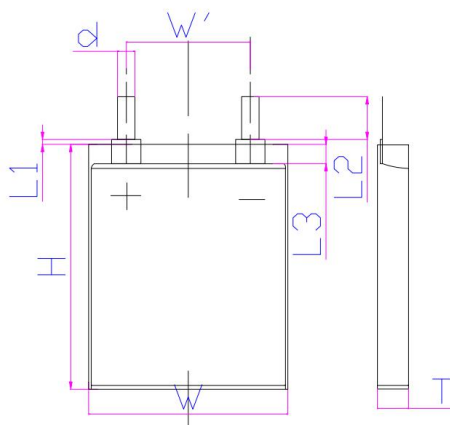
The main features of the cell are shown as below (clause 7.1.1):

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
645464	4000mAh	3.85V	800mA	800mA	2000mA	2000mA	4.4V	3.0V

The main features of the cell are shown as below (clause 7.1.2):

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
645464	4.4V	200mA	5°C	45°C

### Construction



T	6.5
W	55.0
H	65.0

Cell (Unit: mm)

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
4	Parameter measurement tolerances		P
	Parameter measurement tolerances	Comply with relevant requirements.	P
5	General safety considerations		P
5.1	General		P
	Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		P
5.2	Insulation and wiring		N/A
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ	No metal case exists.	N/A
	Insulation resistance (MΩ) :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		N/A
	Orientation of wiring maintains adequate clearance and creepage distances between conductors		N/A
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		N/A
5.3	Venting		P
	Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition		P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		N/A
5.4	Temperature, voltage and current management		N/A
	Batteries are designed such that abnormal temperature rise conditions are prevented		N/A
	Batteries are designed to be within temperature,		N/A

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	voltage and current limits specified by the cell manufacturer		
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified		N/A
5.5	Terminal contacts		N/A
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		N/A
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		N/A
	Terminal contacts are arranged to minimize the risk of short-circuit		N/A
5.6	Assembly of cells into batteries		N/A
5.6.1	General		N/A
	Each battery have an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region		N/A
	This protection may be provided external to the battery such as within the charger or the end devices		N/A
	If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation		N/A
	If there is more than one battery housed in a single battery case, each battery have protective circuitry that can maintain the cells within their operating regions		N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/ designer may ensure proper design and assembly		N/A
	Batteries that are designed for the selective discharge of a portion of their series connected		N/A

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer		
	Protective circuit components added as appropriate and consideration given to the end-device application		N/A
	The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance		N/A
5.6.2	Design recommendation		N/A
	For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2		N/A
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Table 2, by monitoring the voltage of every single cell or the single cellblocks		N/A
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that charging is stopped when the upper limit of the charging voltage is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks		N/A
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection		N/A
	For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		N/A
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's		N/A

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	specified final voltage		
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system		N/A
5.6.3	Mechanical protection for cells and components of batteries		N/A
	Mechanical protection for cells, cell connections and control circuits within the battery provided to prevent damage as a result of intended use and reasonably foreseeable misuse		N/A
	The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product		N/A
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		N/A
	For batteries intended for building into a portable end product, testing with the battery installed within the end product considered when conducting mechanical tests		N/A
5.7	Quality plan		P
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery	Complied. Quality plan provided.	P
5.8	Battery safety components		N/A
	According annex F	See TABLE: Critical components information.	N/A
6	Type test and sample size		P
	Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old		P
	Coin cells with resistance $\leq 3 \Omega$ (measured according annex D) are tested according table 1	Not coin cells	N/A
	Unless otherwise specified, tests are carried out in		P

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	an ambient temperature of 20 °C ± 5 °C		
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and overdischarge protection		N/A
	When conducting the short-circuit test, consideration given to the simulation of any single fault condition that is likely to occur in the protecting circuit that would affect the short-circuit test	See clause 7.3.2.	N/A

7	Specific requirements and tests		P
7.1	Charging procedure for test purposes		P
7.1.1	First procedure		P
	This charging procedure applies to subclauses other than those specified in 7.1.2		P
	Unless otherwise stated in this document, the charging procedure for test purposes is carried out in an ambient temperature of 20 °C ± 5 °C, using the method declared by the manufacturer	See page 5.	P
	Prior to charging, the battery have been discharged at 20 °C ± 5 °C at a constant current of 0,2 It A down to a specified final voltage	See page 5.	P
7.1.2	Second procedure		P
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		P
	After stabilization for 1 h and 4 h, respectively, at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant voltage charging method	Charging temperature specified by client is: 5 ~ 45°C 45°C used for upper limit tests; 0°C used for lower limit tests.	P
7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)		P
	Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer	Charging for 7 days with 800mA	P

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	Results: No fire. No explosion. No leakage :	(See appended table 7.2.1)	P
7.2.2	Case stress at high ambient temperature (battery)		N/A
	Oven temperature (°C) :		—
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells		N/A
7.3	Reasonably foreseeable misuse		P
7.3.1	External short-circuit (cell)	Tested complied.	P
	The cells were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		P
	Results: No fire. No explosion :	(See appended table 7.3.1)	P
7.3.2	External short-circuit (battery)	Tested complied.	N/A
	The batteries were tested until one of the following occurred:		N/A
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		N/A
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		N/A
	A single fault in the discharge protection circuit conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test		N/A
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor		N/A
	Results: No fire. No explosion :	(See appended table 7.3.2)	N/A
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion	No fire. No explosion.	P
7.3.4	Thermal abuse (cells)	Tested complied.	P

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	Oven temperature (°C) :	130°C	—
	Results: No fire. No explosion	No fire. No explosion.	P
7.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: No fire. No explosion :	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery		N/A
	The supply voltage which is:		N/A
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or		N/A
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		N/A
	- Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached		N/A
	Test was continued until the temperature of the outer casing:		N/A
	- Reached steady state conditions (less than 10°C change in 30-minute period); or		N/A
	- Returned to ambient		N/A
	Results: No fire. No explosion :	(See appended table 7.3.6)	N/A
7.3.7	Forced discharge (cells)	Tested complied.	P
	If the discharge voltage reaches the negative value of upper limit charging voltage within the testing duration, the voltage is maintained at the negative value of the upper limit charging voltage by reducing the current for the remainder of the testing duration		N/A
	If the discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration, the test is terminated at the end of the testing duration		P

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	Results: No fire. No explosion :	(See appended table 7.3.7)	P
7.3.8	Mechanical tests (batteries)		N/A
7.3.8.1	Vibration	Tested complied.	N/A
	Results: No fire, no explosion, no rupture, no leakage or venting. :	(See appended table 7.3.8.1)	N/A
7.3.8.2	Mechanical shock	Tested complied.	N/A
	Results: No leakage, no venting, no rupture, no explosion and no fire :	(See appended table 7.3.8.2)	N/A
7.3.9	Design evaluation – Forced internal short-circuit (cells)		P
	The cells complied with national requirement for:		
	The pressing was stopped upon:		P
	- A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	400N	P
	Results: No fire :	(See appended table 7.3.9)	P
8	Information for safety		P
8.1	General		P
	Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products	Information of safety mentioned in manufacturer's specification.	P
	Manufacturers of batteries ensure that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards		N/A
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product.		N/A
	As appropriate, any information relating to hazard avoidance resulting from a system analysis provided to the end user		N/A
	Do not allow children to replace batteries without adult supervision		N/A
8.2	Small cell and battery safety information		N/A

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N/A
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N/A
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N/A

9	Marking		P
9.1	Cell marking		P
	Cells marked as specified in IEC 61960, except coin cells		N/A
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity	Not coin cells	N/A
	By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked		P
9.2	Battery marking		N/A
	Batteries marked as specified in IEC 61960, except for coin batteries		N/A
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement	Not coin batteries	N/A
	Terminals have clear polarity marking on the external surface of the battery		N/A
	Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	Caution for ingestion of small cells and batteries		N/A

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	Coin cells and batteries identified as small batteries according to 8.2 include a caution statement regarding the hazards of ingestion in accordance with 8.2		N/A
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package		N/A
9.4	Other information		P
	Storage and disposal instructions	Information for storage and disposal instructions mentioned in manufacturer's specifications.	P
	Recommended charging instructions	Information for recommended charging instructions mentioned in manufacturer's specifications.	P

10	Packaging and transport		P
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cell	N/A
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		P

Annex A	Charging and discharging range of secondary lithium ion cells for safe use		P
A.1	General		P
A.2	Safety of lithium ion secondary battery	Complied.	P
A.3	Consideration on charging voltage	Complied.	P
A.3.1	General		P
A.3.2	Upper limit charging voltage	4.4V	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint	4.4V applied.	N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N/A
A.4	Consideration of temperature and charging current		P

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
A.4.1	General		P
A.4.2	Recommended temperature range	Charging temperature declared by client is: 5 ~45°C	P
A.4.2.1	General		N/A
A.4.2.2	Safety consideration when a different recommended temperature range is applied		N/A
A.4.3	High temperature range	Charging high temperature declared by client is 45°C	N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint		N/A
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range	45°C applied.	N/A
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range		N/A
A.4.4	Low temperature range	Charging low temperature declared by client is 5°C	P
A.4.4.1	General		P
A.4.4.2	Explanation of safety viewpoint		P
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	0°C applied.	P
A.4.5	Scope of the application of charging current		P
A.4.6	Consideration of discharge		P
A.4.6.1	General		P
A.4.6.2	Final discharge voltage and explanation of safety viewpoint	Battery specified final discharge voltage 3.0V, not exceed 3.0V specified by cell manufacturer.	P
A.4.6.3	Discharge current and temperature range		P
A.4.6.4	Scope of application of the discharging current		P
A.5	Sample preparation		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle in cylindrical cell		N/A
A.5.5.1	Insertion of nickel particle in winding core		N/A
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		N/A
A.5.6	Insertion of nickel particle in prismatic cell		P
A.6	Experimental procedure of the forced internal short-circuit test		P
A.6.1	Material and tools for preparation of nickel particle		P
A.6.2	Example of a nickel particle preparation procedure		P
A.6.3	Positioning (or placement) of a nickel particle		P
A.6.4	Damaged separator precaution		P
A.6.5	Caution for rewinding separator and electrode		P
A.6.6	Insulation film for preventing short-circuit		P
A.6.7	Caution when disassembling a cell		P
A.6.8	Protective equipment for safety		P
A.6.9	Caution in the case of fire during disassembling		P
A.6.10	Caution for the disassembling process and pressing the electrode core		P
A.6.11	Recommended specifications for the pressing device		P
Annex B	Recommendations to equipment manufacturers and battery assemblers		N/A
Annex C	Recommendations to the end-users		N/A
Annex D	Measurement of the internal ac resistance for coin cells		N/A
D.1	General	Not coin cells	N/A
D.2	Method		N/A
	A sample size of three coin cells is required for this		N/A

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	measurement :		
	Coin cells with an internal resistance of less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N/A
Annex E	Packaging and transport		P
Annex F	Component standards references		N/A

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Table: Critical components information					P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity
-Electrolyte	Zhuhai Guangrui New Material Co., Ltd	CR-ATJ005A	LiPF <sub>6</sub> , DMC, EMC, EC	IEC6213 3-2:2017	Test with cell
-Separator	Shenzhen Zhuolang New Energy Technology Co., Ltd	7+2.5+3*60	PP+PE+PP three layers, Shutdown temperature: 130°C	IEC6213 3-2:2017	Test with cell
-Positive electrode	Shenzhen Walworth Technology Co., Ltd	ZH5000B	LiCoO <sub>2</sub> , Conductive Additive PVDF, Aluminum Foil	IEC6213 3-2:2017	Test with cell
-Negative electrode	Yuanjiang Ducheng New Material Technology Co., Ltd	AG-1	Graphite, Conductive Additive, Copper Foil	IEC6213 3-2:2017	Test with cell
-Positive electrode tab	Dongguan xinjingyuan Electronic Technology Co., Ltd	0.08*5*56*4.5*4.5	Aluminum belt, 5mm*0.08mm	IEC6213 3-2:2017	Test with cell
-Negative electrode tab	Dongguan xinjingyuan Electronic Technology Co., Ltd	0.08*5*56*4.5*4.5	Nickel belt, 5mm*0.08mm	IEC6213 3-2:2017	Test with cell
-Aluminium plastic film	Shenzhen anborui New Material Co., Ltd	0.113μm	Nylon, PP, Aluminum	IEC6213 3-2:2017	Test with cell
Supplementary information:--					

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7.2.1	TABLE: Continuous charging at constant voltage (cells)				P
Sample no.	Recommended charging voltage Vc (Vdc)	Recommended charging current I <sub>rec</sub> (A)	OCV before test (Vdc)	Results	
C01	4.4	0.8	4.393	P	
C02	4.4	0.8	4.393	P	
C03	4.4	0.8	4.393	P	
C04	4.4	0.8	4.393	P	
C05	4.4	0.8	4.393	P	
<b>Supplementary information:</b>					
- No fire or explosion					
- No leakage					

7.3.1	TABLE: External short-circuit (cell)					P
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (°C)	Results	
<b>Samples charged at charging temperature upper limit ( 45°C)</b>						
C06	56.0	4.365	81	107.3	P	
C07	56.0	4.362	85	103.5	P	
C08	56.0	4.363	80	106.7	P	
C09	56.0	4.365	80	105.9	P	
C10	56.0	4.364	83	114.3	P	
<b>Samples charged at charging temperature lower limit ( 0°C)</b>						
C11	56.3	4.261	86	98.5	P	
C12	56.3	4.264	82	98.0	P	
C13	56.3	4.263	81	95.2	P	
C14	56.3	4.263	84	103.9	P	
C15	56.3	4.266	81	103.6	P	
<b>Supplementary information:</b>						
- No fire or explosion						

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7.3.2 TABLE: External short-circuit (battery)						N/A
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise $\Delta T$ (°C)	Component single fault condition	Results
<b>Supplementary information:</b>						
- No fire or explosion						

7.3.5 TABLE: Crush (cells)					P
Sample no.	OCV before test (Vdc)	OCV at removal of crushing force (Vdc)	Maximum force applied to the cell during crush (kN)	Results	
<b>Samples charged at charging temperature upper limit ( 45°C)</b>					
C26	4.359	4.358	13.10	P	
C27	4.362	4.361	13.09	P	
C28	4.358	4.357	13.11	P	
C29	4.365	4.364	13.08	P	
C30	4.360	4.359	13.10	P	
<b>Samples charged at charging temperature lower limit ( 0°C)</b>					
C31	4.261	4.260	13.11	P	
C32	4.259	4.258	13.13	P	
C33	4.262	4.261	13.09	P	
C34	4.264	4.263	13.10	P	
C35	4.261	4.260	13.11	P	
<b>Note:</b>					
<b>Supplementary information:</b>					
- No fire or explosion					

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7.3.6		TABLE: Over-charging of battery			N/A
Constant charging current (A).....:					—
Supply voltage (Vdc).....:					—
Sample no.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results	
<b>Supplementary information:</b>					
- No fire or explosion					

7.3.7		TABLE: Forced discharge (cells)			P
Sample no.	OCV before application of reverse charge (Vdc)	Measured reverse charge I <sub>t</sub> (A)	Lower limit discharge voltage (Vdc)	Results	
C36	3.448	4.0	3.0	P	
C37	3.457	4.0	3.0	P	
C38	3.450	4.0	3.0	P	
C39	3.435	4.0	3.0	P	
C40	3.461	4.0	3.0	P	
<b>Supplementary information:</b>					
- No fire or explosion					

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7.3.8.1 TABLE: Vibration					N/A
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results
<b>Supplementary information:</b>					
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No rupture</li> <li>- No leakage</li> <li>- No venting</li> </ul>					

7.3.8.2 TABLE: Mechanical shock					N/A
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results
<b>Supplementary information:</b>					
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No rupture</li> <li>- No leakage</li> <li>- No venting</li> </ul>					

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7.3.9	TABLE: Forced internal short circuit (cells)					P
Sample no.	Chamber ambient T (°C)	OCV before test (Vdc)	Particle location <sup>1)</sup>	Maximum applied pressure (N)	Results	
<b>Samples charged at charging temperature upper limit</b>						
C44	45	4.363	1	400	P	
C45	45	4.363	1	400	P	
C46	45	4.365	1	400	P	
C47	45	4.362	1	400	P	
C48	45	4.364	1	400	P	
<b>Samples charged at charging temperature lower limit</b>						
C49	0	4.260	1	400	P	
C50	0	4.266	1	400	P	
C51	0	4.263	1	400	P	
C52	0	4.261	1	400	P	
C53	0	4.262	1	400	P	
<b>Supplementary information:</b>						

D.2	TABLE: Internal AC resistance for coin cells				N/A
Sample no.	Ambient T (°C)	Store time (h)	Resistance Rac (Ω)	Results <sup>1)</sup>	
<b>Supplementary information:</b>					
<sup>1)</sup> Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables					

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### Appendix 1 Photos of product

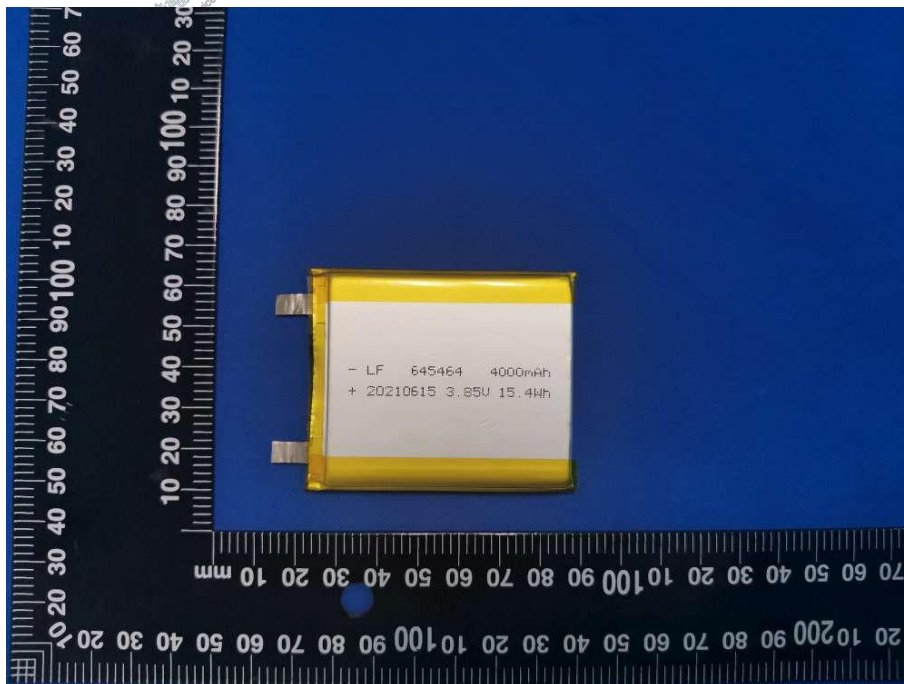


Fig. 1—Front view of Cell

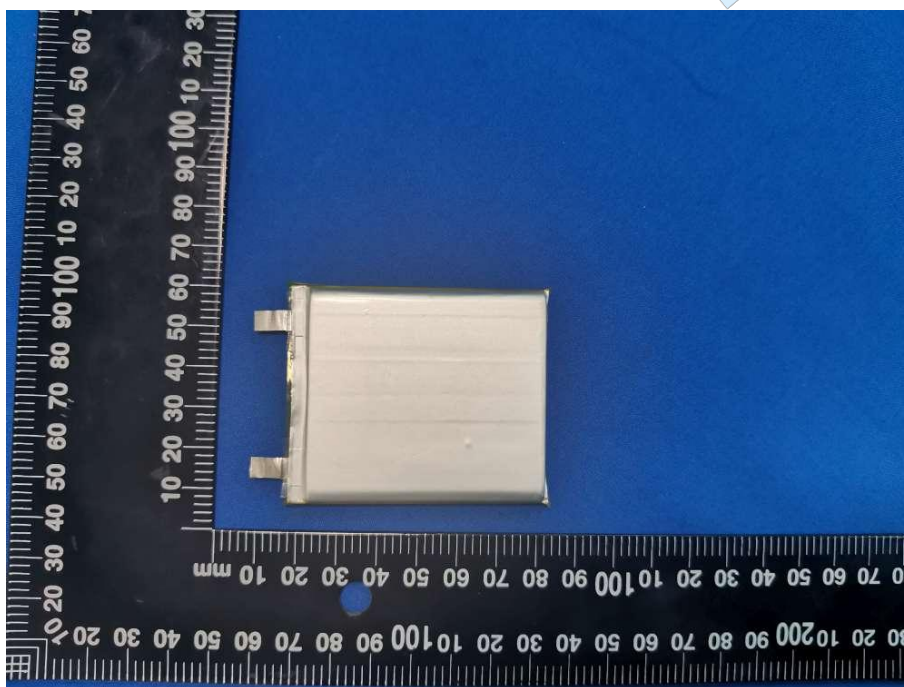


Fig. 2—Back view of Cell

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## Appendix 2

### Test Equipment

No	Name	Model specifications	Device Number	Calibration validity
1	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-01	2022-07-13
2	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-10	2022-07-13
3	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-11	2022-07-13
4	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-12	2022-07-13
5	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-13	2022-07-13
6	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-14	2022-07-13
7	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-15	2022-07-13
8	Programmable constant temperature and humidity test chamber	WTH-225-40-OYO	ORTWD225-01	2022-05-27
9	Multimeter	17B+	ORT-WYB-01	2022-07-13
10	DC power supply	IT6723	ORT-DY-01	2022-05-27
11	Temperature controlled External short-circuit testing system	GX-6055-B	ORT-WDL-01-01	2022-07-13
12	Temperature controlled External short-circuit testing system	GX-6055-B	ORT-WDL-01-02	2022-07-13
13	Data acquisition instrument	2635A	ORT-CJY-02	2022-07-13
14	Drop test table	LX-DL-315	ORT-DL-01	2022-03-03
15	Thermal shock tester	GX-3020-B150T	ORT-RCJ-01	2022-07-13
16	Crush / needle tester	GX-5067-BM3T	ORT-JYZC-01	2022-05-27
17	Electromagnetic vibration tester	MPA406/M232A	ORTZD2000-01	2022-01-03
18	Electronic balance	HZK-JA510S	ORT-DZTP-02	2022-07-13
19	Mechanical Shock tester	IS500	ORTCJ-01	2022-03-03

\*\*\* End of Report \*\*\*

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# 材料安全数据表

## Material Safety Data Sheet

本报告本年度有效  
有效期至 2023 年 12 月 31 日

样品名称: 锂离子电芯

Sample name: Lithium ion cell

样品型号: 645464

Sample model:

委托单位: 云南路飞新能源材料有限公司

Applicant: Yunnan Road Fei New Energy Materials  
Co.,Ltd.

签发时间 Date of issue: 2022.12.29 Dec. 29, 2022

Written by 陈伟悦 Approved by 段江涛

深圳天溯计量检测股份有限公司

Shenzhen Tiansu Calibration and Testing Co., Ltd.



\* The MSDS is prepared based on the information provided by client. The contents and formats of this MSDS are revised as per client's request. 这份材料安全数据表是根据客户提供的信息编辑，其内容和格式按客户要求来修订。

## 第一部分-化学品及企业标识

**Section 1-Chemical Product and Company Identification**

产品名称 <b>Product Name</b>	锂离子电芯 Lithium ion cell
型号 <b>Model</b>	645464
商标 <b>Trade Mark</b>	--
额定参数 <b>Ratings</b>	3.85V/4000mAh/15.4Wh
重量 <b>Weight</b>	51.9g
制造商 <b>Manufacturer</b>	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.
制造商地址 <b>Manufacturer Address</b>	云南省保山市腾冲市边境经济开发合作区高新技术产业园1号 NO.1 high tech industrial Park, Tengchong border economic development and cooperation zone ,Baoshan City, yunnan Province
应急电话 <b>Emergency Telephone</b>	0875-5189928
传真 <b>Fax</b>	--

## 第二部分-成分信息

**Section 2- Composition Information**

化学成分 <b>Chemical Composition</b>	化学式 <b>Chemical Formula</b>	CAS号 <b>CAS No.</b>	重量含量 (%) <b>Weight (%)</b>
钴酸锂 Lithium cobaltate	LiCoO <sub>2</sub>	12190-79-3	15 - 40
石墨 Graphite	C	7782-42-5	10 - 30
六氟磷酸锂 Lithium hexafluorophosphate	LiPF <sub>6</sub>	21324-40-3	10 - 30
铜箔 Copper	Cu	7440-50-8	7-13



铝箔 Aluminium	Al	7429-90-5	5-10
镍 Nickel	Ni	7440-02-0	1-5

## 第三部分-危险性概述

**Section 3- Hazards Identification**

紧急情况概述 <b>Emergency overview</b>	不适用 N/A
标签元素 <b>Label elements:</b>	
危险标签图 <b>Hazard pictogram(s)</b>	不适用 Not Applicable
提示语 <b>Signal word</b>	不适用 Not Applicable
危险声明 <b>Hazard statement(s)</b>	不适用 Not Applicable
预防声明 <b>Precautionary statement(s):</b>	
预防 <b>Prevention</b>	不适用 Not Applicable
反应 <b>Response</b>	不适用 Not Applicable
废弃处理 <b>Disposal</b>	不适用 Not Applicable
环境危害 <b>Environmental hazards:</b>	无相关信息 No relevant information
重要症状 <b>Important symptoms:</b>	见第11部分更多信息 See section 11 for more information

## 第四部分-急救措施

**Section 4- First Aid Measures**

眼睛接触 <b>Eye contact</b>	万一接触，立即用大量的清水冲洗至少15分钟，翻起上下眼睑，直到化学的残留物消失为止，迅速就医。 Flush eyes with plenty of water for least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
皮肤接触 <b>Skin contact</b>	万一接触，用大量的水冲洗至少15分钟，同时除去污染的衣物和鞋子，迅速就医。 Remove contaminated clothes and rinse skin with plenty of water or shower for 15 minutes. Get medical aid.
吸入 <b>Inhalation</b>	立即从暴露处移至空气清新处，如果呼吸困难给予输氧，立即就医。 Remove from exposure and move to fresh air immediately. Use oxygen if available.
摄入 <b>Ingestion</b>	饮用两杯牛奶或水，如果当事人仍然清晰可以采取催吐的方法，并且立即就医。 Give at least 2 glasses of milk or water. Induce vomiting unless patient is unconscious. Call a physician.



第五部分-消防措施

**Section 5- Fire Fighting Measures**

燃点 <b>Flash Point</b>	不适用 N/A
自燃温度 <b>Auto-Ignition Temperature</b>	不适用 N/A
灭火介质 <b>Extinguishing Media</b>	水, 二氧化碳 H <sub>2</sub> O, CO <sub>2</sub>
特殊灭火程序 <b>Special Fire-Fighting Procedures</b>	自给式呼吸器 Self-contained breathing apparatus
异常火灾或爆炸 <b>Unusual Fire and Explosion Hazards</b>	当电芯暴露于过热的环境中时, 安全阀可能会打开 Cell may vent when subjected to excessive heat-exposing battery contents
燃烧产生的危险物品 <b>Hazardous Combustion Products</b>	一氧化碳, 二氧化碳, 锂氧化物烟气 Carbon monoxide, carbon dioxide, lithium oxide fumes.

第六部分-泄露应急处理

**Section 6- Accidental Release Measures**

**个人预防措施、保护设备和应急程序:**

如果电池被泄露, 让人员离开该区域直到烟雾消散。提供最大限度的通风, 清除有害气体。首选的反应就是离开这个地区并消散气体, 避免皮肤和眼睛接触或吸入气体。用吸收剂清除溢出的液体然后焚烧。如果电池泄漏发生时, 液体可以用砂、泥土或其他惰性物质来吸收, 污染区域应该保持通风。

**Personal precautions, protective equipment and emergency procedures:**

If the battery is released, remove personnel from area until fumes dissipate. Provide maximum ventilation to clear out hazardous gases. The preferred response is to leave the area and allow the vapors to dissipate, Avoid skin and eyes contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerated. If leakage of the battery happens, liquid could be absorbed by using sand, earth or other inert substance and contaminated area should be ventilated meantime.

**环境预防措施:**

不允许产品到达排水系统或任何水源。  
如果渗透进排水系统或任何水源, 通知相应的部门。  
不允许进入下水道/表面或地下水。

**Environment precautions:**

Do not allow product to reach sewage system or any water source.  
Inform respective authorities in case of seepage into water course or sewage system.  
Do not allow to enter sewers/ surface or ground water.

**抑制和清理材料的方法:**

如果电池外壳被拆除, 少量电解液可能会泄漏。收集所有材料放进一个塑料容器。根据当地的法律法规来处置, 避免可溶物质进入大地、下水道或水源。

**Methods and material for containment and cleaning up:**

If battery casing is dismantled, small amounts of electrolyte may leak. Collect all released material in a plastic



lined container. Dispose off according to the local law and rules, Avoid leached substances to get into the earth, canalization or waters.

第七部分-操作处置和储存

**Section 7- Handling and Storage**

<p>操作处置 <b>Handling</b></p>	<p>禁止打开、毁坏或焚烧电池，因为电池有可能在这些处理过程中发生爆炸、破裂或泄露等事故。 禁止将电池短路、过充、强制放电或扔入火中。 禁止挤压或刺穿电池，或将电池浸入溶液中。 The battery should not be opened, destroyed or incinerate, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container. Do not short circuit terminals, or over charge the battery, forced over-discharge, throw to fire. Do not crush or puncture the battery, or immerse in liquids.</p>
<p>储存 <b>Storage</b></p>	<p>禁止物理或电滥用，禁止高温储存，最好将电池储存在阴凉、干燥、通风及温度变化较小的环境中。 禁止将电池接触加热设备，或将电池长时间直接暴露在阳光中。 Avoid mechanical or electrical abuse. Storage preferably in cool, dry and ventilated area, which is subject to little temperature change. Storage at high temperatures should be avoided. Do not place the battery near heating equipment, nor expose to direct sunlight for long periods.</p>
<p>其他要注意的防范措施 <b>Other Precautions</b></p>	<p>拆解、挤压、直接放入火中或高温条件下，电池可能发生爆炸和燃烧。 禁止短接或将电池正负极错误的安装在设备中。 The battery may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures. Do not short or install with incorrect polarity.</p>

第八部分-接触控制和个体防护

**Section 8- Exposure Controls/Personal Protection**

<p>设计控制 <b>Engineering Controls</b></p>	<p>设计局部排气通风或其它设计来控制粉尘、雾、烟雾和气体。 Use local exhaust ventilation or other engineering controls to control sources of dust, mist, fumes and vapor. Keep away from heat and open flame. Store in a cool, dry place.</p>
---------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



个人防护装备 <b>Personal Protective Equipment</b>	呼吸防护: 在正常情况下不需要。 皮肤和身体防护: 在正常情况下不需要, 如果处理一个裂开的或泄漏的电池需要穿戴适当的防护服和手套。 手保护: 如果处理一个裂开的或泄漏的电池需要戴适当手套。 眼睛保护: 在正常情况下不需要, 如果处理一个裂开的或泄漏的电池需要戴上安全眼镜。 Respiratory Protection: Not necessary under normal conditions. Skin and body Protection: Not necessary under normal conditions, Wear suitable protective clothing and gloves if handling an open or leaking battery. Hand protection: Wear suitable gloves if handling an open or leaking battery. Eye Protection: Not necessary under normal conditions, Wear safety glasses if handling an open or leaking battery.
其它防护装备 <b>Other Protective Equipment</b>	在工作区域应该有一个立即可以使用的安全淋浴和喷水洗眼器。 Have a safety shower and eye wash fountain readily available in the immediate work area.
卫生措施 <b>Hygiene Measures</b>	在工作区域不得进食, 饮水或吸烟。 Do not eat, drink, or smoke in work area. Maintain good housekeeping.
第九部分-物理和化学特性 <b>Section 9- Physical and Chemical Properties</b>	
颜色 <b>Color</b>	银色 Silver
气味 <b>Odour</b>	不适用 Not Applicable
酸碱度 <b>pH</b>	不适用 Not Applicable
熔点/凝固点 <b>Melting point/freezing point</b>	不适用 Not Applicable
沸点、沸点范围: <b>Boiling Point and Boiling range</b>	不适用 Not Applicable
易燃度 <b>Flash Point</b>	不适用 Not Applicable
自燃或爆炸的上、下极限 <b>Upper/lower flammability or explosive limits</b>	不适用 Not Applicable
蒸汽压 <b>Vapor Pressure</b>	不适用 Not Applicable



蒸汽密度 <b>Vapor Density</b>	不适用 Not Applicable
相对密度 <b>Relative density</b>	不适用 Not Applicable
水溶性 <b>Solubility in Water</b>	不适用 Not Applicable
自燃温度 <b>Auto-ignition temperature</b>	不适用 Not Applicable
分解温度 <b>Decomposition temperature</b>	不适用 Not Applicable
蒸发速率 <b>Evaporation rate</b>	不适用 Not Applicable
易燃性(土壤、天然气) <b>Flammability (soil, gas)</b>	不适用 Not Applicable
粘性 <b>Viscosity</b>	不适用 Not Applicable
第十部分 稳定性和反应活性 <b>Section 10- Stability and reactivity</b>	
稳定性 <b>Stability</b>	产品在第七部分所述的条件下稳定 The product is stable under conditions described Section 7
应避免的条件 <b>Conditions to Avoid</b>	加热 70°C 以上或焚烧、变形、毁坏、粉碎、拆卸、过充电、短路，长时间暴露在潮湿的条件下。 Heat above 70°C or incinerate. Deform, Mutilate, Crush, Disassemble, Overcharge, Short circuit, Expose over a long period to humid conditions.
不兼容的材料 <b>Incompatible Materials</b>	氧化剂，酸，碱。 Oxidizing agents, acid, base.
危险分解物 <b>Hazardous Decomposition Products</b>	一氧化碳、二氧化碳、氧化锂烟雾。 Carbon monoxide, carbon dioxide, lithium oxide fumes.
危险反应的可能性 <b>Possibility of Hazardous Reaction</b>	不适用 Not Applicable
第十一部分-毒理学资料 <b>Section 11 - Toxicological Information</b>	
刺激	如果电芯的外壳受到机械、热或电的滥用到达一定程度，会发生刺激的风险。



<b>Irritation</b>	<p>如果发生这种情况，可能会刺激皮肤、眼睛和呼吸道。</p> <p>Risk of irritation occurs only if the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, irritation to the skin, eyes and respiratory tract may occur.</p>
致过敏 <b>Sensitization</b>	<p>不适用</p> <p>Not Applicable</p>
影响神经系统 <b>Neurological Effects</b>	<p>不适用</p> <p>Not Applicable</p>
致畸 <b>Teratogenicity</b>	<p>不适用</p> <p>Not Applicable</p>
再生毒性 <b>Reproductive Toxicity</b>	<p>不适用</p> <p>Not Applicable</p>
诱变(遗传效应) <b>Mutagenicity (Genetic Effects)</b>	<p>不适用</p> <p>Not Applicable</p>
附带材料毒理性 <b>Toxicologically Synergistic Materials</b>	<p>不适用</p> <p>Not Applicable</p>

第十二部分-生态学资料

**Section 12- Ecological Information**

生态毒性 <b>Ecological Toxicity</b>	<p>不适用</p> <p>Not Applicable</p>
在土壤中的流动性 <b>Mobility in soil</b>	<p>不适用</p> <p>Not Applicable</p>
持久性和分解性 <b>Persistence and Degradability</b>	<p>不适用</p> <p>Not Applicable</p>
生物聚积 <b>Bioaccumulation potential</b>	<p>不适用</p> <p>Not Applicable</p>
其他不利影响 <b>Other Adverse Effects</b>	<p>不适用</p> <p>Not Applicable</p>

第十三部分-废弃处置





## Section 13- Disposal Considerations

<b>产品废弃处理建议</b> <b>Product disposal recommendation</b>	遵守当地、州和联邦法律和法规。 Observe local, state and federal laws and regulations.
<b>包装处理建议</b> <b>Packaging disposal recommendation</b>	废弃处理必须根据当地法规 Disposal must be made according to official regulations

### 第十四部分-运输信息

## Section 14 - Transport Information

<b>运输标签</b> <b>Label for conveyance</b>	锂电池标签 Lithium Battery Label
<b>UN 编号</b> <b>UN Number</b>	UN 3480 或 UN 3481 UN 3480 or UN 3481
<b>运输风险类别</b> <b>Transport hazard class(es)</b>	9
<b>包装等级</b> <b>Packing group</b>	---
<b>海洋污染物</b> <b>Marine pollutant</b>	无污染 No
<b>联合国运输专用名称</b> <b>UN Proper shipping name</b>	锂离子电池(包括锂离子聚合物电池) Lithium ion Batteries (Including lithium ion polymer batteries) 锂离子电池和设备包装在一起(包括锂离子聚合物电池) Lithium ion Batteries packed with equipment (Including lithium ion polymer batteries) 设备里内含锂离子电池(包括锂离子聚合物电池) Lithium ion Batteries contained in equipments (Including lithium ion polymer batteries)
<b>ICAO/IATA</b>	可根据国际民用航空组织(ICAO), TI 或国际航空协会(IATA) DGR 64 版本包装说明 965 第 IB 节规定或 966~967 第 II 节规定进行空运 Can be shipped by air in accordance with international Civil Aviation Organization (ICAO), TI or International Air Transport Association (IATA) DGR 64 <sup>th</sup> Packing Instructions Section IB of 965 or Section II of 966~967 appropriately.



<b>IMDG CODE</b>	《国际海运危险货物规则》特殊规定 188 IMDG CODE (Amdt 41-22) International Maritime Dangerous Goods Code under Special Provision 188 IMDG CODE (Amdt 41-22)
<b>ADR</b>	《国际危险货物道路运输欧洲协定》(ADR) 根据特殊规定 188 European Agreement concerning the International Carriage of Dangerous Goods by Road under Special Provision 188
<b>RID</b>	《国际危险货物铁路运输欧洲协定》(RID) 根据特殊规定 188 Regulations concerning the International Carriage of Dangerous Goods by Rail under Special Provision 188

危险品规例规定，运输前，每一个电池设计须通过联合国试验和标准手册38.3节所载的测试。

The dangerous goods regulations require that each battery design be subject to tests contained in Section 38.3 of the UN Manual of Tests and Criteria prior to being offered for transport.

第十五部分 法规信息

**Section 15- Regulatory information**

法律信息

Law information

- 《危险物品规则》
- 《Dangerous Goods Regulations》
- 《对危险货物运输的有关规定的建议》
- 《Recommendation on the Transport of Dangerous Goods Model Regulations》
- 《国际海运危险货物规则》
- 《International Maritime Dangerous Goods》
- 《危险品安全运输技术指令》
- 《Technical Instructions for the Safe Transport of Dangerous Goods》
- 《危险货物分类和品名编号》
- 《Classification and code of dangerous Goods》
- 《消费产品安全法》
- 《Consumer Product Safety Act》(CPSA)
- 《联邦环境污染控制法》
- 《Federal Environmental Pollution Control Act》(FEPCA)
- 《资源保护及恢复法案》
- 《Resource Conservation and Recovery Act》(RCRA)
- 《国际危险货物道路运输欧洲协定》
- 《European Agreement concerning the International Carriage of Dangerous》
- 《国际危险货物铁路运输欧洲协定》
- 《Regulations concerning the International Carriage of Dangerous》

根据所有联邦、州和地方法律。

In according with all Federal, State and local laws.



## Section 16- Other Information

上面的信息被认为是准确代表了目前最好的信息提供给我们。然而,飞机没有对商品性能保证或任何其他保证,包括明示或暗示,对这类信息的使用我们不承担责任。用户应作出自己的调查,以确定是否适合其特定用途的信息。虽然在此处所包含的数据的准备已经采取了合理的预防措施,这是仅为你提供提供的信息、考虑和调查。这个化学品安全技术说明书为本产品提供了安全操作指南和使用指南,它并不能对所有可能发生的情况提供建议,因此,您特殊使用该产品应先进进行评估,以确定是否需要额外的预防措施。

The information above is believed to be accurate and represents the best information currently available to us. However, concorde makes no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. This material safety data sheet provides guidelines for the safe handling and use of this product; it does not and cannot advise on all possible situations, therefore, your specific use of this product should be evaluated to determine if additional precautions are required.

-- End of Report --

-- 报告结束 --





中国认可  
国际互认  
检测  
TESTING  
CNAS L5138

# 1. 2m 跌落测试报告

## 1. 2m Drop Test Report

样品名称: 锂离子电芯

Sample name: Lithium ion cell

样品型号: 645464

Sample model:

委托单位: 云南路飞新能源材料有限公司  
Applicant: Yunnan Road Fei New Energy Materials  
Co.,Ltd.



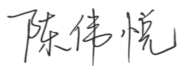
深圳天溯计量检测股份有限公司

Shenzhen Tiansu Calibration and Testing Co., Ltd.



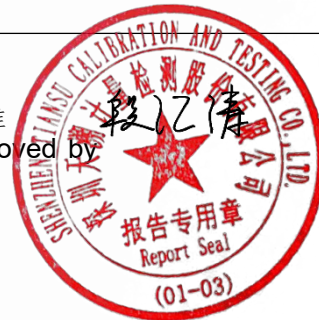
委托单位 Applicant	名称 Name	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.		
	地址 Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province		
制造单位 Manufacturer	名称 Name	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.		
	地址 Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province		
	电话 Phone number	0875-5189928	邮箱 Email address	2411318566@qq.com
	网址 Website	--		
测试实验室 Testing laboratory	名称 Name	深圳天溯计量检测股份有限公司 Shenzhen Tiansu Calibration and Testing Co. , Ltd.		
	地址 Address	深圳市龙岗区宝龙街道锦龙大道 2 号 1 栋、4 栋 B/1,4, NO.2 Jinlong Road, Longgang District, Shenzhen, China		
测试标准 Test Standard	联合国《关于危险货物运输的建议书—规章范本》第 3.3 章节 188 款 ST/SG/AC. 10/1/Rev. 21 Chapter3. 3/Special provisions 188 United nations “recommendations on the TRANSPORT OF DANGEROUS GOODS” model Regulations (21 Rev. Edition) Chapter3. 3/Special provisions 188.			
测试日期 Test date	2022.12.14 to 2022.12.16			
Test conclusion: 检测结论: 由 云南路飞新能源材料有限公司送检的锂离子电芯 的包装件 1.2m 跌落测试依据《关于危险货物运输的建议书》规章范本第 21 修订版进行检测。试验结果符合《关于危险货物运输的建议书》规章范本第 21 修订版相关要求。 The 1.2m drop test of the packages for Lithium ion cell submitted by Yunnan Road Fei New Energy Materials Co.,Ltd. is tested according to the 21st Revised Edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC. 10/1/Rev. 21). 签发日期 Date of issue: 2022.12.16				

 主检  
Tested by



 审核  
Reviewed by



 批准  
Approved by


**一、基本信息 Basic information**

样品名称 Sample name	锂离子电芯 Lithium ion cell	样品型号 Sample model	645464
标称电压 Nominal voltage	3.85V	额定能量 Ratings energy	15.4Wh
内含数量 Number	189 PCS	商标 Trade mark	--
包装件重量 Packaging weight	10.9kg	包装件尺寸 Packaging dimensions	L*W*T(365mm*270mm*160 mm)
外包装 Outer packing	瓦楞纸 Corrugated paper	内包装 Inside packing	塑料 Plastics
包装方式 Type of packing	单独运输电池 Cells or batteries only		
每包装件电池净重 Net quantity of batteries per package	9.809kg		

**二、1.2米跌落测试 1.2m drop test**

No. 序号	Test item 试验项目	Test method 试验依据	Result 结果	Remark 备注
1	1.2米跌落测试 1.2m drop test	联合国《关于危险货物运输的建议书—规章范本》第3.3 章节188款ST/SG/AC. 10/1/Rev. 21 Chapter3.3/Special provisions 188 United nations “recommendations on the TRANSPORT OF DANGEROUS GOODS” model Regulations (21 Rev. Edition) Chapter3.3/Special provisions 188.	合格 Pass	--

Drop position 跌落方向:

Drop position 跌落方向	Top 上面	Front 前面	Side 侧面	Edge 棱	Angle 角
Status 包装状态	合格/Pass	合格/Pass	合格/Pass	合格/Pass	合格/Pass

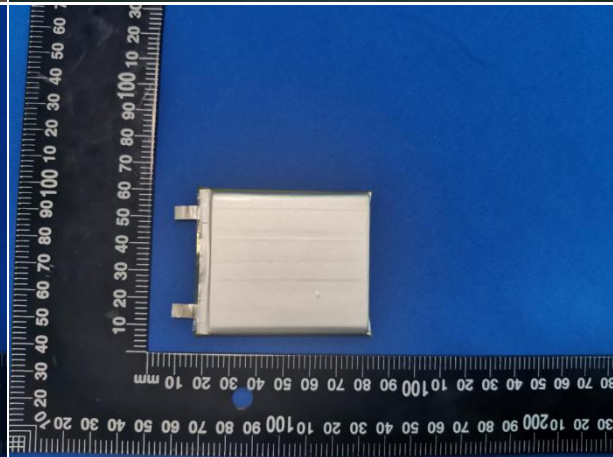
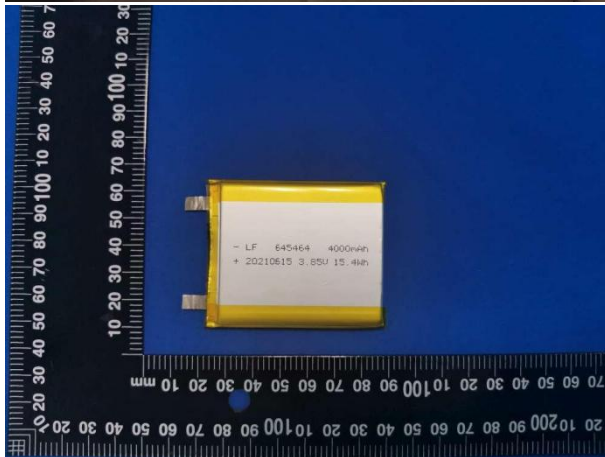
**三、测试要求描述 Testing requirements description:**

每个电芯或电池的包装件或者完全包装件必须能承受 1.2 米跌落测试，每个包装件进行 5 次不同方向的跌落测试，而不造成包含在其中的电池或电芯的损坏，不造成使电池与电池（电芯与电芯）接触的内含物的移动和内含物的释出。

The package of batteries is dropped from 1.2m 5 times per package. Each package is capable of withstanding a 1.2m drop test in any orientation without damage to cells or batteries contained therein, without shifting of the content so as to allow battery to battery (cell to cell) contact and without release of contents.



THE PHOTO OF SAMPLE 样品图片



## 声 明

# STATEMENTS

1. 本报告无检测单位印章无效。  
The test report is invalid without the official stamp of Tiansu.
2. 除非全部复制，否则无深圳天溯计量检测股份有限公司书面批准本报告不得部分复制。  
This report shall not be copied partly without the written approval of Shenzhen Tiansu Calibration and Testing Co., Ltd.
3. 本报告无批准人、审核人及检测人签名无效。  
This report is invalid without the signature of the approver, reviewer, and tester.
4. 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。  
The report is invalid when anything of following happens - illegal transfer, reproduce, embezzlement, imposture, modification or tampering in any media form.
5. 本报告仅与送检样品有关。  
The test report is valid for the tested samples only.
6. 样品信息和客户信息由申请人提供，本实验室不对其真实性负责。  
Product information and customer information provided by the applicant, we are not responsible for its authenticity.
7. 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 Tiansu within 15 days.

-----报告结束-----

-- End of report --







中国认可  
国际互认  
检测  
TESTING  
CNAS L5138

# 堆码试验报告

## Stacking test Report

样品名称: 锂离子电芯

Sample name: Lithium ion cell

样品型号: 645464

Sample model:

委托单位: 云南路飞新能源材料有限公司  
Applicant: Yunnan Road Fei New Energy Materials  
Co.,Ltd.



深圳天溯计量检测股份有限公司

Shenzhen Tiansu Calibration and Testing Co., Ltd.



委托单位 Applicant	名称 Name	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.
	地址 Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province
包装件 制造单位 Manufacturer	名称 Name	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.
	地址 Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province
包装容器 制造商 Manufacturer of packing containers	名称 Name	开平市开隆纸品包装有限公司 Kaiping Kailong Paper Packaging Co., LTD
	地址 Address	开平市水口镇新风开发区长安西街 6-8 号 No.6-8, West Chang 'an Street, Xinfeng Development Zone, Shuikou Town, Kaiping City
测试实验室 Testing laboratory	名称 Name	深圳天溯计量检测股份有限公司 Shenzhen Tiansu Calibration and Testing Co., Ltd.
	地址 Address	深圳市龙岗区宝龙街道锦龙大道 2 号 1 栋、4 栋 B/1,4, NO.2 Jinlong Road, Longgang District, Shenzhen, China
测试标准 Test Standard	联合国《关于危险货物运输的建议书》规章范本 UN/ST/SG/AC.10/1/Rev.22/6.1.5.6 条款。 Test standard: 22st Revised Edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC.10/1/Rev.22) Clause 6.1.5.6.	
测试日期 Test date	2022.12.14 to 2022.12.17	
<p>Test conclusion: 检测结论: 由 云南路飞新能源材料有限公司送检的锂离子电芯 的包装件堆码测试依据《关于危险货物运输的建议书》规章范本第 22 修订版进行检测。试验结果符合《关于危险货物运输的建议书》规章范本第 22 修订版相关要求。 The Stacking test of the packages for Lithium ion cell submitted by Yunnan Road Fei New Energy Materials Co.,Ltd. is tested according to the 22st Revised Edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC.10/1/Rev.22).</p> <p style="text-align: right;">签发日期 Date of issue: 2022.12.17</p>		

主检  
Tested by

陈伟悦

审核  
Reviewed by

邱伟超

批准  
Approved by



**一、基本信息 Basic information**

包装件信息 Information about the package	外包装材料 Outer packing materials	瓦楞纸 Corrugated paper	内包装材料 Inside packing materials	塑料 Plastics
	封闭装置 Closures	胶封	最大容量 Maximum capacity	189PCS
	包装件尺寸 Packaging dimensions	L*W*T(365mm*270mm*160mm)	包装件重量 Packaging weight	10.9kg
	制造方法 method of manufacture	/	每包装件电池净重 Net quantity of batteries per package	9.809kg
内部电池信息 Information about the battery inside	样品名称 Sample name	锂离子电芯 Lithium ion cell	样品型号 Sample model	645464
	标称电压 Nominal voltage	3.85V	额定能量 Ratings energy	15.4Wh
	尺寸 Dimension	L*W*T(65.0mm*55.0mm*6.5mm)	重量 Weight	51.9g

**二、堆码测试 Stacking test**

No. 序号	Test item 试验项目	Test method 试验依据	Result 结果	Remark 备注
1	堆码测试 Stacking test	联合国《关于危险货物运输的建议书》规章范本 UN/ST/SG/AC.10/1/Rev.22/6.1.5.6条款. Test standard: 22st Revised Edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC.10/1/Rev.22) Clause 6.1.5.6.	Pass 合格	--

测试时的温度	测试时的湿度	加载的负荷
21.8℃	51%RH	1922.8N



### 三、测试要求描述 Testing requirements description:

在试验样品的顶部表面施加一力量，此力相当于运输时可能堆叠在它上面的同样数量包装件的总重量。如果试验样品内装的液体相对密度与待运液体不同，则该力应按后者计算。包括试验样品在内的最小堆码高度应是 3 米。试验时间为 24 小时，但拟装的塑料桶、罐和复合包装 6HH1 和 6HH2，应在不低于 40℃ 的温度下经受 28 天的堆码试验。

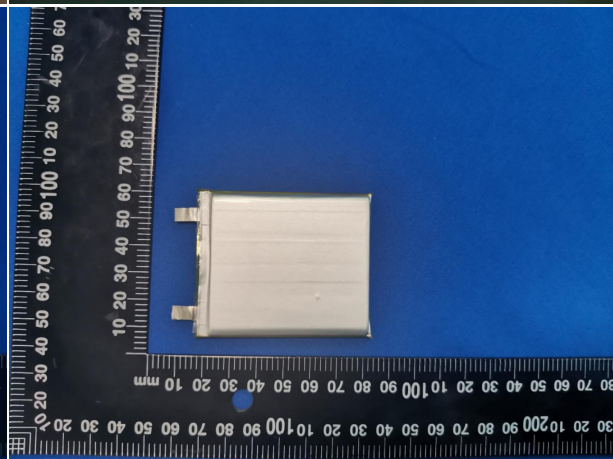
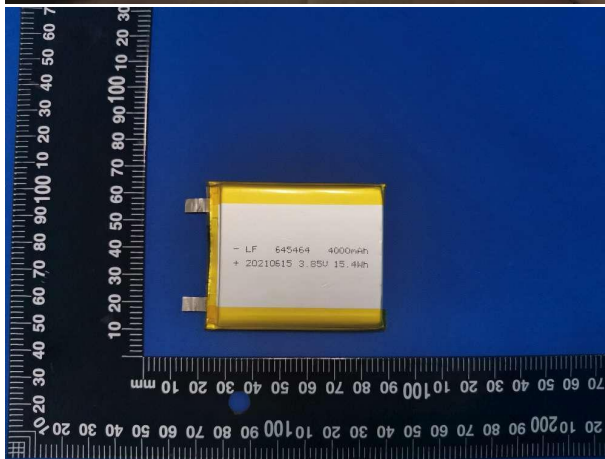
The test sample shall be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during transport; Where the contents of the test sample are liquids with relative density different from that of the liquid to be transported, the force shall be calculated in relation to the latter. The minimum height of the stack including the test sample shall be 3 meters. The duration of the test shall be 24 hours except that plastics drums, jerricans, and composite packagings 6HH1 and 6HH2 intended for liquids shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40°C.

试验样品不得泄漏。对复合或组合包装而言，不得有所装的物质从内贮器和内包装中漏出。试验样品不得显出可能对运输安全有不利影响的损坏，或者可能降低其强度或造成包装件堆码不稳定的变形。在进行评估之前，塑料包装应该冷却至环境温度。

No test sample may leak. In composite packagings or combination packagings, there shall be no leakage of the filling substance from the inner receptacle or inner packaging. No test sample may show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages. Plastics packagings shall be cooled to ambient temperature before the assessment.



THE PHOTO OF SAMPLE 样品图片



## 声 明

# STATEMENTS

1. 本报告无检测单位印章无效。  
The test report is invalid without the official stamp of Tiansu.
2. 除非全部复制，否则无深圳天溯计量检测股份有限公司书面批准本报告不得部分复制。  
This report shall not be copied partly without the written approval of Shenzhen Tiansu Calibration and Testing Co., Ltd.
3. 本报告无批准人、审核人及检测人签名无效。  
This report is invalid without the signature of the approver, reviewer, and tester.
4. 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。  
The report is invalid when anything of following happens – illegal transfer, reproduce, embezzlement, imposture, modification or tampering in any media form.
5. 本报告仅与送检样品有关。  
The test report is valid for the tested samples only.
6. 样品信息和客户信息由申请人提供，本实验室不对其真实性负责。  
Product information and customer information provided by the applicant, we are not responsible for its authenticity.
7. 准备提交运输的包装已按照本章的有关要求进行试验,使用其他打包方法或部件可能使其失效。  
The packaging prepared as for transport was tested in accordance with the appropriate requirements of this Chapter and that the use of other packaging methods or components may render it invalid.
8. 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 Tiansu within 15 days.

----- 报告结束 -----  
-- End of report --



**锂电池**

符合特殊规定 188

## 海运运输条件鉴别报告书

Identification and Classification Report for Sea Transport of Goods

本报告本年度有效  
有效期至 2023 年 12 月 31 日

样品名称: 锂离子电芯

Sample name: Lithium ion cell

样品型号: 645464

Sample model:

委托单位: 云南路飞新能源材料有限公司

Applicant: Yunnan Road Fei New Energy Materials  
Co.,Ltd.

深圳天溯计量检测股份有限公司

Shenzhen Tiansu Calibration and Testing Co., Ltd.



鉴别目的 Identification Purpose	是否属于海运危险品 Dangerous Goods or not restricted	鉴别日期 Identification Date	2022.12.29 Dec. 29, 2022
鉴别依据 Identification Criteria	IMDG CODE (Amdt 41-22)		
委托单位 Client	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.		
地址 Client Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province		
制造商 Manufacturer	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.		
地址 Manufacturer Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province		
物品名称 Name of Goods	锂离子电芯 Lithium ion cell		
物品信息 Nature of the goods	型号规格: Model/Type	645464/3.85V/15.4Wh	
	尺寸 Dimensions	65.0mm*55.0mm*6.5mm	
	外观 Appearance	近长方体 Approximate Cuboid	
	每包装件电池/电芯数目 Net number of batteries/cell per package	189 PCS	
	UN38.3 报告编号 UN38.3 report No.	ORTSZB01210601025	
	1.2m 跌落测试报告为 1.2m drop test report No.	TSZ22120267-P03-R03	
鉴别结论 Conclusion	非限制性 Not subject these Regulations 根据特殊规定 188, 该物品不受 IMDG CODE 限制。 The article is not restricted to IMDG CODE according to special provision 188		
备注 Comment	每一电池必须做好防短路措施, 并装入坚固外包装内。 Each single battery must be packed in such a way as to prevent short circuits normal conditions and packed in strong outer packaging.		

主检  
Tested by

陈伟悦

审核  
Reviewed by

邱伟超

批准  
Approved by

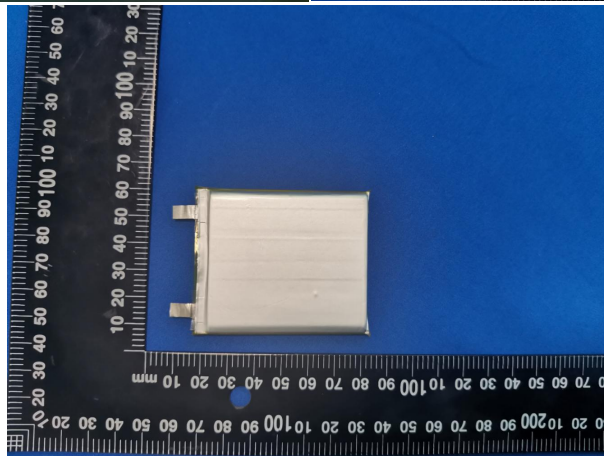
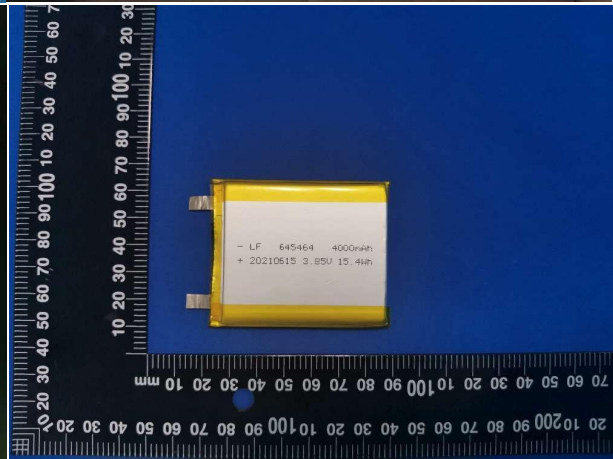




鉴别项目名称 Item	检查结果 Inspection Result
该电池额定瓦特小时数为 15.4Wh Watt-hour rating of the battery is 15.4Wh	$\leq 20$ Wh
该电池已通过 UN38.3 测试 Each battery is of a type proved to meet the Requirements of each test in the UN MANUAL OF TESTING AND CRITERIA, Part III, sub-section 38.3	符合 Conform
电池按照规定的质量管理体系进行制造 Batteries be manufactured under a quality management programmer.	符合 Conform
该锂电池不属于召回电池，不属于废弃和回收电池 The lithium batteries don't belong to batteries returned to the manufacturer for safety reasons, are not waste lithium batteries and not lithium cells being shipped for recycling or disposal.	符合 Conform
通过包装件 1.2 米跌落试验 Each package is capable of withstanding a 1.2m drop test in any orientation	符合 Conform
每个包装件上均有锂电池操作标签。 每票货物均有随附文件说明：包装件内装锂离子电池；必须小心操作。如包装件破损，有易燃危险品；包装件破损时应采取的特殊措施，包括必要时的检查和重新包装；应急电话号码。 Each package is labeled with lithium battery handing label. Each consignment is accompanied with a document with an indication that: The package contains lithium ion batteries; The package must be handled with care, and that a flammability hazard exists if the package is damaged; Special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and A telephone number for additional information	符合 Conform



THE PHOTO OF SAMPLE 样品图片



# 声 明

## STATEMENTS

1. 本公司依据委托人(托运人或其代理人)提供的物品及其运输信息,确定货物的运输条件并出具此报告书。

The report is issued by Shenzhen Tiansu Calibration and Testing Co. ,Ltd according to the information of the goods and the information of its shipping provided by the applicant (shipper or his agent).

2. 依据鉴别的需要,本公司要求委托人提供真实、完整的货物样品及资料。

According to the demanded of identification and classification, SHENZHEN TIAN SU CALIBRATION AND TESTING CO. ,LTD requires the applicant to provide true and exact sample and data of the cargo.

3. 委托人保证申报的物品/或提供的样品与交运的货物是同一种物质。

The applicant guarantees that the declared goods and/or the sample who provides should be identical with the contents of cargo that is to be transported.

4. 本公司仅对样品的鉴别结果负责。

SHENZHEN TIAN SU CALIBRATION AND TESTING CO. ,LTD is only responsible for the identification and classification of the sample provided by the applicant.

5. 本报告书经主检员、审批人和批准人签字并加盖本公司印章后生效。

This report will be effective only after is signed by inspector, checker and approver, and stamped by SHENZHEN TIAN SU CALIBRATION AND TESTING CO. ,LTD.

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8. 报告书仅在本年度有效。

This report is only valid within the year.

----- 报告结束 -----

-- End of report --



EMC TEST REPORT

For

Shenzhen yanbu technology co. LTD

Magnetic absorption wireless charging mobile power supply

Test Model: E29B

Additional Model No.: E29A



中国认可  
国际互认  
检测  
TESTING  
CNAS L4595

Prepared for : Shenzhen yanbu technology co. LTD  
Address : 6 / f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.  
Address : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao' an District, Shenzhen, Guangdong, China

Tel : (+86)755-82591330  
Fax : (+86)755-82591332  
Web : www.LCS-cert.com  
Mail : webmaster@LCS-cert.com

Date of receipt of test sample : March 11, 2021  
Number of tested samples : 1  
Serial number : Prototype  
Date of Test : March 11, 2021~ March 16, 2021  
Date of Report : March 17, 2021

**EMC TEST REPORT****EN 55032: 2015+A11: 2020**

Electromagnetic compatibility of multimedia equipment - Emission Requirements

**EN 55035: 2017+A11: 2020**

Electromagnetic compatibility of multimedia equipment – Immunity requirements

**Report Reference No. .... : LCS210310062AE**

Date of Issue..... : March 17, 2021

**Testing Laboratory Name..... : Shenzhen LCS Compliance Testing Laboratory Ltd.**

Address ..... : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao' an District, Shenzhen, Guangdong, China

Testing Location/ Procedure... : Full application of Harmonised standards ■  
Partial application of Harmonised standards □  
Other standard testing method □**Applicant's Name..... : Shenzhen yanbu technology co. LTD**

Address ..... : 6 / f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

**Test Specification**Standard ..... : EN 55032: 2015+A11: 2020  
EN 55035: 2017+A11: 2020  
EN IEC 61000-3-2: 2019  
EN 61000-3-3: 2013+A1: 2019

Test Report Form No. .... : LCSEMC-1.0

TRF Originator ..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF ..... : Dated 2011-03

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**Test Item Description. .... : Magnetic absorption wireless charging mobile power supply**

Trade Mark ..... : N/A

Test Model ..... : E29B

Ratings ..... : Please Refer to Page 9

**Result ..... : Positive****Compiled by:**

Cindy Nie

**Supervised by:**

Tom Wang



Cindy Nie/ File administrators

Tom Wang / Technique principal

Gavin Liang/ Manager

**EMC -- TEST REPORT****Test Report No. : LCS210310062AE**March 17, 2021

Date of issue

**Test Model..... : E29B**

EUT..... : Magnetic absorption wireless charging mobile power supply

**Applicant..... : Shenzhen yanbu technology co. LTD**

Address..... : 6 / f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

Telephone..... : /

Fax..... : /

**Manufacturer..... : Shenzhen weiduli technology co., LTD**

Address..... : 6 / f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

Telephone..... : /

Fax..... : /

**Factory..... : Shenzhen weiduli technology co., LTD**

Address..... : 6 / f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

Telephone..... : /

Fax..... : /

**Test Result****Positive**

The test report merely corresponds to the test sample.  
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

### Revision History

Revision	Issue Date	Revisions	Revised By
000	March 17, 2021	Initial Issue	Gavin Liang

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## 1. TEST STANDARDS

The tests were performed according to following standards:

EN 55032: 2015+A11: 2020 Electromagnetic compatibility of multimedia equipment - Emission Requirements

EN 55035: 2017+A11: 2020 Electromagnetic compatibility of multimedia equipment – Immunity characteristics

EN IEC 61000-3-2: 2019 Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)

EN 61000-3-3: 2013+A1: 2019 Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current  $\leq 16$  A per phase and not subject to conditional connection

## 2.SUMMARY OF STANDARDS AND RESULTS

### 2.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

<b>Emission (EN 55032: 2015+A11: 2020)</b>			
<b>Description of Test Item</b>	<b>Standard</b>	<b>Limits</b>	<b>Results</b>
Conducted disturbance at mains terminals	EN 55032: 2015+A11: 2020	Class B	PASS
Conducted disturbance at telecommunication port	EN 55032: 2015+A11: 2020	Class B	N/A
Radiated disturbance	EN 55032: 2015+A11: 2020	Class B	PASS
Harmonic current emissions	EN IEC 61000-3-2: 2019	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3: 2013+A1: 2019	-----	PASS
<b>Immunity (EN 55035: 2017+A11: 2020)</b>			
<b>Description of Test Item</b>	<b>Basic Standard</b>	<b>Performance Criteria</b>	<b>Results</b>
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Radio-frequency, Continuous radiated disturbance	EN 61000-4-3: 2006+A2: 2010	A	PASS
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	PASS
Surge (Input a.c. power ports)	EN 61000-4-5: 2014+A1: 2017	B	PASS
Surge (Telecommunication ports)		B	N/A
Radio-frequency, Continuous conducted disturbance	EN 61000-4-6: 2014	A	PASS
Power frequency magnetic field	EN 61000-4-8: 2010	A	PASS
Voltage dips, >95% reduction	EN 61000-4-11: 2004+A1: 2017	B	PASS
Voltage dips, 30% reduction		C	PASS
Voltage interruptions		C	PASS

\*\*\*Note: N/A is an abbreviation for Not Applicable.

<b>Test mode:</b>		
Mode 1	Charging	Record
Mode 2	Discharging	Pre-scan
***Note: All test modes were tested, but we only recorded the worst case in this report.		

## 2.2. Description of Performance Criteria

### General Performance Criteria

Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

- essential operational modes and states;

#### 2.2.1. Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacture when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

#### 2.2.2. Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacture, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operation state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

#### 2.2.3. Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacture's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

### 3. GENERAL INFORMATION

#### 3.1. Description of Device (EUT)

EUT : Magnetic absorption wireless charging mobile power supply

Trade Mark : N/A

Test Model : E29B

Additional Model : E29A

Model Declaration : PCB board, structure and internal of these model(s) are the same, So no additional models were tested.

Power Supply : Input: Type C: 9V $\overline{=}$ 2.25A  
Output: Type C: 9V $\overline{=}$ 2.25A  
PD-QC: 20W  
Wireless charging output: 15W

Highest internal frequency (F <sub>x</sub> )	Highest measured frequency
F <sub>x</sub> ≤ 108 MHz 108 MHz < F <sub>x</sub> ≤ 500 MHz 500 MHz < F <sub>x</sub> ≤ 1 GHz F <sub>x</sub> > 1 GHz	1 GHz 2 GHz 5 GHz 5 × F <sub>x</sub> up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, F <sub>x</sub> is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies. Where F <sub>x</sub> is unknown, the radiated emission measurements shall be performed up to 6 GHz	

#### 3.2. Description of Support Device

Name	Manufacturers	M/N	S/N
/	/	/	/

#### 3.3. Description of Test Facility

Site Description  
EMC Lab. : NVLAP Accreditation Code is 600167-0.  
FCC Designation Number is CN5024.  
CAB identifier is CN0071.  
CNAS Registration Number is L4595.

### 3.4. Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

### 3.5. Measurement Uncertainty

Test	Parameters	Expanded uncertainty ( $U_{lab}$ )	Expanded uncertainty ( $U_{cispr}$ )
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	$\pm 2.63$ dB $\pm 2.35$ dB	$\pm 3.8$ dB $\pm 3.4$ dB
Power Disturbance	Level accuracy (30MHz to 300MHz)	$\pm 2.90$ dB	$\pm 4.5$ dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	$\pm 3.60$ dB	$\pm 3.3$ dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	$\pm 3.68$ dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	$\pm 3.48$ dB	$\pm 5.3$ dB
Radiated Emission	Level accuracy (above 1000MHz)	$\pm 3.90$ dB	$\pm 5.2$ dB
Mains Harmonic	Voltage	$\pm 0.510\%$	N/A
Voltage Fluctuations & Flicker	Voltage	$\pm 0.510\%$	N/A
EMF	/	$\pm 21.59\%$	N/A

1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

## 4. MEASURING DEVICES AND TEST EQUIPMENT

### LINE CONDUCTED EMISSION

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	EZ	EZ-EMC	/	N/A	N/A
2	EMI Test Receiver	R&S	ESPI	101840	2020-06-22	2021-06-21
3	Artificial Mains	R&S	ENV216	101288	2020-06-22	2021-06-21
4	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-003 2	2020-06-22	2021-06-21
5	Impedance Stabilization Network	TESEQ	ISN T800	45130	2020-10-20	2021-10-19

### RADIATED DISTURBANCE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	E3	E3-EMC	/	N/A	N/A
2	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2021-07-25
3	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2021-07-01
4	EMI Test Receiver	R&S	ESR 7	101181	2020-06-22	2021-06-21
5	Broadband Preamplifier	/	BP-01M18G	P190501	2020-06-22	2021-06-21

### VOLTAGE FLUCTUATION AND FLICKER/HARMONIC CURRENT EMISSIONS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Analyzer Test System	Voltech	PM6000	200006700523	2020-06-22	2021-06-21

### ELECTROSTATIC DISCHARGE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESD Simulator	SCHLODER	SESD 230	604035	2020-07-21	2021-07-20

### RF ELECTROMAGNETIC FIELD

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESG Vector Signal Generator	Agilent	E4438C	MY42081396	2020-11-21	2021-11-20
2	RF POWER AMPLIFIER	OPHIR	5225R	1052	NCR	NCR
3	RF POWER AMPLIFIER	OPHIR	5273F	1019	NCR	NCR
4	Stacked Broadband Log Periodic Antenna	SCHWARZBEC K	STLP 9128	9128ES-145	NCR	NCR
5	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBEC K	STLP 9149	9149-484	NCR	NCR
6	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2020-03-26	2021-03-25

### ELECTRICAL FAST TRANSIENT IMMUNITY

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2020-06-22	2021-06-21

### SURGES, LINE TO LINE AND LINE TO GROUND

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2020-06-22	2021-06-21

### RF COMMON MODE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Simulator	FRANKONIA	CIT-10/75	A126A1195	2020-06-22	2021-06-21
2	CDN	FRANKONIA	CDN-M2+M3	A2210177	2020-06-22	2021-06-21
3	6dB Attenuator	FRANKONIA	DAM25W	1172040	2020-06-22	2021-06-21

## MAGNETIC FIELD SUSCEPTIBILITY TEST

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power frequency mag-field generator System	EVERFINE	EMS61000-8K	906003	2020-06-22	2021-06-21

## VOLTAGE DIPS/INTERRUPTIONS IMMUNITY TEST

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2020-06-22	2021-06-21

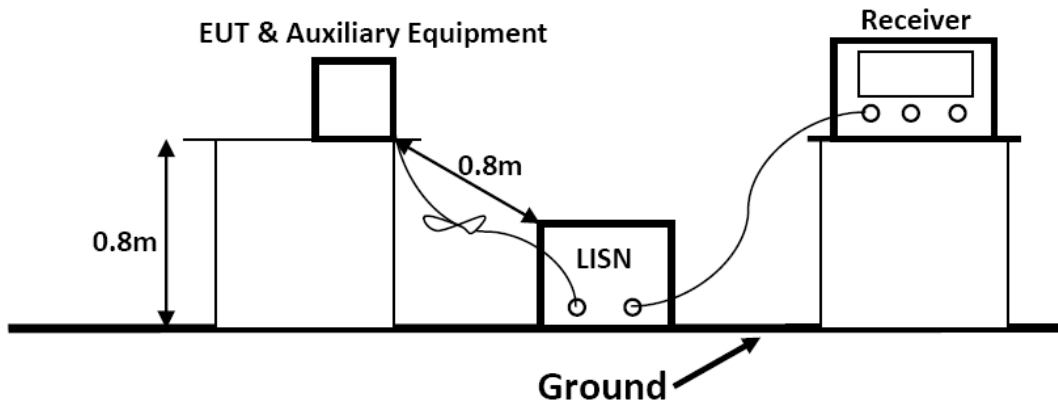
Note: All equipment is calibrated through CHINA CEPREI LABORATORY and GUANGZHOU LISAI CALIBRATION AND TEST CO., LTD.

NCR --- No calibration requirement.

## 5. TEST RESULTS

### 5.1. POWER LINE CONDUCTED EMISSION MEASUREMENT

#### 5.1.1. Block Diagram of Test Setup



#### 5.1.2. Test Standard

EN 55032: 2015+A11: 2020 Class B

Power Line Conducted Emission Limits (Class B)		
Frequency (MHz)	Limit (dB $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

NOTE1-The lower limit shall apply at the transition frequencies.  
 NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

#### 5.1.3. EUT Configuration on Test

The following equipments are installed on Power Line Conducted Emission Measurement to meet the EN 55032 requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

#### 5.1.4. Operating Condition of EUT

- 5.1.4.1. Setup the EUT as shown on Section 5.1.1
- 5.1.4.2. Turn on the power of all equipments.
- 5.1.4.3. Let the EUT work in measuring mode(1) and measure it.



### 5.1.5. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided 50-ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55032 regulations during conducted emission measurement.

The bandwidth of the field strength meter is set at 9kHz in 150kHz~30MHz.

The frequency range from 150kHz to 30MHz is investigated.

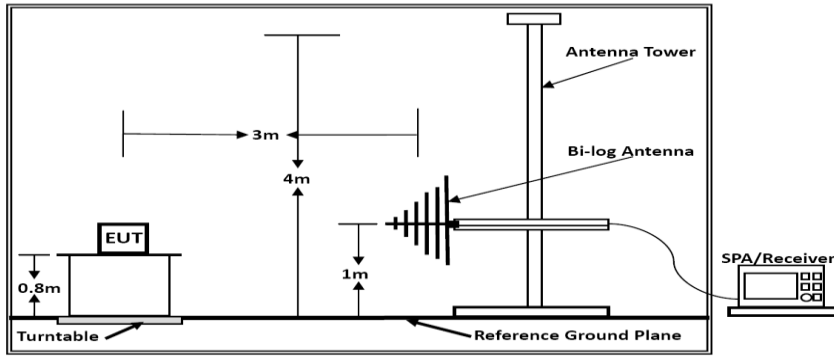
### 5.1.6. Test Results

**PASS.**

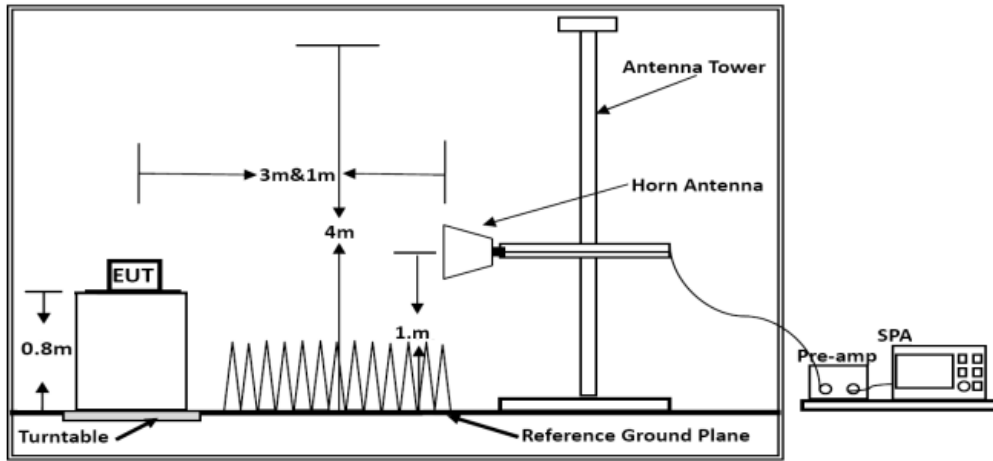
Refer to attached Annex B.1

## 5.2. RADIATED EMISSION MEASUREMENT

### 5.2.1. Block Diagram of Test Setup



Below 1GHz



Above 1GHz

### 5.2.2. Test Standard

EN 55032: 2015+A11: 2020 Class B

All emanations from a class B device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

Limits for Radiated Emission Below 1GHz			
Frequency (MHz)	Distance (Meters)	Field Strengths Limit (dB $\mu$ V/m)	
30 ~ 230	3	40	
230 ~ 1000	3	47	
***Note: (1) The smaller limit shall apply at the combination point between two frequency bands. (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.			
Limits for Radiated Emission Above 1GHz			
Frequency (MHz)	Distance (Meters)	Peak Limit (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)
1000 ~ 3000	3	70	50
3000 ~ 6000	3	74	54
***Note: The lower limit applies at the transition frequency.			

### 5.2.3. EUT Configuration on Test

The EN 55032 regulations test method must be used to find the maximum emission during radiated emission measurement.

### 5.2.4. Operating Condition of EUT

5.2.4.1. Turn on the power.

5.2.4.2. Let the EUT work in the test mode(1) and measure it.

### 5.2.5. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. By-log antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the EMI test receiver is set at RBW/VBW=120kHz/300kHz.

The frequency range from 30MHz to 1000MHz is checked.

The bandwidth of the Spectrum analyzer is set at RBW/VBW=1MHz/3MHz.

The frequency range from 1GHz to the frequency which about 5th carrier harmonic or 6GHz is checked.

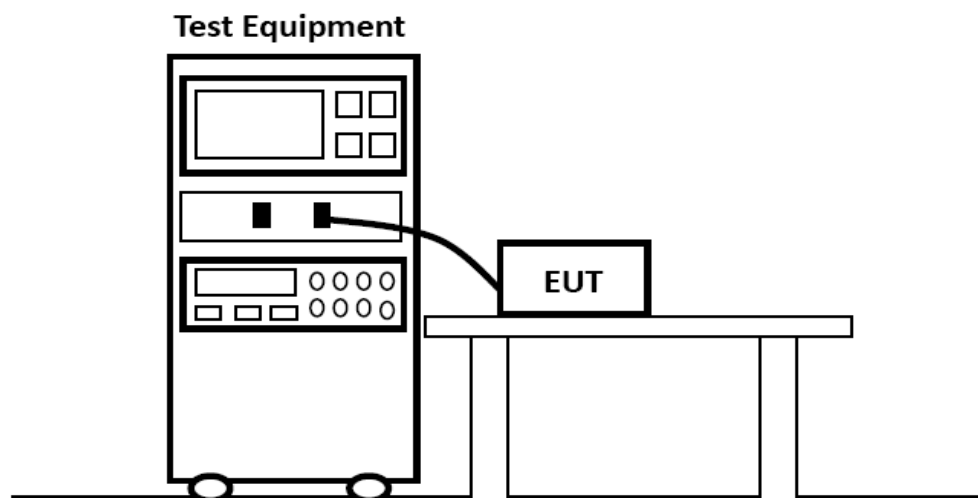
### 5.2.6. Test Results

**PASS.**

Refer to attached Annex B.2

### 5.3. HARMONIC CURRENT EMISSION MEASUREMENT

#### 5.3.1. Block Diagram of Test Setup



#### 5.3.2. Test Standard

EN IEC 61000-3-2: 2019

#### 5.3.3. Operating Condition of EUT

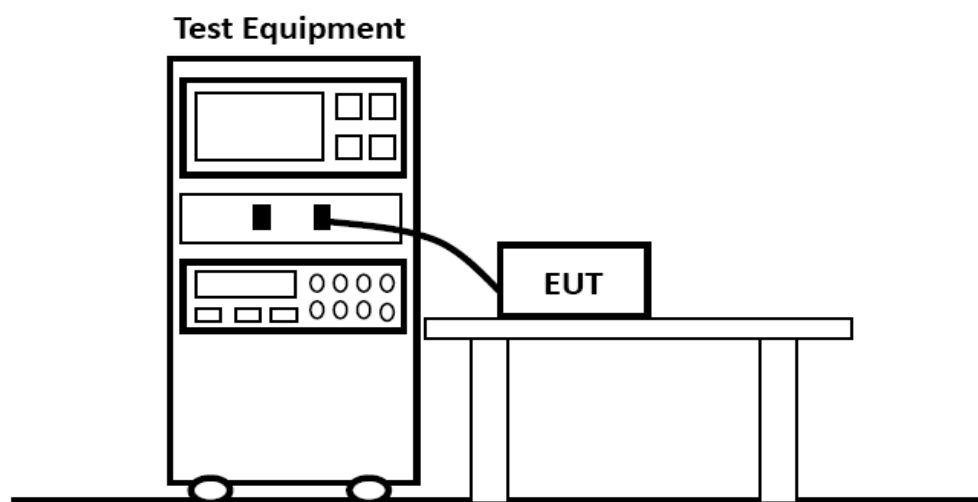
Same as Section 5.2.4, except the test setup replaced as Section 5.3.1.

#### 5.3.4. Test Results

Refer to attached Annex B.3

## 5.4. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

### 5.4.1. Block Diagram of Test Setup



### 5.4.2. Test Standard

EN 61000-3-3: 2013+A1: 2019

### 5.4.3. Operating Condition of EUT

Same as Section 5.2.4, except the test setup replaced as Section 5.4.1.

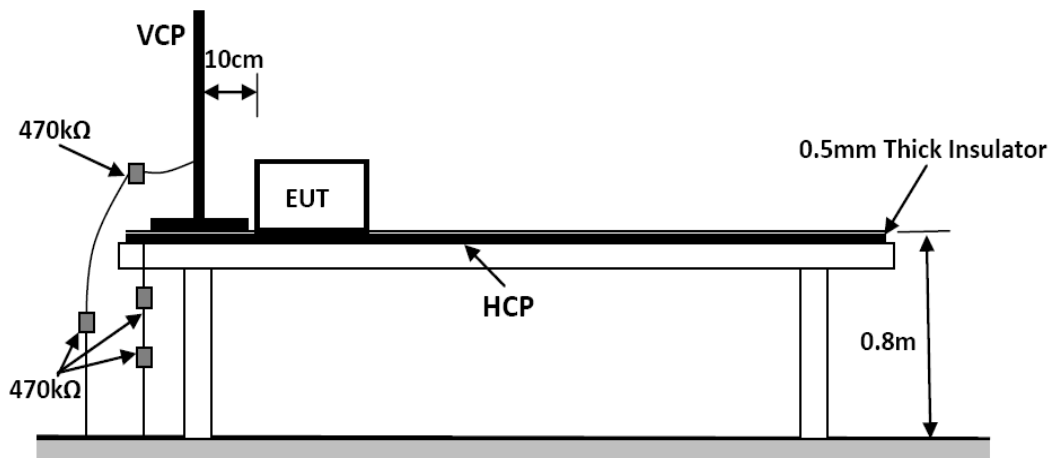
### 5.4.4. Test Results

**PASS.**

Refer to attached Annex B.4

## 5.5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

### 5.5.1. Block Diagram of Test Setup



### 5.5.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-2: 2009, Severity Level: 3 / Air Discharge:  $\pm 8$ KV, Level: 2 / Contact Discharge:  $\pm 4$ KV)

### 5.5.3. Severity Levels and Performance Criterion

#### 5.5.3.1. Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1	$\pm 2$	$\pm 2$
2	$\pm 4$	$\pm 4$
3	$\pm 6$	$\pm 8$
4	$\pm 8$	$\pm 15$
X	Special	Special

#### 5.5.3.2. Performance Criterion

Performance Criterion: B

### 5.5.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.5.1.

### 5.5.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 5.1.4. Except the test set up replaced by Section 5.5.1.

### 5.5.6. Test Procedure

#### 5.2.6.1. Air Discharge

This test is done on a non-conductive surfaces. The round discharge tip of the Electrostatic Discharge simulator shall be approached as fast as possible then to touch the EUT. After each discharge, the simulator shall be removed from the EUT. The simulator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

#### 5.2.6.2. Contact Discharge

All the procedure shall be same as air discharge, except using the acute discharge tip. The top end of the Electrostatic Discharge simulator is touch the EUT all the time when the simulator is re-triggered for a new single discharge and repeated 10 times for each pre-selected test point.

#### 5.2.6.3. Indirect Discharge For Horizontal Coupling Plane

The vertical coupling plane(VCP) is placed 0.1m away from EUT. The top end of Electrostatic Discharge simulator should aim at the center of one border of the VCP for at least 25 times discharge.

#### 5.2.6.4. Indirect Discharge For Vertical Coupling Plane

The top end of Electrostatic Discharge simulator should place at the point 0.1m away from EUT on the horizontal coupling plane(HCP). At least 25 times discharge should be done for every pre-selected point around EUT.

Record any performance degradation of the EUT during the test and judge the test result according to ce criterion.

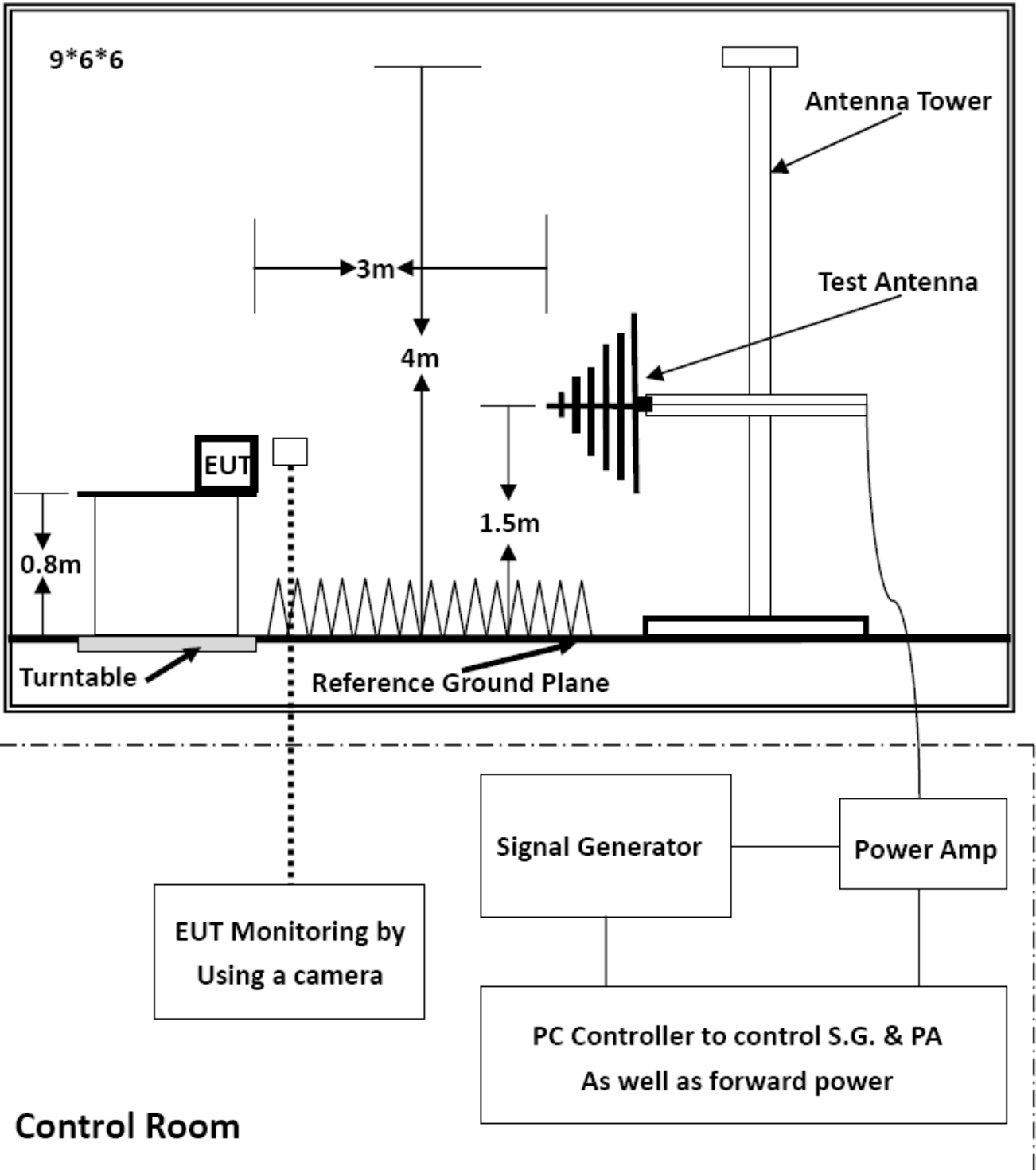
### 5.5.7. Test Results

**PASS.**

Refer to attached Annex B.5

### 5.6. RF FIELD STRENGTH SUSCEPTIBILITY TEST

#### 5.6.1. Block Diagram of Test Setup





### 5.6.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-3: 2006+A2: 2010 Severity Level: 2, 3V/m)

### 5.6.3. Severity Levels and Performance Criterion

#### 5.6.3.1. Severity level

Level	Field Strength (V/m)
1	1
2	3
3	10
X	1

#### 5.6.3.2. Performance Criterion

Performance Criterion: A

### 5.6.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.6.1.

### 5.6.5. Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 5.2.4, except the test setup replaced as Section 5.6.1.

### 5.6.6. Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD Recording is used to monitor its screen. All the scanning conditions are as following:

Condition of Test	Remark
Fielded Strength	3 V/m (Severity Level 2)
Radiated Signal	Unmodulated
Test Frequency Range (swept test)	80-1000MHz
Test Frequency (spot test)	1800MHz, 2600MHz, 3500MHz, 5000MHz
Dwell time of radiated	0.0015 decade/s
Waiting Time	3 Sec.

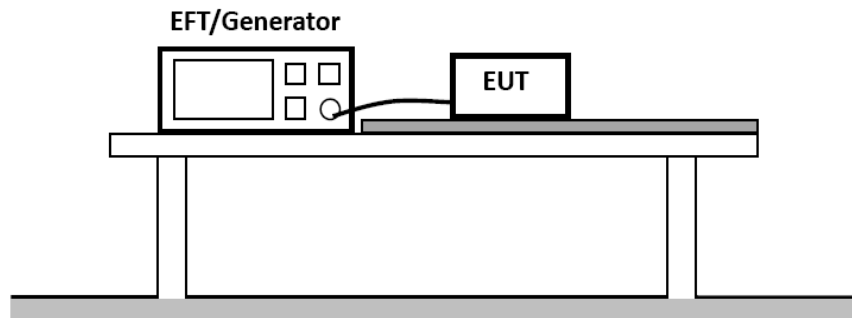
### 5.6.7. Test Results

**PASS.**

Refer to attached Annex B.6

## 5.7. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

### 5.7.1. Block Diagram of Test Setup



### 5.7.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-4: 2012, Severity Level, Level 2: 1KV)

### 5.7.3. Severity Levels and Performance Criterion

#### 5.7.3.1. Severity level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 KV	0.25 KV
2	1 KV	0.5 KV
3	2 KV	1 KV
4	4 KV	2 KV
X	Special	Special

#### 5.7.3.2. Performance Criterion

Performance Criterion: B

### 5.7.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.7.1.

### 5.7.5. Operating Condition of EUT

5.7.5.1. Setup the EUT as shown in Section 5.7.1.

5.7.5.2. Turn on the power of all equipments.

5.7.5.3. Let the EUT work in test mode(1) and measure it.

### 5.7.6. Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

5.7.6.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 mins.

5.7.6.2. For signal lines and control lines ports:

It's unnecessary to test.

5.7.6.3. For DC output line ports:

It's unnecessary to test.

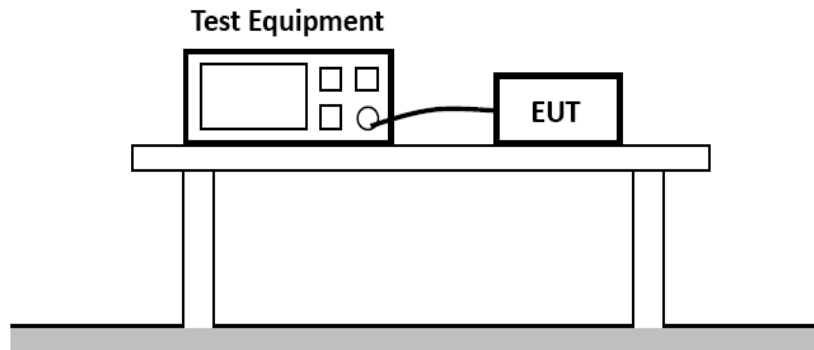
### 5.7.7. Test Results

**PASS.**

Refer to attached Annex B.7

## 5.8. SURGE IMMUNITY TEST

### 5.8.1. Block Diagram of Test Setup



### 5.8.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-5: 2014+A1: 2017, Severity Level: Line to Line: Level 2, 1.0KV, Line to Earth: Level 3, 2.0KV)

### 5.8.3. Severity Levels and Performance Criterion

#### 5.8.3.1. Severity level

Severity Level	Open-Circuit Test Voltage (KV)
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

#### 5.8.3.2. Performance Criterion

Performance Criterion: B

### 5.8.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.8.1.

### 5.8.5. Operating Condition of EUT

5.8.5.1. Setup the EUT as shown in Section 5.8.1.

5.8.5.1. Turn on the power of all equipments.

5.8.5.1. Let the EUT work in test mode (1) and measure it.

### 5.8.6. Test Procedure

5.8.6.1. Set up the EUT and test generator as shown on Section 5.8.1.

5.8.6.2. For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

5.8.6.3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.

5.8.6.4. Different phase angles are done individually.

5.8.6.5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

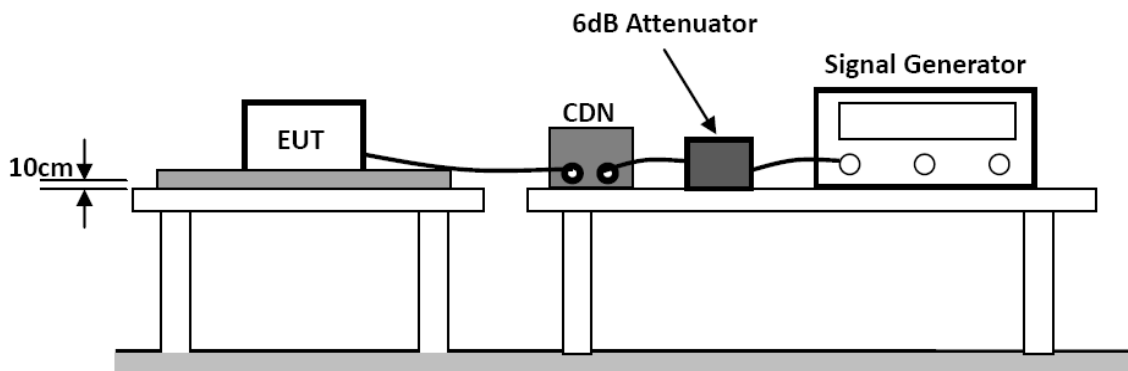
### 5.8.7. Test Results

**PASS.**

Refer to attached Annex B.8

## 5.9. INJECTED CURRENTS SUSCEPTIBILITY TEST

### 5.9.1. Block Diagram of Test Setup



### 5.9.2. Test Standard

EN 55035: 2017+A11: 2020(EN 61000-4-6: 2014, Severity Level: Level 2, (0.15MHz ~ 80MHz))

### 5.9.3. Severity Levels and Performance Criterion

#### 5.9.3.1. Severity level

Level	Field Strength (V)
1	1
2	3
3	10
X	Special

#### 5.9.3.2. Performance Criterion

Performance Criterion: A

### 5.9.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.9.1.

### 5.9.5. Operating Condition of EUT

5.9.5.1. Setup the EUT as shown in Section 5.9.1.

5.9.5.2. Turn on the power of all equipments.

5.9.5.3. Let the EUT work in test mode(1) and measure it.

### 5.9.6. Test Procedure

- 5.9.6.1. Set up the EUT, CDN and test generators as shown on Section 5.9.1.
- 5.9.6.2. Let the EUT work in test mode and measure it.
- 5.9.6.3. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 5.9.6.4. The disturbance signal described below is injected to EUT through CDN.
- 5.9.6.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 5.9.6.6. The frequency range is swept from 150kHz to 10MHz using 3V signal level, 10MHz to 30MHz using 3V to 1V signal level, 30MHz to 80MHz using 1V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
- 5.9.6.7. The rate of sweep shall not exceed  $1.5 \times 10^{-3}$  decades/s. where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 5.9.6.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

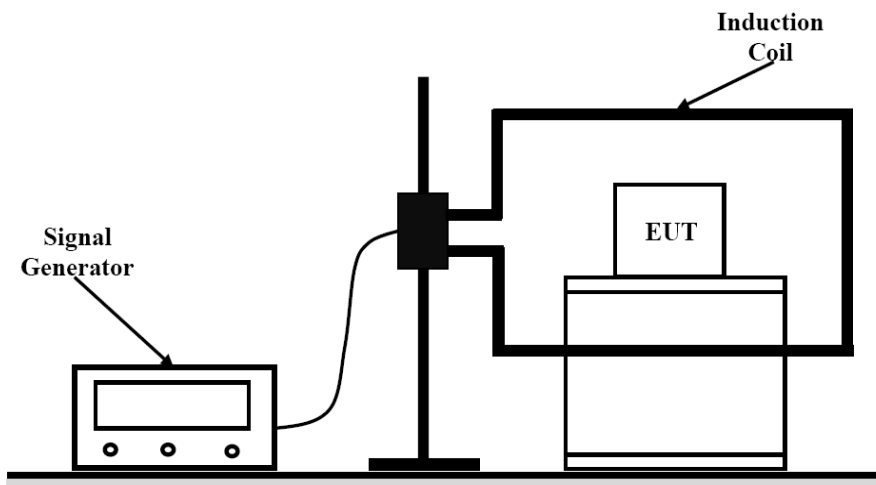
### 5.9.7. Test Results

**PASS.**

Refer to attached Annex B.9

## 5.10. MAGNETIC FIELD SUSCEPTIBILITY TEST

### 5.10.1. Block Diagram of Test Setup



### 5.10.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-8: 2010, Severity Level: Level 1, 1A/m)

### 5.10.3. Severity Levels and Performance Criterion

#### 5.10.3.1. Severity level

Level	Field Strength (A/m)
1	1
2	3
3	10
4	30
5	100
X	Special

#### 5.10.3.2. Performance Criterion

Performance Criterion: A

### 5.10.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.10.1.

### 5.10.5. Test Procedure

EUT is placed on an insulating support of 0.1m high above a table of 0.8m high. There is a minimum 1m\*1m ground metallic plane put on this table. EUT is put in the center of the magnetic coil then two orientations of the magnetic coil, horizontal and vertical, shall be rotated in order to expose the EUT to the difference polarization magnetic field.

Record any performance degradation of the EUT during the test and judge the test result according to performance criterion.

### 5.10.6. Test Results

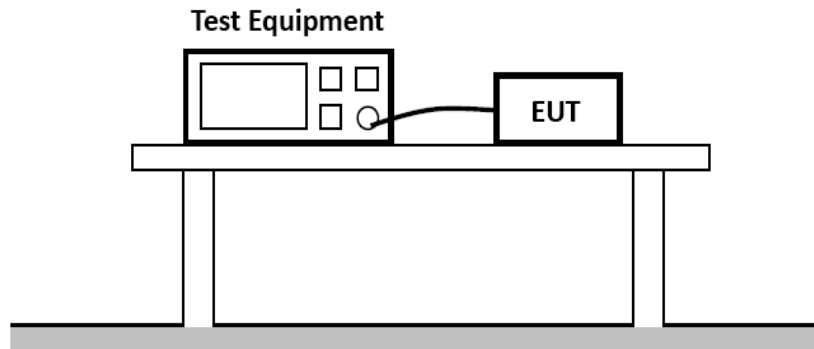
**PASS.**

Refer to attached Annex B.10



## 5.11. VOLTAGE DIPS AND INTERRUPTIONS TEST

### 5.11.1. Block Diagram of Test Setup



### 5.11.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-11: 2004+A1: 2017)

### 5.11.3. Severity Levels and Performance Criterion

#### 5.11.3.1. Severity level

Test Level		
Voltage Reduction %U <sub>T</sub>	Voltage Dips %U <sub>T</sub>	Duration (in Period)
100	0	0.5
100	0	1
30	70	5
Voltage Reduction %U <sub>T</sub>	Voltage Dips %U <sub>T</sub>	Duration (in Period)
100	0	250

#### 5.11.3.2. Performance Criterion

Performance Criterion: B&C

### 5.11.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.11.1.

### 5.11.5. Operating Condition of EUT

5.11.5.1. Setup the EUT as shown in Section 5.11.1.

5.11.5.2. Turn on the power of all equipments.

5.11.5.3. Let the EUT work in test mode (1) and measure it.

### 5.11.6. Test Procedure

5.11.6.1. Set up the EUT and test generator as shown on Section 5.11.1.

5.11.6.2. The interruptions are introduced at selected phase angles with specified duration.

5.11.6.3. Record any degradation of performance.

### 5.11.7. Test Results

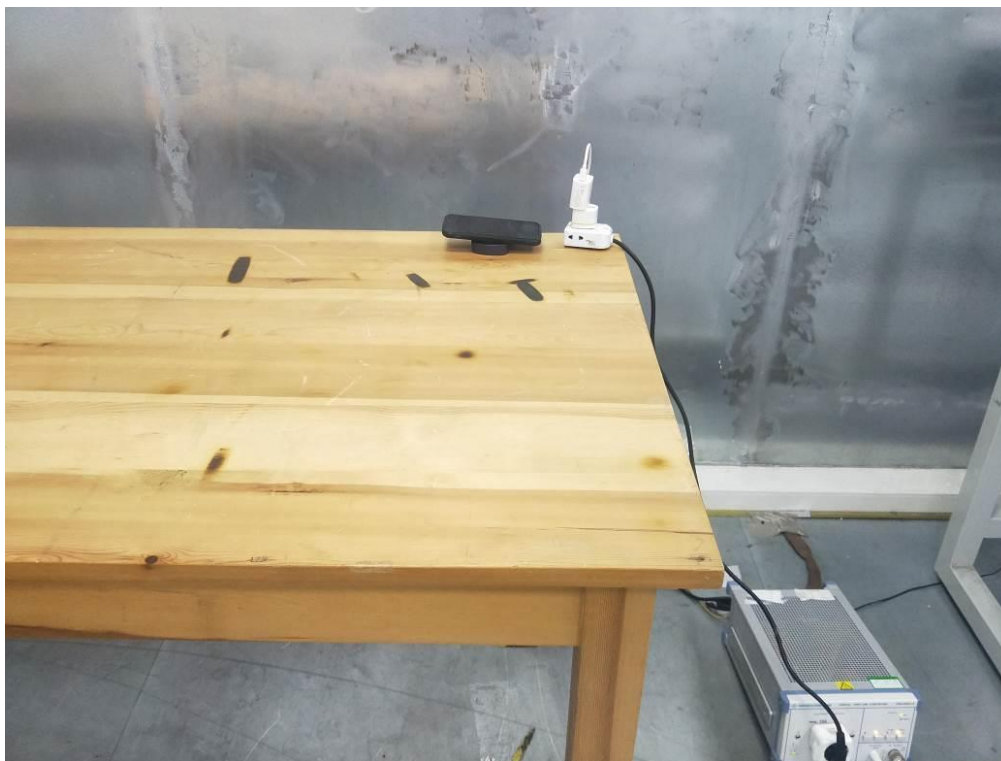
**PASS.**

Refer to attached Annex B.11

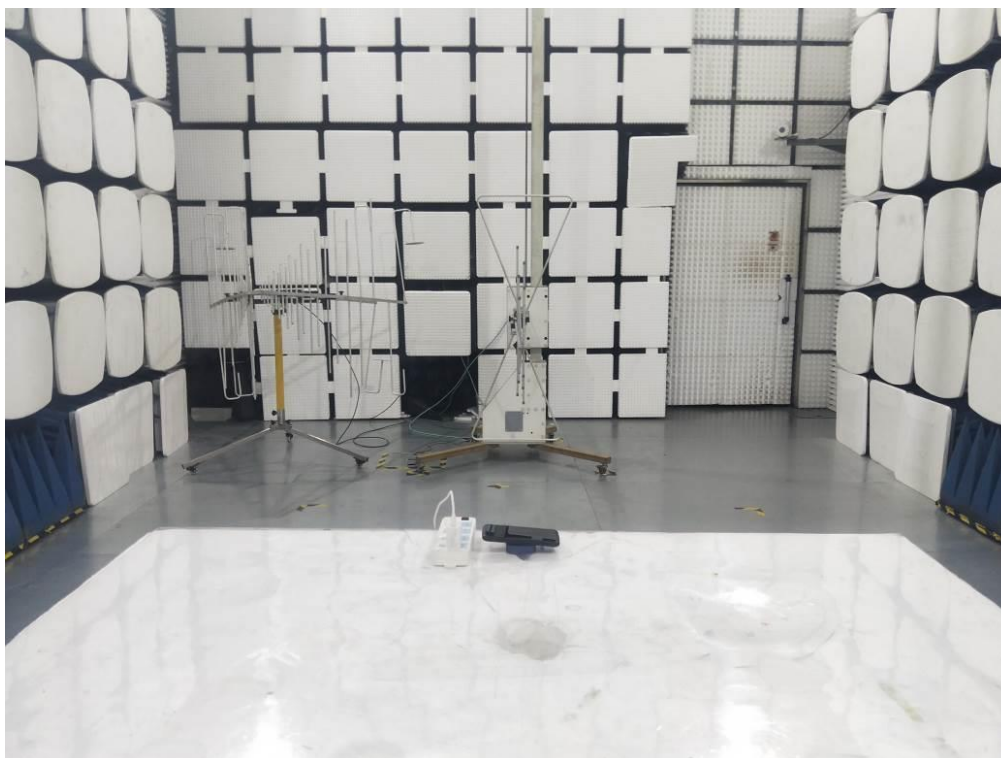
## ANNEX A

(Test photograph)

### A.1 Test Setup Photo of Power Line Conducted Measurement



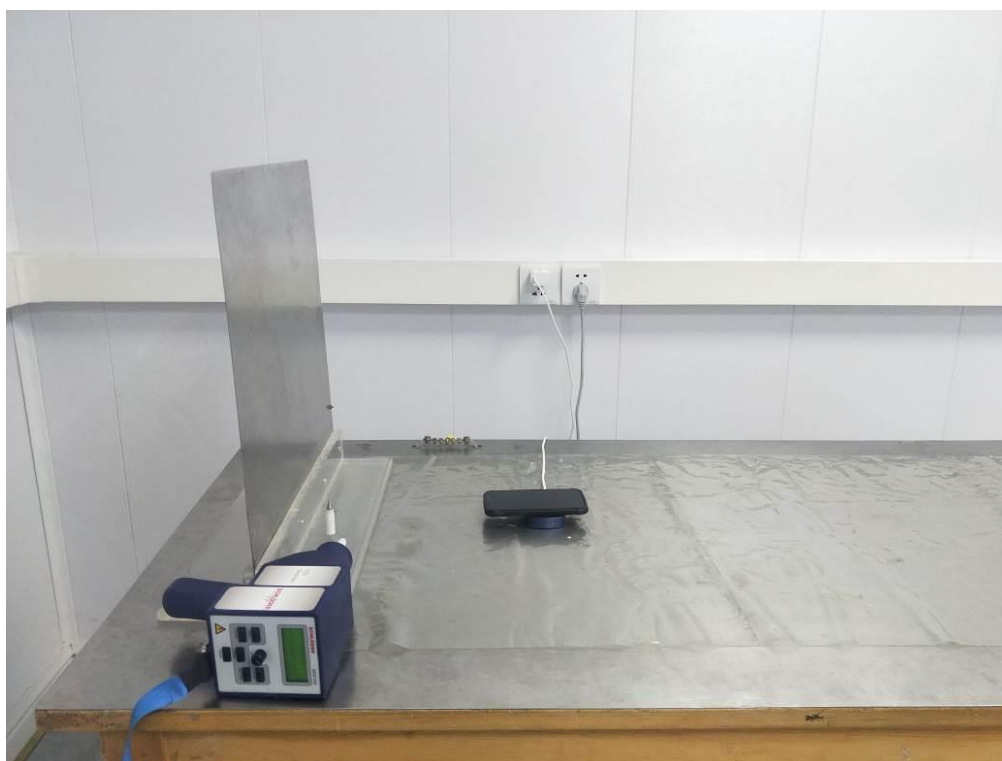
### A.2 Test Setup Photo of Radiated Measurement (30MHz~1GHz)



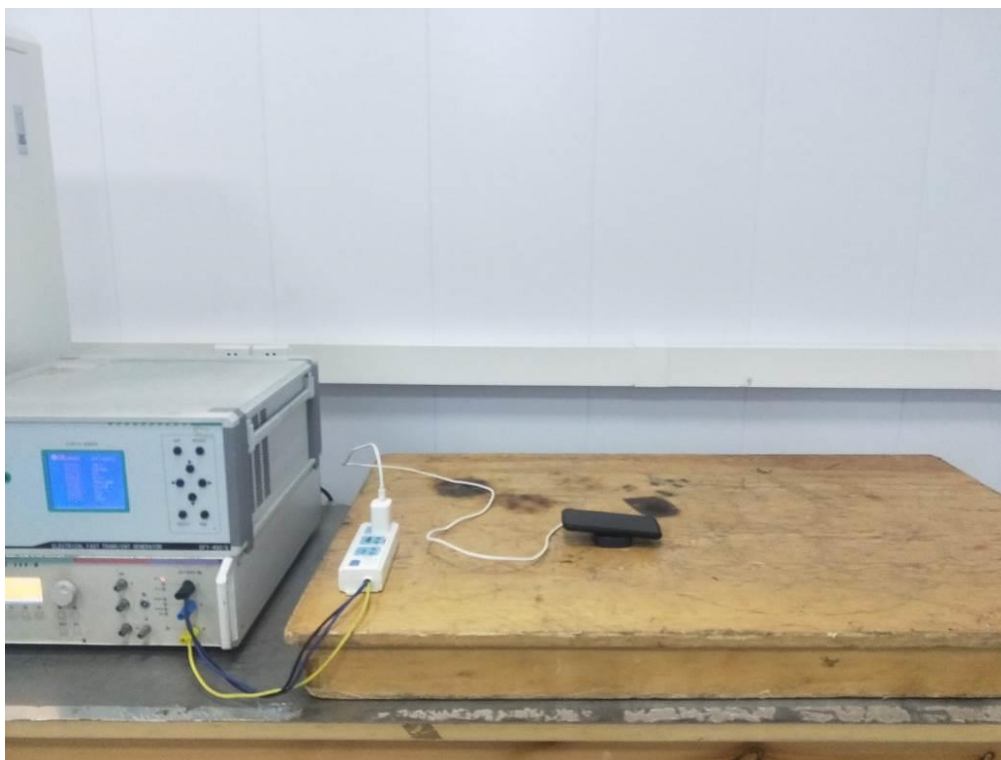
### A.3 Test Setup Photo of Harmonic & Flicker Measurement



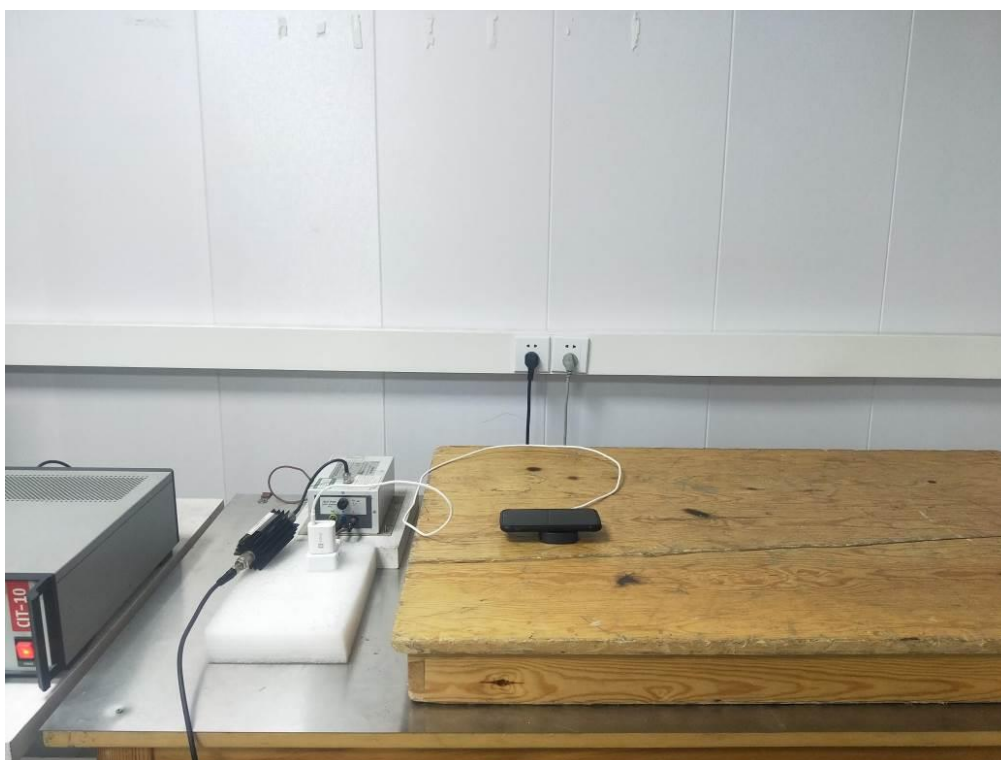
### A.4 Test Setup Photo of Electrostatic Discharge Test



A.5 Photo of Electrical Fast Transient/Burst Test & Surge Immunity Test



A.6 Test Setup Photo of Injected Currents Susceptibility Test



A.7 Test Setup Photo of Magnetic Field Immunity Test



A.8 Test Setup Photo of Voltage Dips and Interruptions Test



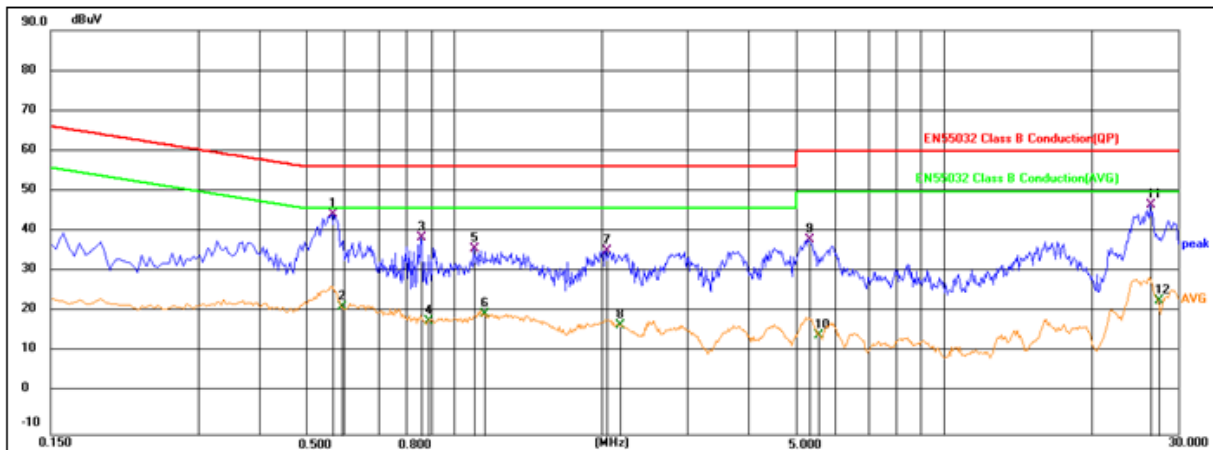
## ANNEX B

(Emission and Immunity test results)

### B.1 POWER LINE CONDUCTED EMISSION MEASUREMENT

Environmental Conditions:	22.7°C, 53.7 % RH
Test Voltage:	AC 230V, 50Hz
Test Model:	E29B
Test Mode:	Mode 1
Test Engineer:	DAIWEI DAI
Pol:	Line

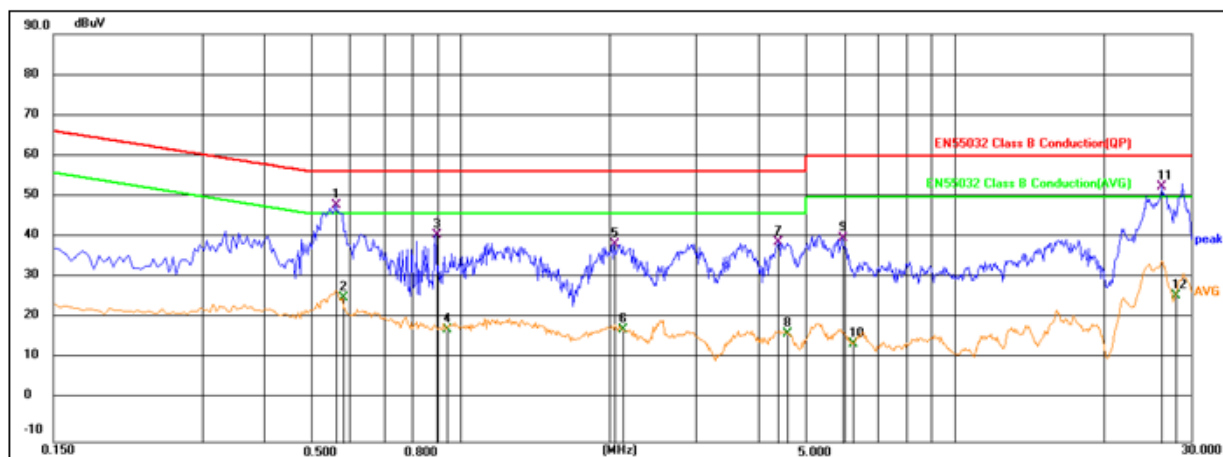
Detailed results are shown below



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.5641	23.94	20.67	44.61	56.00	-11.39	QP
2	0.5911	0.94	20.64	21.58	46.00	-24.42	AVG
3	0.8566	18.49	20.21	38.70	56.00	-17.30	QP
4	0.8881	-1.78	19.90	18.12	46.00	-27.88	AVG
5	1.0951	16.75	19.26	36.01	56.00	-19.99	QP
6	1.1491	0.55	19.27	19.82	46.00	-26.18	AVG
7	2.0446	16.16	19.40	35.56	56.00	-20.44	QP
8	2.1751	-2.43	19.41	16.98	46.00	-29.02	AVG
9	5.2936	18.71	19.50	38.21	60.00	-21.79	QP
10	5.5861	-5.08	19.52	14.44	50.00	-35.56	AVG
11	26.3311	26.72	20.08	46.80	60.00	-13.20	QP
12	27.3616	2.89	20.11	23.00	50.00	-27.00	AVG

Environmental Conditions:	22.7°C, 53.7 % RH
Test Voltage:	AC 230V,50Hz
Test Model:	E29B
Test Mode:	Mode 1
Test Engineer:	DAIWEI DAI
Pol:	Neutral

Detailed results are shown below

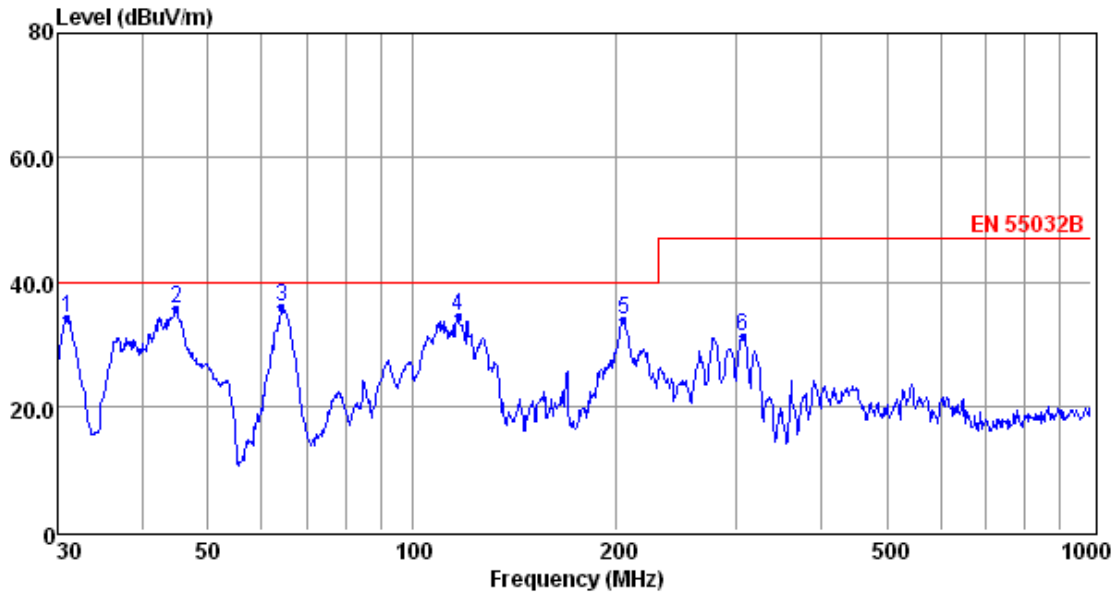


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.5596	27.26	20.68	47.94	56.00	-8.06	QP
2	0.5776	4.63	20.66	25.29	46.00	-20.71	AVG
3	0.8926	20.80	19.85	40.65	56.00	-15.35	QP
4	0.9376	-1.86	19.40	17.54	46.00	-28.46	AVG
5	2.0491	19.19	19.40	38.59	56.00	-17.41	QP
6	2.1301	-1.75	19.41	17.66	46.00	-28.34	AVG
7	4.3891	19.52	19.47	38.99	56.00	-17.01	QP
8	4.5781	-2.96	19.48	16.52	46.00	-29.48	AVG
9	5.9056	20.53	19.53	40.06	60.00	-19.94	QP
10	6.2431	-5.48	19.54	14.06	50.00	-35.94	AVG
11	26.2636	32.42	20.08	52.50	60.00	-7.50	QP
12	27.9421	5.85	20.15	26.00	50.00	-24.00	AVG

**B.2 Radiated Disturbance Test Results (30MHz to 1000MHz)**

Environmental Conditions:	22.1°C, 53.2% RH
Test Voltage:	AC 230V,50Hz
Test Model:	E29B
Test Mode:	Mode 1
Test Engineer:	DAIWEI DAI
Pol:	Vertical

Detailed results are shown below



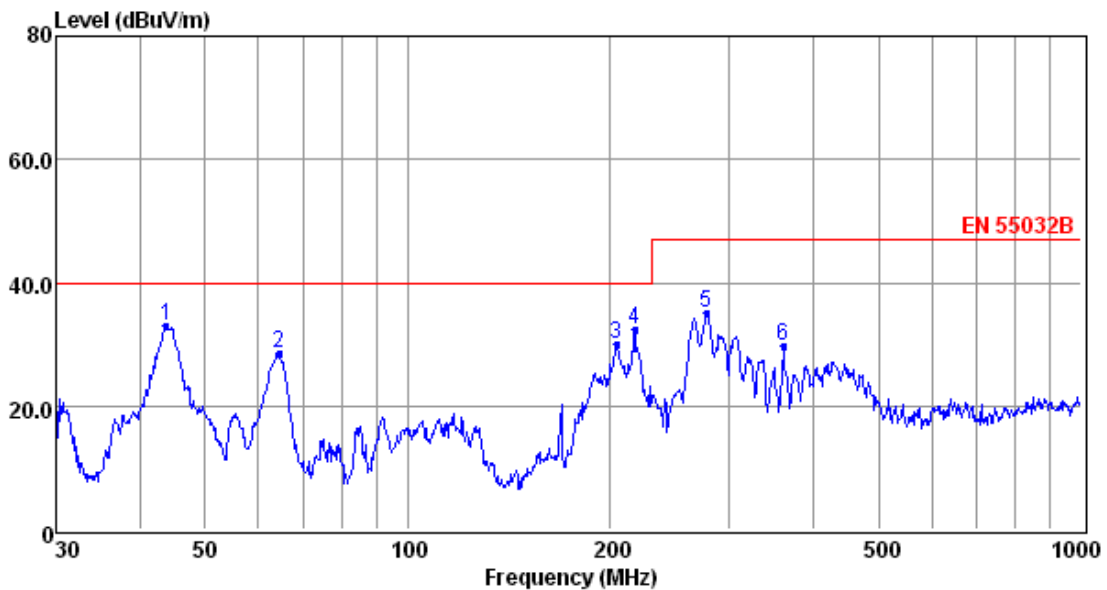
	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	30.96	51.46	0.39	12.32	34.22	40.00	-5.78	QP
2	44.90	51.76	0.41	13.55	35.73	40.00	-4.27	QP
3	64.21	54.36	0.52	11.02	35.85	40.00	-4.15	QP
4	116.95	52.83	0.68	11.02	34.37	40.00	-5.63	QP
5	204.96	52.49	0.99	10.73	33.85	40.00	-6.15	QP
6	306.75	47.56	1.05	13.15	31.23	47.00	-15.77	QP

Note: 1. All readings are Quasi-peak values.  
 2. Measured= Reading + Antenna Factor + Cable Loss  
 3. The emission that are 20db below the official limit are not reported



Environmental Conditions:	22.1°C, 53.2% RH
Test Voltage:	AC 230V,50Hz
Test Model:	E29B
Test Mode:	Mode 1
Test Engineer:	DAIWEI DAI
Pol:	Horizontal

Detailed results are shown below



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	43.81	49.07	0.41	13.56	33.05	40.00	-6.95	QP
2	64.43	47.15	0.52	10.93	28.55	40.00	-11.45	QP
3	204.24	48.77	0.99	10.70	30.10	40.00	-9.90	QP
4	217.54	50.69	0.88	11.12	32.31	40.00	-7.69	QP
5	278.07	51.91	1.01	12.61	35.06	47.00	-11.94	QP
6	361.71	44.94	1.17	14.44	29.83	47.00	-17.17	QP

- Note: 1. All readings are Quasi-peak values.  
 2. Measured= Reading + Antenna Factor + Cable Loss  
 3. The emission that are 20db below the official limit are not reported

### B.3 HARMONIC CURRENT EMISSION MEASUREMENT

**Pass**

Because the power of EUT is less than 75W, according to standard EN 61000-3-2, harmonic current unnecessary to test.

**B.4 VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT**

<b>Test Model</b>	E29B	<b>Test Engineer</b>	DAIWEI DAI	
<b>Test Voltage</b>	AC 230V/50Hz			
Overall Result:  <b>PASS</b>	Notes: Measurement method - Voltage			
	Pst	dc (%)	dmax (%)	Tmax(> 3.3%)(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.088	0.005	0.190	0

**B.5 ELECTROSTATIC DISCHARGE IMMUNITY TEST**

Electrostatic Discharge Test Results			
<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-2 <input checked="" type="checkbox"/> EN 61000-4-2		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	24.8℃
<b>M/N</b>	E29B	<b>Humidity</b>	53.8%
<b>Criterion</b>	B	<b>Pressure</b>	1021mbar
<b>Test Mode</b>	Mode 1	<b>Test Engineer</b>	DAIWEI DAI

Air Discharge						
Test Points	Test Levels			Results		
	± 2kV	± 4kV	± 8kV	Passed	Fail	Performance Criterion
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B

Contact Discharge						
Test Points	Test Levels		Results			
	± 2 kV	±4 kV	Passed	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B

Discharge To Horizontal Coupling Plane						
Side of EUT	Test Levels		Results			
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B

Discharge To Vertical Coupling Plane						
Side of EUT	Test Levels		Results			
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B

**B.6 RF FIELD STRENGTH SUSCEPTIBILITY TEST****RF Field Strength Susceptibility Test Results**

<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-3 <input checked="" type="checkbox"/> EN 61000-4-3		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	22.8℃
<b>M/N</b>	E29B	<b>Humidity</b>	53.0%
<b>Field Strength</b>	3 V/m	<b>Criterion</b>	A
<b>Test Mode</b>	Mode 1	<b>Test Engineer</b>	DAIWEI DAI
<b>Test Frequency</b>	80MHz to 1000MHz (swept test) 1800MHz, 2600MHz, 3500MHz, 5000MHz (spot test)		
<b>Modulation</b>	<input type="checkbox"/> None <input type="checkbox"/> Pulse <input checked="" type="checkbox"/> AM 1KHz 80%		
<b>Steps</b>	1%		

	<b>Horizontal</b>	<b>Vertical</b>
<b>Front</b>	PASS	PASS
<b>Right</b>	PASS	PASS
<b>Rear</b>	PASS	PASS
<b>Left</b>	PASS	PASS

## Test Equipment:

- 1.ESG Vector Signal Generator
- 2.RF POWER AMPLIFIER
- 3.RF POWER AMPLIFIER
- 4.Stacked Broadband Log Periodic Antenna
- 5.Electric field probe

## Note:



**B.8 SURGE IMMUNITY TEST**

Surge Immunity Test Result			
<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-5 <input checked="" type="checkbox"/> EN 61000-4-5		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	22.9℃
<b>M/N</b>	E29B	<b>Humidity</b>	53.4%
<b>Test Mode</b>	Mode 1	<b>Criterion</b>	B
<b>Test Engineer</b>	DAIWEI DAI		

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Result
L-N	+	90°	5	1.0	PASS
	-	270°	5	1.0	PASS
L-PE					
N-PE					
Signal Line					
Note					

**B.9 INJECTED CURRENTS SUSCEPTIBILITY TEST**

Injected Currents Susceptibility Test Results			
<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-6 <input checked="" type="checkbox"/> EN 61000-4-6		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	23.5°C
<b>M/N</b>	E29B	<b>Humidity</b>	53.2%
<b>Test Mode</b>	Mode 1	<b>Criterion</b>	A
<b>Test Engineer</b>	DAIWEI DAI		

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 10	AC Mains	3V	A	PASS
10 ~ 30		3V ~ 1V		
30 ~ 80		1V		

Remark:

1. Modulation Signal: 1kHz 80% AM
2. Measurement Equipment :
  - Simulator: CIT-10 (FRANKONIA)
  - CDN : CDN-M2 (FRANKONIA)
  - CDN-M3 (FRANKONIA)

Note:



**B.10 MAGNETIC FIELD SUSCEPTIBILITY TEST**

Magnetic Field Immunity Test Result			
<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-8 <input checked="" type="checkbox"/> EN 61000-4-8		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	24.4°C
<b>M/N</b>	E29B	<b>Humidity</b>	54.1%
<b>Test Mode</b>	Mode 1	<b>Criterion</b>	A
<b>Test Engineer</b>	DAIWEI DAI		

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
1	5 mins	X	A	PASS
1	5 mins	Y	A	PASS
1	5 mins	Z	A	PASS

Note:

## B.11 VOLTAGE DIPS AND INTERRUPTIONS TEST

## Voltage Dips And Interruptions Test Results

<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-11 <input checked="" type="checkbox"/> EN 61000-4-11		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	22.3°C
<b>M/N</b>	E29B	<b>Humidity</b>	54.4%
<b>Test Mode</b>	Mode 1	<b>Criterion</b>	B&C
<b>Test Engineer</b>	DAIWEI DAI		

Test Level % U <sub>T</sub>	Voltage Dips & Short Interruptions % U <sub>T</sub>	Duration (in periods)	Criterion	Result
0	100	0.5P	B	PASS
70	30	25P	C	PASS
0	100	250P	C	PASS

Note:

### ANNEX C

( External and internal photos of the EUT )



Fig. 1



Fig. 2

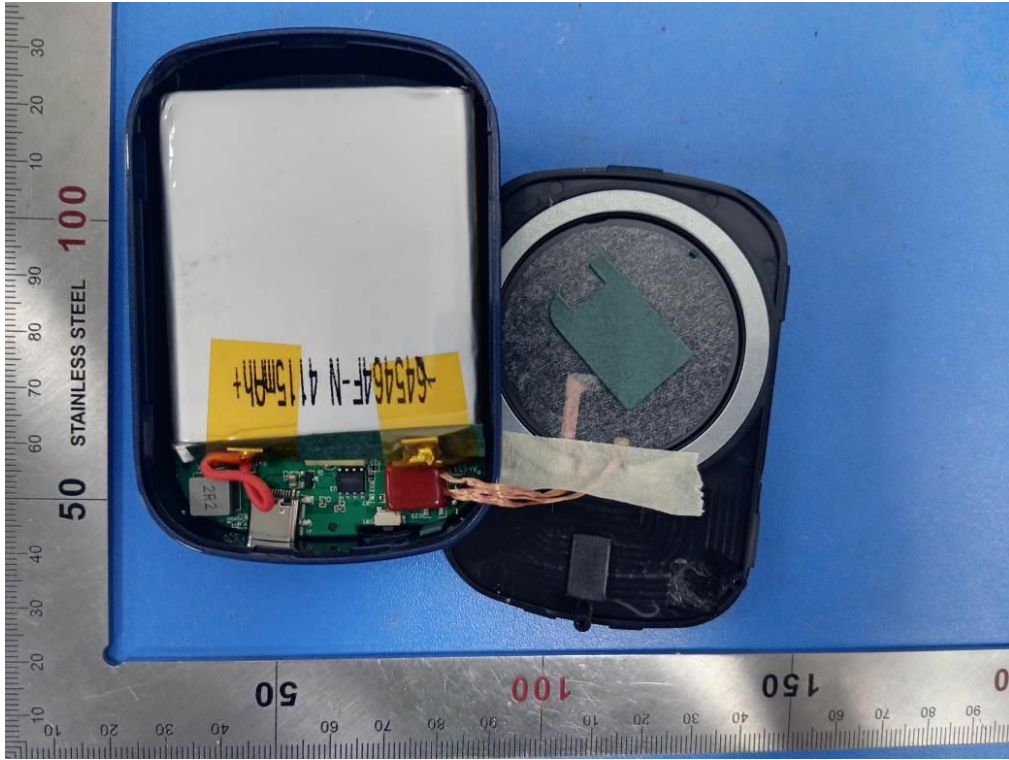


Fig. 3

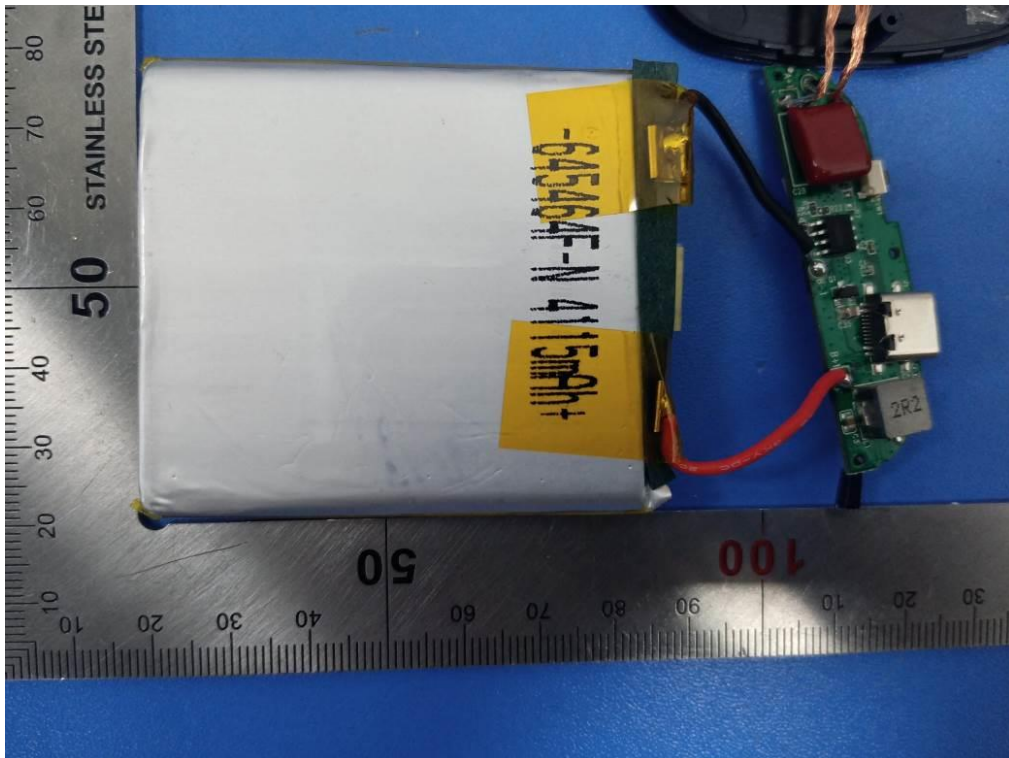


Fig. 4

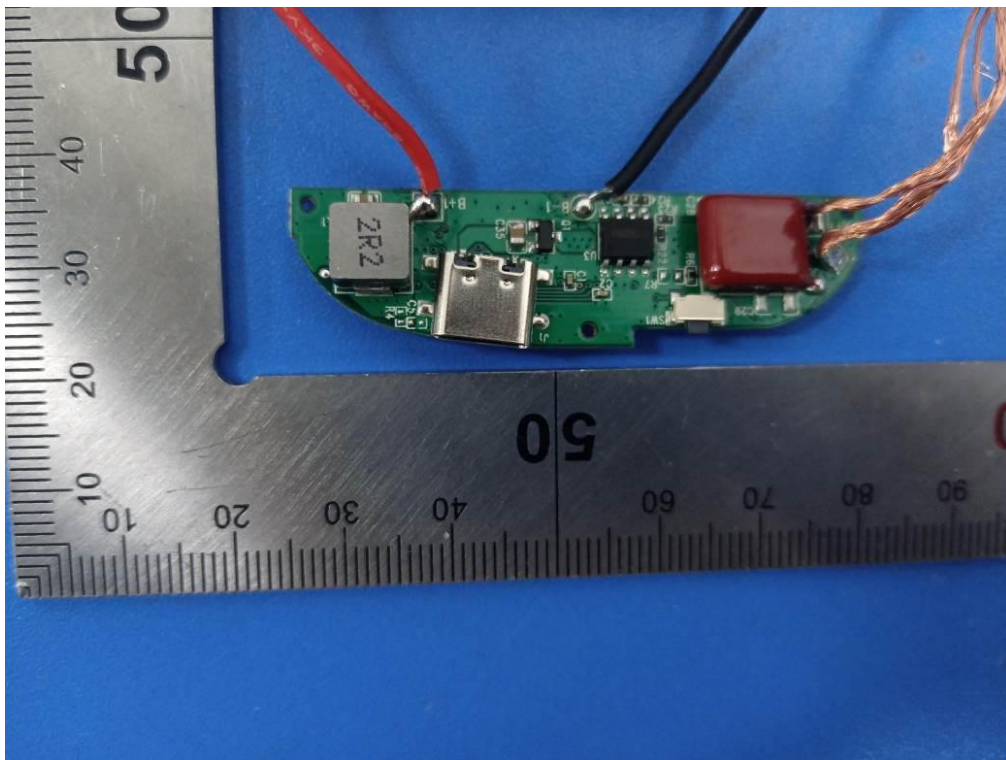


Fig. 5

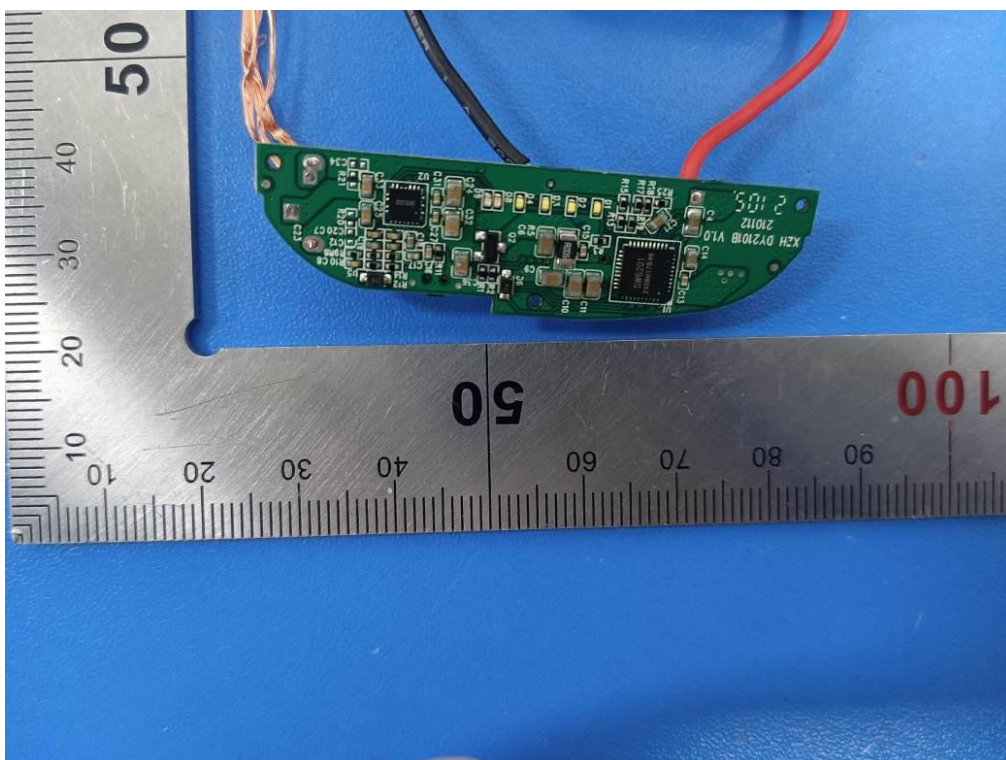


Fig. 6



Fig. 7

-----THE END OF TEST REPORT -----



中国认可  
国际互认  
检测  
TESTING  
CNAS L4595

# TEST REPORT

Report No.: LCS210203039AR

Date: 2021.03.02

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**Applicant** : Shenzhen yanbu technology co. LTD  
**Address** : 6/f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

Report on the submitted samples said to be:

**Sample Name** : Magnetic absorption wireless charging mobile power supply  
**Trade Mark** : N/A  
**Style No.** : E29A, E29B  
**Testing Period** : February 25, 2021 ~ March 02, 2021  
**Results** : Please refer to next page(s).

TEST REQUEST	CONCLUSION
<p>According to the customer's request, based on the performed tests on submitted sample, the result of Lead(Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium(Cr(VI)), PBBs, PBDEs, Dibutyl Phthalate(DBP), Benzylbutyl Phthalate(BBP), Bis(2-ethylhexyl) Phthalate(DEHP), Diisobutyl phthalate(DIBP) content comply with the limit requirement as set of RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.</p>	<p>Pass</p>

Signed for and on behalf of LCS





# TEST REPORT

Report No.: LCS210203039AR

Date: 2021.03.02

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## Results:

### A.EU RoHS Directive 2011/65/EU and its amendment directives on XRF

Test method: With reference to IEC 62321-3-1:2013, Screening by X-ray Fluorescence Spectroscopy (XRF)

Seq. No.	Tested Part(s)	Results						Date of sample submission/resubmission
		Cd	Pb	Hg	Cr <sup>v</sup>	Br <sup>v</sup>		
						PBBs	PBDEs	
1	Blue plastic shell	BL	BL	BL	BL	BL	BL	2021-02-25
2	Black soft plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25
3	Black plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25
4	Silver metal ring	BL	BL	BL	BL	/	/	2021-02-25
5	White plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25
6	Black plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25
7	Silver metal shrapnel	BL	BL	BL	BL	/	/	2021-02-25
8	Silver sheet metal	BL	BL	BL	BL	/	/	2021-02-25
9	Black plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25
10	Silver metal needle	BL	BL	BL	BL	/	/	2021-02-25
11	Grey ceramics	BL	BL	BL	BL	BL	BL	2021-02-25
12	Red wire	BL	BL	BL	BL	/	/	2021-02-25
13	Red plastic thread	BL	BL	BL	BL	BL	BL	2021-02-25
14	Silver wire	BL	BL	BL	BL	/	/	2021-02-25
15	Black triode	BL	BL	BL	BL	BL	BL	2021-02-25
16	Black IC	BL	BL	BL	BL	BL	BL	2021-02-25
17	Red capacitor	BL	BL	BL	BL	BL	BL	2021-02-25
18	Black plastic thread	BL	BL	BL	BL	BL	BL	2021-02-25
19	Brown capacitor	BL	BL	BL	BL	BL	BL	2021-02-25
20	light-emitting diode	BL	BL	BL	BL	BL	BL	2021-02-25
21	Tin solder	BL	BL	BL	BL	/	/	2021-02-25
22	PCB board	BL	BL	BL	BL	BL	BL	2021-02-25
23	Black IC	BL	BL	BL	BL	BL	BL	2021-02-25
24	Chip resistor	BL	BL	BL	BL	BL	BL	2021-02-25
25	Black diode	BL	BL	BL	BL	BL	BL	2021-02-25
26	Silver plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25

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# TEST REPORT

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Note:

- (1) Results were obtained by XRF for primary screening, and further chemical testing by ICP (for Cd, Pb, Hg), UV-Vis (for Cr(VI)) and GC-MS (for PBBs, PBDEs) are recommended to be performed, if the concentration exceeds the below warning value according to IEC 62321-3-1:2013.

Element	Unit	Non-metal	Metal	Composite Material
Cd	mg/kg	$BL \leq 70 - 3\sigma < X < 130 + 3\sigma \leq OL$	$BL \leq 70 - 3\sigma < X < 130 + 3\sigma \leq OL$	$BL \leq 50 - 3\sigma < X < 150 + 3\sigma \leq OL$
Pb	mg/kg	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 500 - 3\sigma < X < 1500 + 3\sigma \leq OL$
Hg	mg/kg	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 500 - 3\sigma < X < 1500 + 3\sigma \leq OL$
Cr	mg/kg	$BL \leq 700 - 3\sigma < X$	$BL \leq 700 - 3\sigma < X$	$BL \leq 500 - 3\sigma < X$
Br	mg/kg	$BL \leq 300 - 3\sigma < X$	--	$BL \leq 250 - 3\sigma < X$

Note:

- BL = Below Limit  
 OL = Over Limit  
 X = Inconclusive

- (2) The XRF screening test for RoHS elements – The reading may be different to the actual content in the sample be of non-uniformity composition.
- (3) The maximum permissible limit is quoted from the document 2015/863/EC amending RoHS directive 2011/65/EU:
- (4) ▼=For restricted substances PBBs and PBDEs, the results show the total Br content; The restricted substance was Cr(VI), and the results showed the total Cr content

RoHS Restricted Substances	Maximum Concentration Value (mg/kg) (by weight in homogenous materials)
Cadmium (Cd)	100
Lead (Pb)	1000
Mercury (Hg)	1000
Hexavalent Chromium (Cr(VI))	1000
Polybrominated biphenyls (PBBs)	1000
Polybrominated diphenylethers (PBDEs)	1000
Dibutyl Phthalate(DBP)	1000
Benzylbutyl Phthalate(BBP)	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	1000
Diisobutyl phthalate(DIBP)	1000

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# TEST REPORT

Report No.: LCS210203039AR

Date: 2021.03.02

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**Disclaimers:**

This XRF Screening report is for reference purposes only. The applicant shall make its/his/her own judgment as to whether the information provided in this XRF screening report is sufficient for its/his/her purposes.

The result shown in this XRF screening report will differ based on various factors, including but not limited to, the sample size, thickness, area, surface flatness, equipment parameters and matrix effect (e.g. plastic, rubber, metal, glass, ceramic etc.). Further wet chemical pre-treatment with relevant chemical equipment analysis are required to obtain quantitative data.

**B. EU RoHS Directive 2011/65/EU and its amendment Directives 2015/863/EU on Lead, Cadmium, Mercury, Hexavalent Chromium, PBBs, PBDEs, DBP, BBP, DEHP, DIBP content.**

Test method:

**Lead(Pb) & Cadmium(Cd) Content:**

With reference to IEC 62321-5:2013, by acid digestion and analysis was performed by inductively coupled plasma atomic emission spectrometer (ICP-OES)

**Mercury(Hg) Content:**

With reference to IEC 62321-4:2013+AMD1:2017 CSV, by acid digestion and analysis was performed by inductively coupled plasma atomic emission spectrometer (ICP-OES)

**Hexavalent Chromium(Cr(VI)) Content:**

With reference to IEC 62321-7-1:2015 or IEC 62321-7-2:2017, by alkaline digestion and analysis was performed by UV-visible spectrophotometer (UV-Vis)

**PBBs & PBDEs Content:**

With reference to IEC 62321-6:2015, by solvent extraction and analysis was performed by gas chromatographic-mass spectrometer (GC-MS)

**BBP DBP DEHP & DIBP Content:**

With reference to IEC 62321-8:2017, by solvent extraction and analysis was performed by gas chromatographic-mass spectrometer (GC-MS)

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# TEST REPORT

Report No.: LCS210203039AR

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Note:

- MDL = Method Detection Limit
  - /= Not apply
  - LOQ = Limit of Quantification, The LOQ of Hexavalent chromium is 0.10 µg/cm<sup>2</sup>
  - ▼ = a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13µg/cm<sup>2</sup>. The sample coating is considered to contain Cr(VI)  
 b. The sample is negative for Cr(VI) if Cr(VI) is N.D.(concentration less than 0.10µg/cm<sup>2</sup>). The sample coating is considered a non- Cr(VI) based coating  
 c. The result between 0.10µg/cm<sup>2</sup> and 0.13µg/cm<sup>2</sup> is considered to be inconclusive, unavoidable coating variations may influence the determination
  - Information on storage conditions and production date of the tested samples is unavailable and thus Cr(VI) results represent status of the sample at the time of testing
  - mg/kg = ppm=parts per million
  - N.D.=Not Detected(<MDL or LOQ)
- #1 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted in glass of cathode ray tubes, electronic components and fluorescent tubes.
  - #2 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted in electronic ceramic parts (e.g. piezoelectronic devices).
  - #3 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted as an alloying element in Copper containing up to 4% (40000ppm) by weight.
  - #4 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead).
  - #5 According to the statement provided by the customer, according to RoHS directive 2011/65/EU and its amendments, Lead is exempted as an alloying element in Aluminum containing up to 0.4% (4000ppm) by weight.
  - #6 According to the statement provided by the customer, according to RoHS directive 2011/65/EU and its amendments, Cadmium and its compounds in electrical contact is exempted.
  - #7 According to the statement provided by the customer, according to RoHS directive 2011/65/EU and its Amendments, Lead is exempted in steel for machining purposes and in galvanised steel containing up to 0.35% (3500ppm) by weight.

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# TEST REPORT

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## 1) The test results of DBP、BBP、DEHP & DIBP

Item	Unit	MDL	Results	Limit
			1+2+3+5+6+9	
Dibutyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

Item	Unit	MDL	Results	Limit
			11+13+15+16+17+18	
Dibutyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

Item	Unit	MDL	Results	Limit
			19+20+22+23+24+25+26	
Dibutyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

### Remark:

- mg/kg = ppm
- N.D. = Not detected
- MDL=Method detected limited
- Flow chart appendix is included
- Photo appendix is included.

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# TEST REPORT

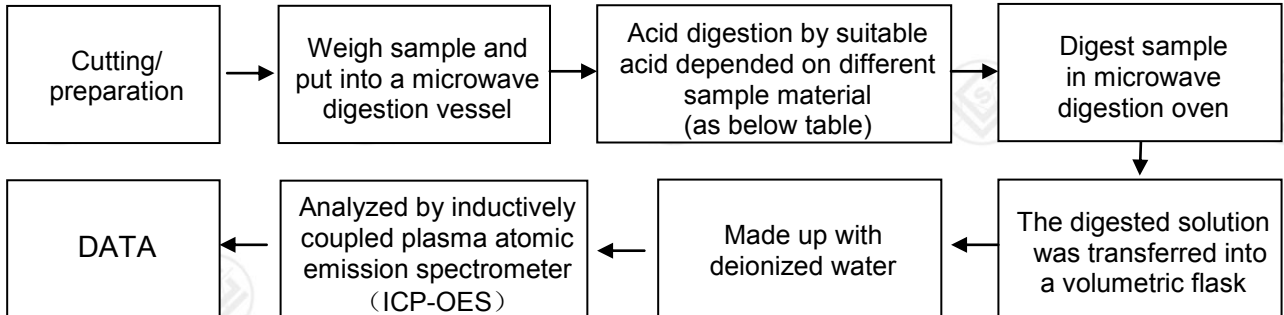
Report No.: LCS210203039AR

Date: 2021.03.02

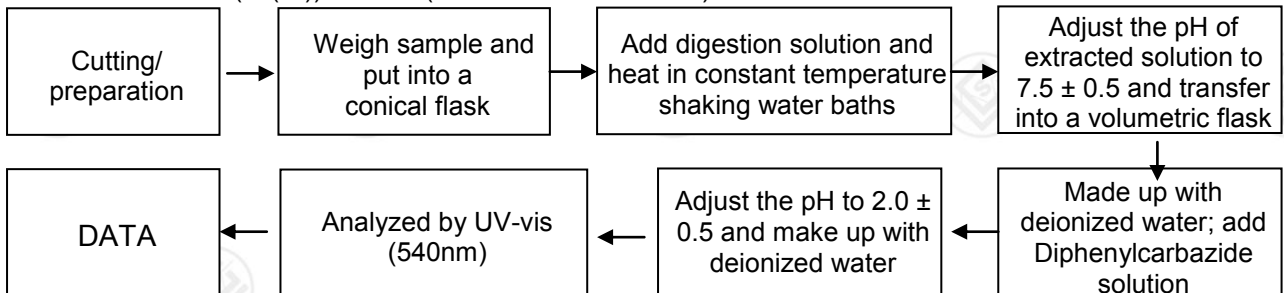
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## Appendix

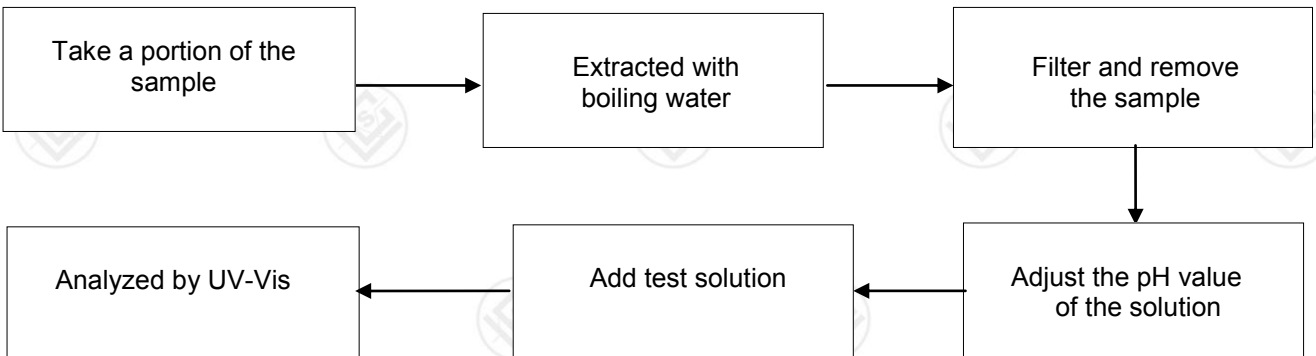
### 1. Test Flow chart for Cd/Pb /Hg content



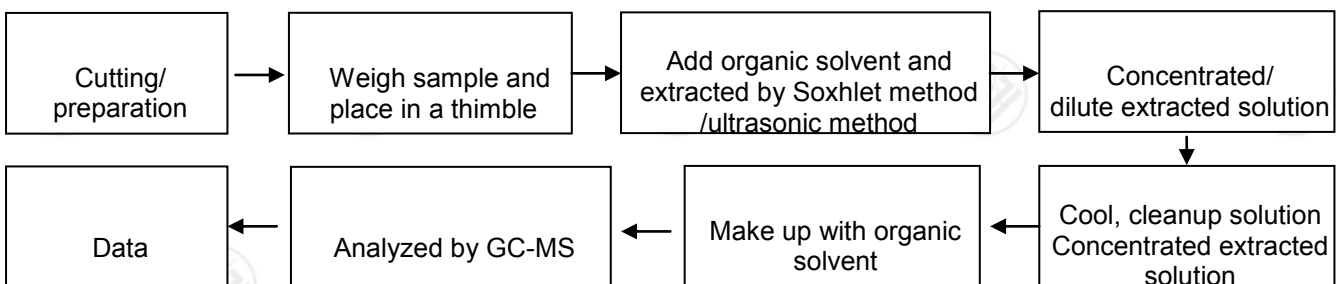
### 2. Test Flowchart for (Cr(VI)) content (For non-metal material)



### Test Flowchart for (Cr(VI)) content (For metal material)



### 3. Test Flow chart for PBBs & PBDEs & DBP & BBP & DEHP & DIBP content



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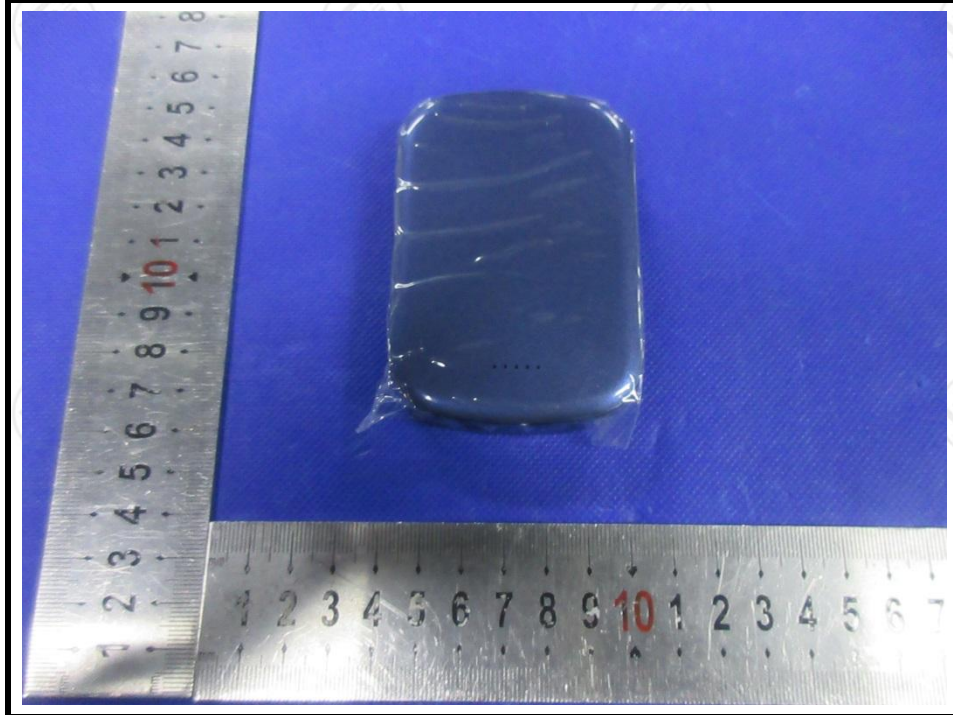
# TEST REPORT

Report No.: LCS210203039AR

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The photo of the sample



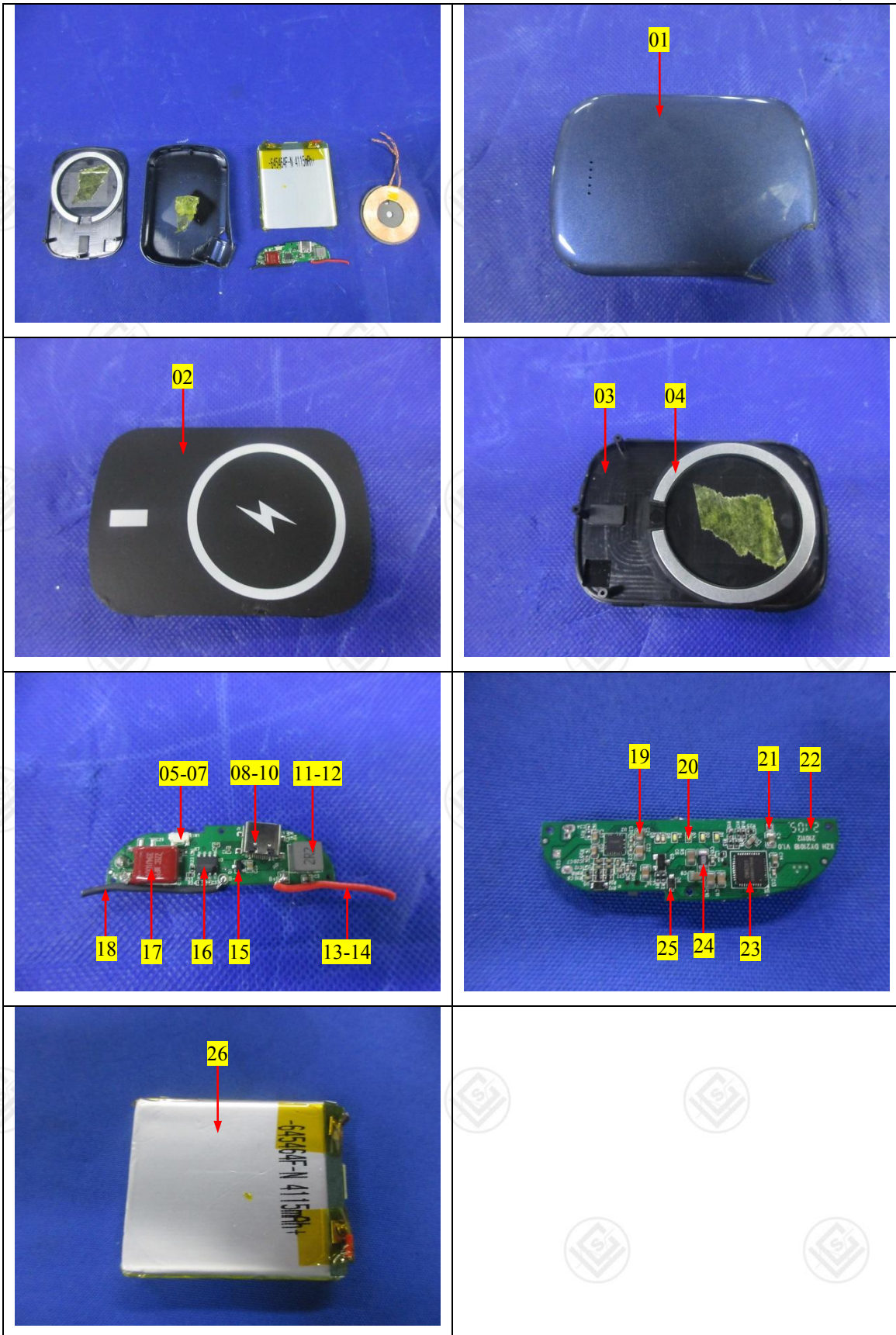


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Report No.: LCS210203039AR

Date: 2021.03.02

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\*\*\*\*\* End of Report \*\*\*\*\*



# TEST REPORT

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Date: 2021.03.02

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Statement:

1. The test report is considered invalidated without approval signature, special seal on the perforation.
2. The result(s) shown in this report refer only to the sample(s) tested.
3. Without written approval of LCS, this report can't be reproduced except in full.
4. The sample(s) and sample information was/were provided by the client who should be responsible for the authenticity which LCS hasn't verified.
5. In case of any discrepancy between the English version and Chinese version of the testing reports(if generated), the Chinese version shall prevail.





中国认可  
检验  
INSPECTION  
CNAS IB0078

危险物品  
DANGEROUS GOODS

仅限货机运输

# 航空运输条件鉴别报告书

## Identification and Classification Report for Air Transport of Goods

报告编号:

PEKSZ202212315084PXY370001

此报告本年度有效  
有效期至2023年12月31日

Issued No.:

生效日期:

2023. 01. 04

Effective Date:

委托单位:

云南路飞新能源材料有限公司

Applicant:

Yunnan Road Fei New Energy Materials Co., Ltd.

物品名称:

锂离子电芯 645464 3.85V 4000mAh 15.4Wh

Name of Goods:

Lithium ion cell 645464 3.85V 4000mAh 15.4Wh

北京迪捷姆空运技术开发有限公司

Beijing DGM Air Transport Technology Development Co., Ltd.



# 报告书使用约定

## Terms of the Using of the Report

1. 本公司依据本年度国际航协《危险品规则》以及委托人（托运人或其代理人）提供的物品及其运输信息，确定货物的航空运输条件并出具此报告书。

The report is issued by DGM China according to IATA *Dangerous Goods Regulations* published in the current year and the information of the goods and the information of its shipping provided by the applicant (shipper or his agent).

2. 依据鉴别的需要，本公司要求委托人提供真实、完整的货物样品及资料。

According to the demand of identification and classification, DGM China requires the applicant to provide true and exact sample and data of the cargo.

3. 委托人保证申报的物品和/或提供的样品与交运的货物是同一种物质。

The applicant guarantees that the declared goods and/or the sample who provides should be identical with the contents of cargo that is to be transported.

4. 本公司仅对样品的鉴别结果负责。

DGM China is only responsible for the identification and classification of the sample provided by the applicant.

5. 本报告书经主检员、审核人和批准人签字并加盖本公司印章后生效。

This report will be effective only after it is signed by the inspector, checker and approver, and stamped by DGM China.

6. 未经本公司书面批准，不得复制本报告书。

The duplicating of this report is prohibited without the written approval of DGM China.

7. 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。

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

8. 为适应国际航协《危险品规则》的年度变化，报告书仅在本年度内有效。

This report is only valid within the year in which the IATA *Dangerous Goods Regulations* is effective.

地址：北京首都国际机场货运北路天竺综合保税区BGS货运楼249室

邮编：101300

电话：010-69479673

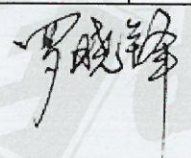
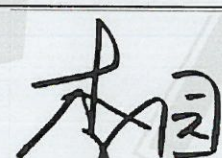

传真：010-69479621

网址：[www.dgmchina.com.cn](http://www.dgmchina.com.cn)

E-mail：[test@dgmchina.com.cn](mailto:test@dgmchina.com.cn)





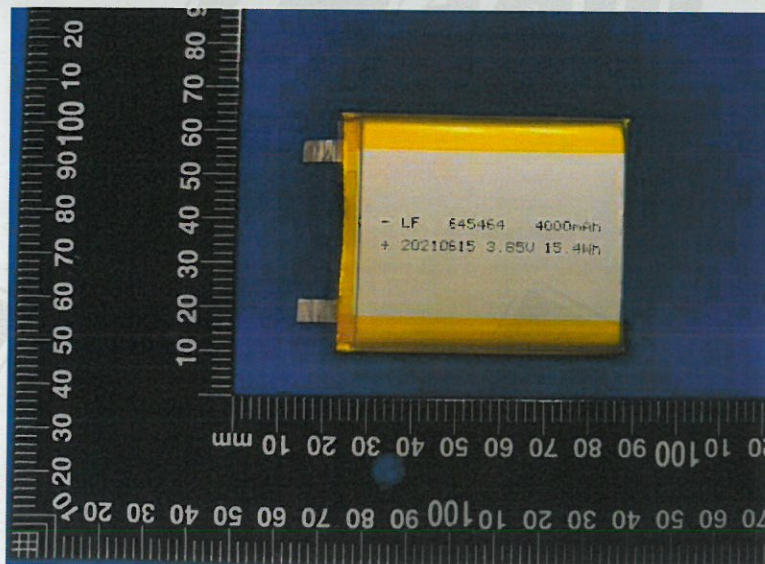
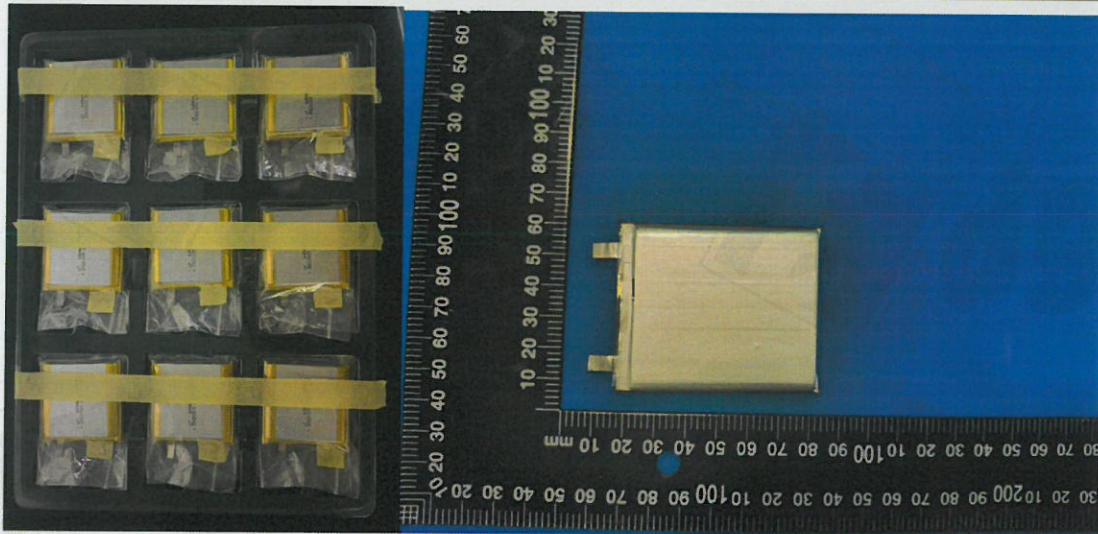
项目编号 Item No.		PEKSZ202212315084		
物品名称 Name of Goods	中文 Chinese	锂离子电芯 645464 3.85V 4000mAh 15.4Wh		
	英文 English	Lithium ion cell 645464 3.85V 4000mAh 15.4Wh		
鉴别结论 Conclusions		<p>该货物为锂离子/聚合物电芯，单独包装。额定瓦特小时为15.4Wh。已通过 UN38.3 测试，已通过包装件1.2米跌落试验，包装件通过3米堆码试验，每个包装件上均有锂电池标记。</p> <p>参考有关资料，根据DGR有关规定，该物质分类识别为第9类（或项）危险品，UN3480。 This goods is lithium ion/polymer cell,packed individually.Watt-hour rating is 15.4Wh.Each battery is of a type proved to meet the Requirements of each test in the UN MANUAL OF TESTS AND CRITERIA, Part III, sub-section 38.3,Each package is capable of withstanding a 1.2m drop test in any orientation without damage to the cells contained therein, without shifting of the contents so as to allow cell to cell contact and without release of contents,The package is capable of withstanding the 3m stack test,Each package is marked with lithium battery mark.</p> <p>According to IATA DGR this substance is classified as dangerous goods Class (or division)9,UN3480.</p>		
建议运输条件 Suggestion for Transport Condition	UN/ID 编号 UN/ID No.	运输专用名称 Proper Shipping Name		类或项 Class or Div. (次要危险性) (Subsidiary Risk)
	UN3480	Lithium ion batteries		9
	包装说明 Packing Inst.	客货机 Passenger and Cargo Aircraft	Forbidden	
		仅限货机 Cargo Aircraft only	965 IB	
	注意事项 Remarks	<p>每一单电芯必须做好防短路措施，并装入坚固外包装内。 each single cell must be packed in such a way as to prevent short circuits under the normal conditions and packed in strong outer packing.</p>		
主检员 Prepared by:	审核人 Checked by:	批准人 Approved by:	报告单位（盖章） Stamp	
				

制单： 彭新玉



# 锂离子电芯 645464 3.85V 4000mAh 15.4Wh

PEKSZ202212315084



# 锂电池 UN38.3 试验概要 Lithium Battery Test Summary

项目编号: PEKSZ202212315084

单位信息 Company Information					
委托单位 Consignor	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd. 云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province 电话/Tel: 0875-5189928 邮箱/Mail: 2411318566@qq.com				
生产单位 Manufacturer	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd. 云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province 电话/Tel: 0875-5189928 邮箱/Mail: 2411318566@qq.com				
测试单位 Test Lab	深圳市优瑞特检测技术有限公司 深圳市龙岗区龙岗街道南联第六工业区方兴科技园 C 区 15 栋一楼 电话/Tel: 0086-755-27817553 邮箱/Mail: battery@ort-ts.com 网址/Website: http://www.ort-ts.com				
电池信息 Battery Information					
名称 Name	锂离子电芯 Lithium ion cell	电池/电芯类别 Battery/Cell Classification		锂离子电芯 Li-ion Cell	
型号 Type	645464	商标 Trademark		/	
额定电压 Normal Voltage	3.85V	额定容量 Rated Capacity		4000mAh	
额定能量 Watt-hour rating	15.4Wh	外观/Appearance		银色长方体 Silver Cuboid	
质量/Mass	51.9g	锂含量/Li Content		不适用 N/A	
测试信息 Test Information					
测试报告编号 Test Report Number	ORTSZB01210601025		测试报告签发日期 Date of Test Report	2021-08-02	
测试标准 Edition of UN Manual of Tests and Criteria Used	联合国《关于危险货物运输的建议书-试验和标准手册》(第 6 版修订 1) 38.3 节 UN Recommendations on the Transport of Dangerous Goods Manual of Tests and Criteria ST/SG/AC.10/11/Rev.6/Amend 1/Subsection 38.3				
T.1: 高度模拟 Altitude Simulation	通过 Pass	T.2: 温度试验 Thermal Test	通过 Pass	T.3: 振动 Vibration	通过 Pass
T.4: 冲击 Shock	通过 Pass	T.5: 外部短路 External Short Circuit	通过 Pass	T.6: 撞击/挤压 Impact/Crush	通过 Pass
T.7: 过度充电 Overcharge	不适用 N/A	T.8: 强制放电 Forced Discharge	通过 Pass	/	
UN38.3.3(f)	不适用 N/A		UN38.3.3(g)		不适用 N/A
签名 Signatory	 检验员		签发日期 Issued Date	 2022.12.31	
职务 Title					



中国认可  
检验  
INSPECTION  
CNAS IB0396

# 货物运输条件鉴定报告

Certificate for Safe Transport of Goods

(空运/By Air)

危险物品  
DANGEROUS GOODS

## 锂电池-符合包装说明 965 第 IB 部分

物品名称: 锂离子电芯 645464 3.85V, 4000mAh, 15.4Wh  
Goods Name Lithium ion cell 645464 3.85V, 4000mAh, 15.4Wh

委托单位: 云南路飞新能源材料有限公司  
Client Yunnan Lufei New Energy Materials Co., Ltd.

报告编号: DGT2021DL0812F  
Report No. \_\_\_\_\_

签发日期: 2021-07-06  
Issued Date \_\_\_\_\_

中国民用航空总局第二研究所  
The Second Research Institute of CAAC



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## 声 明

### STATEMENT

1.本《鉴定报告》依据本年度国际航协《危险品规则》、委托人（托运人或代理人）提供的物品及其运输信息出具。

The certificate is issued by The Second Research Institute of CAAC according to IATA DGR published in the current year and the information of the goods and its shipment provided by the client (shipper or its agent).

2.本《鉴定报告》的鉴定结论仅对样品负责。

The certificate is only responsible for the sample provided by the client.

3.客户必须如实提供样品及资料，并保证申报品名和样品与运输货物相同。

The client should provide samples and relevant data, at the same time, and they should guarantee that the name they declared is the same as the samples they provided and the goods to be transported.

4.本《鉴定报告》经检验人、审核人、批准人签字并加盖检验印章后生效。

The certificate will be effective only after it is signed by the inspector, checker, and approver, and stamped.

5.本《鉴定报告》不得全部或部分复制，复制无效。本鉴定报告私自转让、复制、盗用、冒用、涂改或以任何媒体形式篡改的均属无效。

The certificate must not be copied wholly or partly. The certificate is invalid if anything of the following happens, such as illegal transfer, reproduction, embezzlement, imposture, modification or tampering in any media form.

6.本《鉴定报告》不考虑国家及经营人差异。

The certificate takes no account of the State and Operator Variations.

7.为适应国际航协《危险品规则》的年度变化，本《鉴定报告》仅在本年度内有效。

This certificate is only valid within the year in which the IATA Dangerous Goods Regulations is effective.

8.对《鉴定报告》若有异议，应于收到报告之日起十五日内向本机构提出。

Objections to the certificate must be submitted to The Second Research Institute of CAAC within 15 days.

地址：成都双流西航港经济开发区腾飞路 765 号

Address: No.765, Tengfei Road, Xihanggang Economic Development Zone, Shuangliu, Chengdu, Sichuan

电话(Tel): 028-64458155 028-64458195

传真(Fax): 028-64458195

邮编(Post Code): 610200

报告查询网址: <http://www.caacdgt.com>

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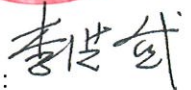
### 货物运输条件鉴定报告

### Certificate for Safe Transport of Goods

<b>鉴定目的</b> <b>Inspection Purpose</b>	是否属于航空运输危险品 Dangerous Goods or not restricted		
<b>样品编号</b> <b>Sample No.</b>	DGT2021DL0812	<b>接样日期</b> <b>Receiving Date</b>	2021-07-5
<b>鉴定依据</b> <b>Criteria</b>	国际航空运输协会《危险品规则》62版 IATA Dangerous Goods Regulations (DGR) 62nd Edition		
<b>样品名称</b> <b>Sample Name</b>	锂离子电芯 645464 3.85V, 4000mAh, 15.4Wh Lithium ion cell 645464 3.85V, 4000mAh, 15.4Wh		
<b>委托单位</b> <b>Client</b>	云南路飞新能源材料有限公司 Yunnan Lufei New Energy Materials Co., Ltd.		
<b>电池生产商</b> <b>Manufacturer</b>	云南路飞新能源材料有限公司 Yunnan Lufei New Energy Materials Co., Ltd.		
<b>物品信息</b> <b>Sample Information</b>	<p><b>-电池信息/Battery information:</b> 型号/Model: 645464 3.85V, 4000mAh, 15.4Wh 类型/Type: 锂离子电芯/lithium ion cell 商标/Mark brand: /</p> <p><b>-包装信息/Package information:</b> 每个包装件中锂电池净重不超过 10.0kg。 Net quantity of lithium battery per package is no more than 10.0kg. 包装件内含 189 个锂电池。 The package contains 189 lithium batteries.</p>		
<b>鉴定结论</b> <b>Conclusion</b>	<p>1.危险性识别 (Hazards Identification) 危险类别/Class: 9 UN Number: UN 3480 Proper Shipping Name: Lithium ion batteries</p> <p>2.按照 IATA DGR 办理的类型 (Suggestion according to IATA DGR) 该样品满足包装说明 965 一般要求和第 IB 部分的规定。 The sample meets the requirements in General Requirements and section IB of Packing Instruction 965.</p> <p>3.包装要求(Packing requirements) 按包装说明 965 第 IB 部分要求办理。 The sample is packaged according to the Packing Instruction 965 section IB.</p> <p>4.仅限货机运输 Cargo Aircraft Only.</p> <p style="text-align: right;">鉴定单位盖章(Stamp) 签发日期(Issued Date): 2021-07-06</p>		
<b>备注 (Comment)</b>	/		

一  
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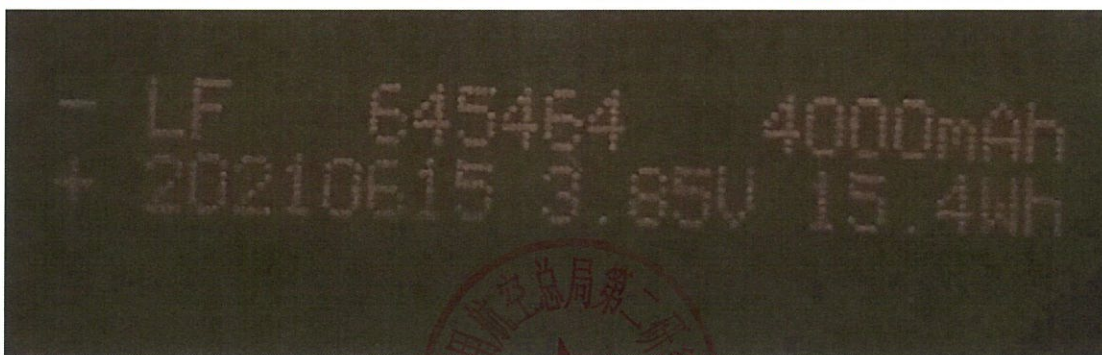
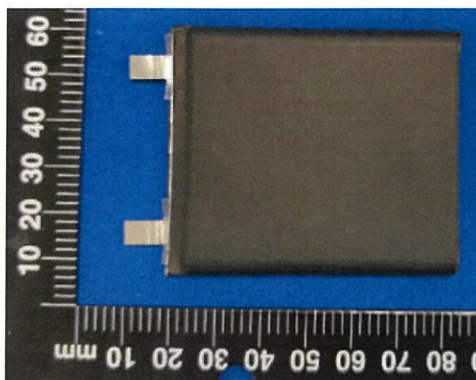
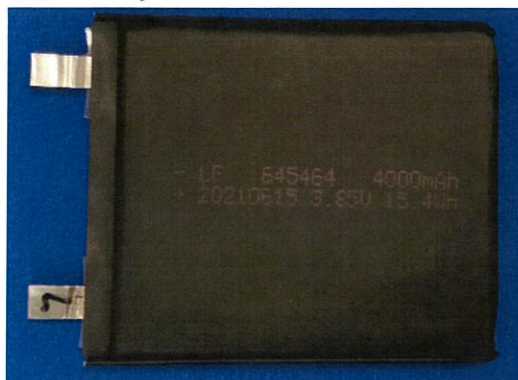
检验 (Inspected by): 
 审核 (Checked by): 
 批准 (Approved by): 

## 货物运输条件鉴定报告

### Certificate for Safe Transport of Goods

检验结果及其他事项 Inspection results and other information	
1	<p>本报告所述锂电池按照《危险品规则》（62版）3.9.2.6.1（e）规定的质量管理体系进行制造。 Lithium batteries listed in this report are manufactured under the quality management program as described in IATA DGR 62nd Edition 3.9.2.6.1（e）.</p> <p>本报告所述锂电池不属于有缺陷和因安全原因而召回的锂电池。 Lithium batteries listed in this report are not defective and returned to the manufacturer for safety reasons.</p> <p>本报告所述锂电池不属于以回收或处置为目的的航空运输，不属于废弃锂电池。 Lithium batteries listed in this report are not waste, shipped for recycling or disposal ones.</p>
2	<p>本报告所述锂电池已经通过联合国《试验与标准手册》第III部分第 38.3 节的测试。测试摘要详见附件。 Lithium batteries listed in the report are of type proved to meet the requirements of each test of the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. The test summary is attached.</p> <p>本报告所述锂电池包装件能够承受 1.2 米跌落试验。 The package is capable of withstanding a 1.2 m drop test.</p>
3	<p>根据委托人声明，本报告所述锂电池的荷电量不超过其设计容量的 30%。 According to the statement from the client, the state of charge (Soc) of Lithium cells and batteries listed in this report is not exceeding 30% of their rated design capacity.</p>
4	<p>本报告所述锂电池放在完全封闭的内包装中，然后再放在坚固的外包装内。 Lithium batteries must be placed in inner packaging that completely enclose the cell or battery then placed in strong outer packaging.</p> <p>本报告所述锂电池具有适当的防外部短路措施。 Lithium batteries are equipped with an effective means of preventing external short circuits.</p>
5	<p>电池已固定不能移位。 The battery is fixed and can't move.</p>
6	<p>本报告所述锂电池不得与第1类爆炸品（1.4S项除外），2.1项易燃气体，第3类易燃液体，4.1项易燃固体和5.1项氧化性物质包装在同一个外包装中。 Lithium batteries must not be packed in the same outer packaging with dangerous goods classified in Class 1(explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).</p>
7	<p>每个包装件必须耐久清晰的标识第9类锂电池危险性标签、锂电池标记及仅限货机标签。包装件必须有足够的位置使得所要求的标记贴在包装件的同一面，而不使标记折叠。 Each package must be durably and legibly marked with the Class 9-Lithium Battery hazard label, the lithium battery mark and the Cargo Aircraft Only label. The package must be of such size that there is adequate space to affix the mark on one side of the package without the mark being folded.</p>
8	<p>附图</p>

电池/Battery



包装件/Package:



以下无正文内容



用

附件:

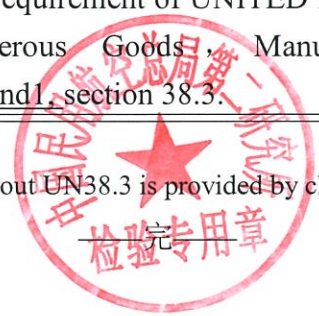
## 测试摘要 TEST SUMMARY

电池生产商信息/Manufacturer information			
电池生产商 Manufacturer	云南路飞新能源材料有限公司 Yunnan Lufei New Energy Materials Co., Ltd.		
生产商地址 Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园1号 No.1 high tech Industrial Park, Tengchong border economic development and cooperation zone, Baoshan City, Yunnan Province		
联系电话 Tell	0875-5189928	电子邮箱 E-mail	13530940968@163.com
网站地址/website	/		
电池信息/Battery information			
电池类型 Type	锂离子电芯 Lithium ion cell	型号 Model	645464
额定能量 Capacity	3.85V, 4000mAh, 15.4W	电池质量 Mass	约 52.0g
物理形状说明 Physical description	黑色长方体 Black cuboid		
测试机构信息/Test laboratory information			
测试机构 test laboratory	深圳市优瑞特检测技术有限公司 Shenzhen ORT Technical Services Co., Ltd.		
机构地址 Address	广东省深圳市龙岗区龙岗街道南联第六工业园方兴科技园C区15栋一楼 1/F, Building 15, Fangxing Science and Technology Park, Nanlian No. 6 Industrial Zone, Longgang Street, Longgang District, Shenzhen, Guangdong, China		
联系电话/Tell	0755-27817553	电子邮箱 E-mail	battery@ort-ts.com
网站地址/website	http://www.ort-ts.com		
测试报告信息/Test report information			
报告编号/Test report ID	ORTSZ210520010212		
接样日期 Receiving date	2021-05-31	测试日期 Test date	2021-05-31 至 2021-06-15
测试人员 Tester	刘文威	批准人员 Approver	周志强

测试项目及结论/Test item and result			
条款/Clause	测试项目/Test Item	结论/Result	备注/Remark
38.3.3(f)	小型集成电池 small battery assemblies	不适用 N/A	/
38.3.3(g)	大型集成电池 Large battery assemblies	不适用 N/A	/
38.3.4.1	高度模拟/Altitude simulation	通过/Pass	/
38.3.4.2	温度试验/Thermal test	通过/Pass	/
38.3.4.3	振动/Vibration	通过/Pass	/
38.3.4.4	冲击/Shock	通过/Pass	/
38.3.4.5	外部短路/External short circuit	通过/Pass	/
38.3.4.6	重物冲击/Impact	不适用 N/A	/
	挤压/Crush	通过/Pass	/
38.3.4.7	过度充电/Overcharge	不适用 N/A	/
38.3.4.8	强制放电/Forced discharge	通过/Pass	/
<p><b>结论/Result:</b></p> <p>样品满足联合国《关于危险货物运输的建议书—试验与标准手册》第6修订版修正1第38.3节的测试要求。</p> <p>The sample meets the requirement of UNITED NATION Recommendation on the Transport of Dangerous Goods, Manual of Test and Criteria ST/SG/AC.10/11/Rev.6,amend1, section 38.3.</p>			

\*测试摘要信息由委托客户提供。

The information of Test Summary about UN38.3 is provided by client.







云南路飞新能源材料有限公司  
Yunnan Road Fei New Energy Materials Co.,Ltd.

版本: A.0

电芯型号: 645464/4.4V

日期: 2021-4-29

# Product Specification

## for Polymer Lithium-ion Batteries

### 聚合物锂离子电芯产品规格书

Model Number: 645464-4000mAh

产品型号: 645464-4000mAh

Prepared By 编制	Verified By 审核	Approved By 批准

	Signature 签署	Date 日期
Customer 客户方确认		
Approval 客户方确认	Company name: 公司名称	
	Company Stamp: 盖章	
客户代码		



云南路飞新能源材料有限公司  
**Yunnan Road Fei New Energy Materials Co.,Ltd.**

PRODUCT SPECIFICATION FOR **645464-4000mAh**

版本: A.0

电芯型号: 645464/4.4V

日期: 2021-4-29

版本号	内容描述	修改人	生效日期
A.0	新版发行		2021-4-29





**云南路飞新能源材料有限公司**  
**Yunnan Road Fei New Energy Materials Co.,Ltd.**

**PRODUCT SPECIFICATION FOR 645464-4000mAh**

版本: A.0

电芯型号: 645464/4.4V

日期: 2021-4-29

1. SCOPE

范围

This document describes the performance characteristics and testing methods for Polymer Li ion batteries produced by Yunnan Road Fei New Energy Materials Co.,Ltd.

本文件描述了云南路飞新能源材料有限公司出品的聚合物锂离子电池的产品规格、性能测试方法

2. PRODUCT TYPE AND MODEL NUMBER

产品类别和产品型号

2.1 PRODUCT TYPE

类别

Polymer Lithium-ion Battery

聚合物锂离子电池

2.2 MODEL NUMBER

产品型号: 645464

3. SPECIFICATION

产品基本特性

No. 序号	Item 项目	Characteristics 特性	Remarks 备注
3.1	Capacity 容量	Minimum: 4000mAh 最小: 4000mAh 典型: 4020mAh Typical:4020mAh	According to the standard charging after full charge, constant current discharge 0.2C to 3.0V. 按标准充电方式充满电后, 以 0.2C 恒流放电到 3.0V
3.2	Nominal Voltage 工作电压	3.85V	
3.3	Charging Cut-off Voltage 最大充电终止电压	4.4V	
3.4	Discharge Cut-off Voltage 最小放电终止电压	3.0V	
3.5	Max. Constant Charge Current 最大持续充电电流	2000mA (0.5C)	
3.6	Max. Continuous Discharge Current 最大持续放电电流	2000mA (0.5C)	
3.7	Operating Temperature 工作温度范围 (不可在极限温度下长时间持续充放电)	Charging/充电	5~15°C: 0.2C CCCV to 4.4V
			15~45°C: 0.5C CCCV to 4.4V
		Discharging/放电	-20~10°C: 0.2C DC to 3.0V
			11~50°C: 0.5C DC to 3.0V



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PRODUCT SPECIFICATION FOR 645464-4000mAh

3.8	Storage Condition ( 50% of fully charge state ) 存储条件 (带电量 50%)	1 个月内 -10~45°C -10~45°C for 1Month 6 个月内 -10~35°C -10~35°C for 6Months
3.9	Weight 重量	Approximate value 约 51g
3.10	Storage Voltage 存储电压	3.70-4.00V
3.11	Environmental request 环保要求	the materials of the product and packaging accord with RoHS standard, there will be a RoHS Id on the box. 满足 ROHS 要求

4. Dimensions

外形尺寸

Please refer the drawing in appendix.

见附图

5. Appearance

外观

No scratches, dirt, defect, leakage of electrolyte or gassing should be observed as a new product.

电池表面无划伤、脏点、变形、漏液、鼓气等缺陷。

6. Characteristics

特性

6.1 Electrochemical performance characteristics

电性能

No. 序号	Item 项目	Testing Method 测试方法	Requirements 标准
1	Standard Charge 标准充电	0.2C constant current charge to 4.4V, then constant Voltage until the charge current decrease to 0.01C. 0.2C 恒流充电至 4.4V, 再 4.4V 恒压至 0.01C	Charge Time ≤6.5hrs 充电时间 ≤6.5 小时
2	Rapid Charge 快速充电	0.5C constant current charge to 4.4V, then constant Voltage until the charge current decrease to 0.01C. 0.5C 恒流充电至 4.4V, 再 4.4V 恒压至 0.01C	Charge Time ≤3.5hrs 充电时间 ≤3.5 小时
3	Nominal Capacity 标称容量	(per 6.1.1) at room temp. (23±2 °C ), rest for 0.5-1 hrs then discharge at a constant current of 0.2C to 3.0V. 在环境温度为(23±2)°C 的条件下按 6.1.1 完全充电后静置 0.5~1 小时, 以 0.2C 放电至 3.0V。	≥4000mAh



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4	Cycle (23°C) 循环寿命 (23°C)	<p>At 23 ± 2 °C ambient temperature, With 0.2C charging and discharging, between each cycle for 10 minutes, in this way for 300C.</p> <p>在 23°C ± 2°C 的环境温度下, 用 0.2C 充电和放电, 每次循环之间搁置 10 分钟, 循环 300 周。</p>	<p>Remaining capacity ≥ 85% Nominal capacity.</p> <p>剩余容量 ≥ 85% 标称容量</p>															
5	Internal Impedance 内阻	<p>Internal impedance is measured on a 50% charged battery at 1KHz AC at ambient temperature (23 ± 2) °C.</p> <p>环境温度 (23 ± 2) °C, 电池荷电 50% 状态时以 1KHz 交流电测得的内部阻抗。</p>	≤ 45m Ω															
6	Capacity Retention 荷电保持能力	<p>After fully charged (23 ± 2) in the 28 days of storage environment temperature, discharge at 0.2C<sub>5</sub>A to 3.0V. Then according to the standard charging mode, and then discharge at 0.2C<sub>5</sub>A to 3.0V. 完全充电后在 (23 ± 2) °C 的环境中储存 28 天, 以 0.2C<sub>5</sub>A 放电至 3.0V。然后按标准充电方式充电后, 再以 0.2C<sub>5</sub>A 放电至 3.0V。</p>	<p>Remaining capacity ≥ 85% initial capacity.</p> <p>放电容量 ≥ 85% 标称容量</p> <p>recovery capacity ≥ 90% initial capacity</p> <p>恢复容量 ≥ 90% 标称容量</p>															
7	Discharge Rate Characteristic 倍率放电特性	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Charge current/ 充电电流</th> <th colspan="3" style="text-align: center;">Discharge current/放电电流</th> </tr> <tr> <th style="text-align: center;">(0.2C)</th> <th style="text-align: center;">(0.2C)</th> <th style="text-align: center;">(0.5C)</th> <th style="text-align: center;">(1.0C)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">(0.2C)</td> <td style="text-align: center;">100%</td> <td style="text-align: center;">95%</td> <td style="text-align: center;">90%</td> </tr> </tbody> </table> <p>Cell shall be charged according to Per.6.1.1, and discharged with different current respectively to 3.0V. The cells should be performed at 23°C ± 2 °C</p> <p>电芯按 6.1.1 充满电, 分别以不同的倍率放电到 3.0V。电芯必须在 23°C ± 2 °C 的温度下进行充放电。</p>	Charge current/ 充电电流	Discharge current/放电电流			(0.2C)	(0.2C)	(0.5C)	(1.0C)	(0.2C)	100%	95%	90%				
Charge current/ 充电电流	Discharge current/放电电流																	
(0.2C)	(0.2C)	(0.5C)	(1.0C)															
(0.2C)	100%	95%	90%															
8	Temperature Characteristic 温度特性	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Discharge current/放电电流</th> <th colspan="4" style="text-align: center;">Discharge temperature/放电温度</th> </tr> <tr> <th style="text-align: center;">(0.2C)</th> <th style="text-align: center;">-20°C</th> <th style="text-align: center;">0°C</th> <th style="text-align: center;">25°C</th> <th style="text-align: center;">50°C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">(0.2C)</td> <td style="text-align: center;">30%</td> <td style="text-align: center;">85%</td> <td style="text-align: center;">100%</td> <td style="text-align: center;">95%</td> </tr> </tbody> </table> <p>Cell shall be charged according to Per.6.1.1, and discharged with different temperature respectively to 3.0V at 0.2C. The cells must be stored for two hours at the corresponding temperature before discharge.</p> <p>电芯按 6.1.1 充满电, 分别在不同温度放电到 3.0V。在放电前电芯必须在对应温度下储存 2 小时。</p>	Discharge current/放电电流	Discharge temperature/放电温度				(0.2C)	-20°C	0°C	25°C	50°C	(0.2C)	30%	85%	100%	95%	
Discharge current/放电电流	Discharge temperature/放电温度																	
(0.2C)	-20°C	0°C	25°C	50°C														
(0.2C)	30%	85%	100%	95%														
9	The factory voltage 出厂电压	<p>Check open circuit voltage (OCV) of cells prior to the delivery to customers</p> <p>出货之后检验</p>	3.8 ~ 3.95V															



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**PRODUCT SPECIFICATION FOR 645464-4000mAh**

版本: A.0

电芯型号: 645464/4.4V

日期: 2021-4-29

6.2 Safety characteristic

安全特性

No. 序号	Item 项目	Test Method 测试方法	Requirements 标准
1	Overcharge 过充	Discharge cells to 3.0V at 0.2C <sub>5</sub> A, then charge to 4.6V at 3C <sub>5</sub> A and rest for 7 hours. 电池以 0.2C <sub>5</sub> A 电流恒流放电至 3.0V, 以电流 3 C <sub>5</sub> A 限制电压 4.6V 的制式充电 7 小时。	No fire No explosion 不爆炸、不起火
2	Over Discharge 过放	Fully charge cells per 6.1.1, then discharge the battery to 3.0V with 0.2C <sub>5</sub> A mA at room temperature, connect with external load of 30 Ω for 7hours. 将电池按 6.1.1 充满电后, 在环境温度 23±2°C的条件下,以 0.2C <sub>5</sub> A 放电至终止电压后,外接 30 Ω 负载电阻放电 7h.	No fire No explosion 不爆炸、不起火
3	Heat Cycle 温度循环	The cell is fully charged with standard charging method, and then it is to be stored for 6 hour at a test temperature equal to 75±2 °C, followed by a storage for 6 hour at a test temperature equal to -40±2 °C, the maximum time interval between test temperature extremes is 30 min, this procedure is to be repeated for 10 times, after which all test cells are to be stored for 6 hours at ambient temperature (23±2 °C). 将用标准充电方法充满电的电芯放入 75±2°C的环境中搁置 6h,再在-40±2°C条件下搁置 6h, 两个极端温度的变化时间间隔最长为 30min, 如此循环 10 次, 试验结束后将电芯取出, 在 23±2°C环境中搁置 6h。	No leakage, no fire and no explosion 不泄露、不起火、不爆炸
4	Mechanical shock 机械冲击	The battery is fixed on the test equipment. Each in three perpendicular directions under the impact of an equivalent. At least one direction perpendicular to the width of the battery. Each shock according to the following method: within the first 3 ms, minimum average speed of 735 m/s <sup>2</sup> , peak acceleration should be between 1225 m/s <sup>2</sup> and 1715 m/s <sup>2</sup> , pulse duration for ms to 6 ms + 1. 将电池固定在试验设备上。在三个相互垂直的方向上各承受一次等值的冲击。至少一个方向垂直于电池的宽面。 每次冲击按下述方法进行: 在最初的 3ms 内, 最小平均加速为 735m/s <sup>2</sup> , 峰值加速应该在 1225m/s <sup>2</sup> 和 1715 m/s <sup>2</sup> 之间, 脉冲持续时间为 6ms±1ms。	No leakage, no fire and no explosion, 不泄露、不起火、不爆炸



**云南路飞新能源材料有限公司**  
**Yunnan Road Fei New Energy Materials Co.,Ltd.**

**PRODUCT SPECIFICATION FOR 645464-4000mAh**

版本: A.0

电芯型号: 645464/4.4V

日期: 2021-4-29

**6.3 Reliability**

环境适应性

No. 序号	Item 项目	Test Method 测试方法	Requirements 标准
1	Humidity Test 高温高湿	Fully charge cells per 6.1.1, stored them at $40 \pm 2^{\circ}\text{C}$ with 90%~95RH% for 48 hours. Then the cells are placed at room temperature to "dry out" for 2 hours. then discharge the cells to 3.0V at 0.2C <sub>5</sub> A. 将按 6.1.1 充满电的电池放入 $40 \pm 2^{\circ}\text{C}$ 、相对湿度为 90%~95% 的恒温湿箱中搁置 48h 后, 取出电池在环境温度 $20 \pm 5^{\circ}\text{C}$ 的条件下搁置 2h。以 0.2C <sub>5</sub> A 电流放电至 3.0V	No deformation, no corrosion, no leakage, no leakage, no rupture, no fire and no explosion, discharge time shall not be less than 3h. 无变形、无锈蚀、不泄漏、不泄气、不破裂、不起火和不爆炸, 放电时间应不低于 3h。
2	Low Pressure Test 低压测试	The fully charged cell is to be stored for 6 hours at an absolute pressure of 11.6kpa and a temperature of $23 \pm 2^{\circ}\text{C}$ . 将充满电的电芯在绝对压力为 11.6kpa、 $23 \pm 2^{\circ}\text{C}$ 条件下贮存 6 小时。	No explosion, no fire and no leakage 不爆炸、不起火、不泄露
3	Drop Test 跌落测试	The cell is fully charged with standard charging method, standby for one hour and then it is submitted to free fall at a height of 1.0m down to one solid board with thickness of 20mm. It should be fallen for 2 times on each direction. 将电芯用标准充电方法充满电, 放置 1h, 将电芯从 1.0m 高度自由落到 20mm 厚的硬木板上。每个方向上各试验 2 次。	No leakage, no smoke, no explosion and no fire 不泄露、不冒烟, 不起火, 不爆炸
4	Vibration 振动	Battery charged by the regulation, after the battery is fixed on the vibration table, don't make the battery out of shape, with sinusoidal vibration, and within 15 min in logarithmic sweep from 7 hz frequency sweep to 200 hz and return to the 7 hz. Vibration along three mutually perpendicular direction of sample (one direction is perpendicular to the plane of the cathode) must match the sample, according to the logarithmic sweep in each direction way to 12 repetitions, vibration 3h. Logarithmic frequency sweeping method is as follows: 7 hz ~ 18 hz maintain peak acceleration of 9.8 m/s <sup>2</sup> . Hold the amplitude at 0.8 mm (displacement of 1.6 mm) until the peak acceleration of 78.4 m/s <sup>2</sup> (frequency is about 50 hz). Keep 78.4 m/s <sup>2</sup> peak acceleration until the frequency increased to 200 hz. 电池按规定充满电后, 将电池固定在振动台上, 不可使电池变形, 采用正弦波进行振动, 并以对数扫频方式在 15min 内从 7Hz 扫频到 200Hz 并返回到 7Hz。振动沿样品互相垂直的三个方向(其中一个方向必须与样品正负极所在平面垂直)进行, 每个方向按上述对数扫	No leakage, no fire and no explosion. 不泄露、不起火、不爆炸。



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频方式重复 12 次, 振动 3h。  
对数扫频方式如下: 7Hz~18Hz 保持 9.8m/s<sup>2</sup> 的峰值加速度。将振幅保持在 0.8mm (位移为 1.6mm) 直至峰值加速度达到 78.4m/s<sup>2</sup> (频率约为 50Hz)。保持 78.4m/s<sup>2</sup> 的峰值加速度直到频率增长到 200Hz。

7. Standard Testing Environment

标准测试环境

Temperature : 23 ± 2°C

温度: 23 ± 2°C

Relative humidity : 45 ± 20% (unless specially requested)

相对湿度: 45 ± 20% (除非另外要求)

8. Warranty

保质期

Warranty period for this product is 12 months starting from the date when the products left the door of manufacturer.

保质期是从出厂日期(喷码)开始起十二个月。

9. Liability

产品责任

The user has to operate the products according to the instructions printed on the battery label or follow the advice described in this "Product Specification for Polymer Lithium Ion Batteries published by Yunnan Road Fei New Energy Materials Co.,Ltd. In case the battery were overheated or even catch fire or explosion caused by mishandling of the user side, Yunnan Road Fei New Energy Materials Co.,Ltd. will not be liable for the lose caused by any of such mishandling.

Yunnan Road Fei New Energy Materials Co.,Ltd.will notify the users in written form if any modifications in specification, raw material, production process control.

您必须严格遵守云南路飞新能源材料有限公司规格书和文件后面的注释使用电池, 由于误用会引起电池过热, 发生火灾或爆炸。对于没有按照规格书进行操作所造成的任何以外事故, 云南路飞新能源材料有限公司不承担任何责任。如果规格书、原材料、生产过程或生产控制系统发生改变, 改变的信息将会随质量和可靠性数据以书面形式通知消费者。

10. Battery Packing Label

包装电池上的标示

The following warnings should be indicated on the battery pack labels.

以下警告应注明在包装后的电池上

Use a specified charger.

使用规定的充电器。

Do not throw the battery into fire, or heat.

不要将电池投入火中或加热。

Do not short-circuit the battery terminals.

不要将电池两端短路。



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Do not disassemble the battery.

不要将电池分解拆散。

11. Warnings and Cautions in Handling the Lithium-ion Battery

电池使用时警告事项及注意事项

To prevent potential leaking, overheating or explosion of batteries please be advised to take following precautions:

为防止电池可能发生泄漏,发热、爆炸,请注意以下预防措施

WARNINGS!

警告!

Do not immerse the battery in water or seawater, and keep the battery in a cool dry environment during stands by period.

严禁将电池浸入海水或水中,保存不用时,应放置于阴凉干燥的环境中。

Do not use or leave the battery near a heat source such as fire or heater.

禁止将电池在热高温源旁,如火、加热器等使用和留置。

When recharging, use the battery charger specifically for that purpose.

充电时请选用锂离子电池专用充电器。

Do not reverse the position (+) and negative (-) terminals.

严禁颠倒正负极使用电池。

Do not connect the battery to an electrical outlet.

严禁将电池直接接入电源插座。

Do not dispose the battery in fire or heat.

禁止将电池丢于火或加热器中。

Do not short-circuit the battery by directly connecting the positive (+) and negative (-) terminal with metal objects such as wire.

禁止用金属直接连接电池正负极短路

Do not transport or store the battery together with metal objects such as necklaces, hairpins etc.

禁止将电池与金属,如发夹、项链等一起运输或贮存。

Do not strike or throw the battery against hard surface.

禁止敲击或抛掷、踩踏电池等。

Do not directly solder the battery and pierce the battery with a nail or other sharp object.

禁止直接焊接电池或用指甲或其它尖锐物体刺穿电池。

Outer metal conduct can not contact the aluminum layer in AL laminate film, especially with electrification, which will be "black spot" and swelling easily.

禁止外层金属导体与铝塑膜中的铝层接触,尤其是带电情况,易产生“黑点”现象,引起鼓胀。

Do not use sharp things to hit the battery.

禁止用尖锐部件碰撞电池。



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CAUTIONS!

注意

Do not use or leave the battery at very high temperature (for example, at strong direct sunlight or in a vehicle in extremely hot weather). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be shortened.

禁止在高温下(炙热的阳光下或很热的汽车中)使用或放置电池,可能会引起电池过热、起火或功能失效、寿命减短。

Do not use it in a location where static electricity is rich, otherwise, the safety devices may be damaged, causing a harmful situation.

禁止在强静电和强磁场的地方使用,否则易破坏电池安全保护装置,带来不安全的隐患。

In case the electrolyte get into the eyes due to the leakage of battery, do not rub the eyes! Rinse the eyes with clean running water, and seek medical attention immediately. Otherwise, it may injure eyes or cause a loss of sight.

如电池泄露,电解液进入眼睛,请不要揉擦,用清水冲洗眼睛,立即送医治疗,否则会伤害眼睛

If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charger and place it in a contained vessel such as a metal box.

如果电池发出异味、发热、变色、变形或使用、贮存,充电过程中出现任何异常,立即将电池从装置或充电器中移除并停用。

In case the battery terminals are contaminated, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection between the battery and the electronic circuitry of the instrument.

如果电池发出异味、发热、变色、变形或使用、贮存,充电过程中出现任何异常,立即将电池从装置或充电器中移除并停用。

Be aware discarded batteries may cause fire, tape the battery terminals to insulate them before disposal.

废弃之电池应用绝缘纸包住电极,以防起火、爆炸。





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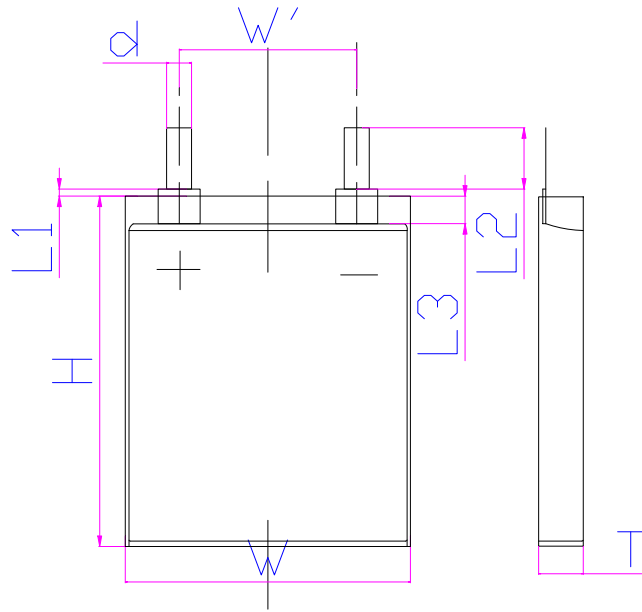
版本: A.0

电芯型号: 645464/4.4V

日期: 2021-4-29

附图: 单位: mm

Attachment: Unit: mm



项目 Items	描述 Description	技术规格 Dimension and Spec
T	厚度 (不含膜) /thickness before shipping	≤ 6.5 mm
W	宽度/width	≤ 55.0 mm
H	高度 (不含极耳胶) /length	≤ 65.0 mm
L1	极耳胶外漏长度/sealant length	0.2-2.0 mm
L2+L1	极耳外露长度 (含极耳胶) /tab length	6.0±1.0 mm
L3	顶封高度/sealing height	3.5±0.5 mm
d	极耳宽度/ tab width	5.0±0.2 mm
W'	极耳中心距/distance between center of 2 tabs	36.0±2.0 mm
备注	单折边, 顶边茶色胶纸, 两侧 L 型茶色胶纸	

备注:1.正极本司使用直转镍铝极耳无需弯折

另注: 您还有任何疑问, 请在 48H 内告知我们, 否则我们将认为您已经同意以上标准, 谢谢!

深圳市优瑞特检测技术有限公司  
Shenzhen ORT Technical Services Co., Ltd.  
UN38.3 检测报告 Test Report

Report Number ORTSZB01210601025					
样品名称 Sample name:	锂离子电芯 Lithium ion cell	型号 Model:	645464		
商标 Brand:	/	检测类别 Test Classification	委托测试 COMMISSION TEST		
委托单位 Applicant	云南路飞新能源材料有限公司 Yunnan Lufei New Energy Materials Co., Ltd. 云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 No.1 high tech Industrial Park, Tengchong border economic development and cooperation zone, Baoshan City, Yunnan Province				
生产单位 Manufacturer	云南路飞新能源材料有限公司 Yunnan Lufei New Energy Materials Co., Ltd. 云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 No.1 high tech Industrial Park, Tengchong border economic development and cooperation zone, Baoshan City, Yunnan Province				
收样日期 Received date:	2021-05-31	试验时间 Detection date:	2021-05-31 to 2021-06-15	报告日期 Report date:	2021-08-02
试验依据 Test Method	联合国《关于危险货物运输的建议书-试验和标准手册》(第 6 版) 38.3 节修订 1 UN Recommendations on the Transport of Dangerous Goods Manual of Tests and Criteria ST/SG/AC.10/11/Rev.6/Subsection 38.3 Amend 1				
试验结论 Conclusion:	该电池样品通过所有项目检测, 符合该条款的性能要求。 The samples have passed all test items.				
主检 Tested by:	刘文威 	日期 Date:	2021-06-15		
审核 Checked by:	吴雄 	日期 Date:	2021-08-02		
批准 Approved by:	周志强 	日期 Date:	2021-08-02		
			深圳市优瑞特检测技术有限公司 Shenzhen ORT Technical Services Co., Ltd. 		

声明:本测试报告无检测报告专用章, 签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可, 不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目, 仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时, 须在收到报告之日起 15 日内对提出投诉或要求进行复测。

**I 电池描述 Battery Description**

电池信息 Information for Battery			
型号 Model	--	额定能量 Rated Energy	--
额定容量 Rated Capacity	--	标称电压 Nominal Voltage	--
充电限制电压 Max. Charging Voltage	--	充电电流 Charging Current	--
放电电流 Discharge current	--	最大连续充电电流 Max. Charging Current	--
最大放电电流 Max. Discharging Current	--	充电截至电流 Charge Cut-off Current	--
放电终止电压 Discharge Cut-off Voltage	--	电芯组合方式 Cell Combination Mode	--
外观形状 Appearance	--	电芯生产厂家 Manufacturer of cell	--

电芯信息 Information for Cell			
型号 Model	645464	额定能量 Rated Energy	15.4Wh
额定容量 Rated Capacity	4000mAh	标称电压 Nominal Voltage	3.85V
充电限制电压 Max. Charging Voltage	4.4V	充电电流 Charging Current	800mA
放电电流 Discharge current	800mA	最大连续充电电流 Max. Charging Current	2000mA
最大放电电流 Max. Discharging Current	2000mA	充电截至电流 Charge Cut-off Current	40mA
放电终止电压 Discharge Cut-off Voltage	3.0V	外观形状 Appearance	银色长方体 Silvery cuboid

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起 15 日内对提出投诉或要求进行复测。

**II 试验记录 Test Records**

序号 No.	测试项目 Test Items	标准要求或标准条款号 Standard requirement or the clause number of standard	测试结果 Test result	本项结论 conclusion	备注 Remarks
1	高度模拟 Altitude simulation	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.1 Test T.1	见附表 1 See Appendix 1	合格 Passed	/
2	温度试验 Thermal test	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.2 Test T.2	见附表 2 See Appendix 2	合格 Passed	/
3	振动 Vibration	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.3 Test T.3	见附表 3 See Appendix 3	合格 Passed	/
4	冲击 Shock	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.4 Test T.4	见附表 4 See Appendix 4	合格 Passed	/
5	外部短路 External short circuit	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.5 Test T.5	见附表 5 See Appendix 5	合格 Passed	/
6	撞击 Impact	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.6 Test T.6	见附表 6 See Appendix 6	合格 Passed	/
7	过度充电 Overcharge	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.7 Test T.7	见附表 7 See Appendix 7	不适用 N/A	
8	强制放电 Forced discharge	ST/SG/AC.10/11/Rev.6/Amend 1, 38.3 试验 T.8 Test T.8	见附表 8 See Appendix 8	合格 Passed	/

备注 Remark:

测试样品已按 UN38.3 经过循环处理, 由客户提供.

Before the samples were sent for testing, the client has already carried out cyclic tests according to the requirements of UN38.3.

声明: 本测试报告无检测报告专用章, 签名无效; 本测试报告检测结果仅对被测样品负责; 未经优瑞特检测书面许可, 不得部分复制本报告; 报告中带“\*”的项目为分包检验项目; 未取得资质认定或认可的检测项目, 仅作为科研、教学或内部质量控制之用; 委托方对检测结果有异议时, 须在收到报告之日起 15 日内对提出投诉或要求进行复测。



附表 2  
 Appendix 2

序号 No.	2	测试项目名称 Name of Test Items				温度试验 Thermal test		
编号 No	样品状态 Sample status	测试前 Before		测试后 After		质量损失	电压损失	测试结果 result
		电池质量 $m_1$ (g)	开路电压 $V_1$ (V)	电池质量 $m_2$ (g)	开路电压 $V_2$ (V)	Mass loss (%)	Voltage loss (%)	
C01	首次完全充电 1st CYC Fully Charged	51.415	4.379	51.409	4.308	0.012	1.621	O
C02	首次完全充电 1st CYC Fully Charged	51.952	4.381	51.947	4.311	0.010	1.598	O
C03	首次完全充电 1st CYC Fully Charged	51.596	4.382	51.591	4.306	0.010	1.734	O
C04	首次完全充电 1st CYC Fully Charged	52.033	4.382	52.028	4.307	0.010	1.712	O
C05	首次完全充电 1st CYC Fully Charged	51.784	4.378	51.778	4.314	0.012	1.462	O
C06	第 25 次完全充电 25th CYC Fully Charged	51.541	4.379	51.536	4.310	0.010	1.576	O
C07	第 25 次完全充电 25th CYC Fully Charged	51.377	4.380	51.372	4.306	0.010	1.689	O
C08	第 25 次完全充电 25th CYC Fully Charged	51.845	4.382	51.839	4.309	0.012	1.666	O
C09	第 25 次完全充电 25th CYC Fully Charged	51.736	4.381	51.730	4.304	0.012	1.758	O
C10	第 25 次完全充电 25th CYC Fully Charged	51.938	4.381	51.933	4.307	0.010	1.689	O
以下空白								
注: L-泄露; V-排气; D-解体; R-破裂; F-起火; O-无泄露、无排气、无解体、无破裂、无起火 Note: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire O-No leakage, no venting, no disassembly, no rupture, no fire.								

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起 15 日内对提出投诉或要求进行复测。

附表 3  
 Appendix 3

序号 No.	3	测试项目名称 Name of Test Items				振动 Vibration		
编号 No	样品状态 Sample status	测试前 Before		测试后 After		质量损失 Mass loss (%)	电压损失 Voltage loss (%)	测试结果 result
		电池质量 $m_1$ (g)	开路电压 $V_1$ (V)	电池质量 $m_2$ (g)	开路电压 $V_2$ (V)			
C01	首次完全充电 1st CYC Fully Charged	51.409	4.308	51.408	4.306	0.002	0.046	O
C02	首次完全充电 1st CYC Fully Charged	51.947	4.311	51.945	4.310	0.004	0.023	O
C03	首次完全充电 1st CYC Fully Charged	51.591	4.306	51.589	4.304	0.004	0.046	O
C04	首次完全充电 1st CYC Fully Charged	52.028	4.307	52.027	4.305	0.002	0.046	O
C05	首次完全充电 1st CYC Fully Charged	51.778	4.314	51.776	4.311	0.004	0.070	O
C06	第 25 次完全充电 25th CYC Fully Charged	51.536	4.310	51.534	4.308	0.004	0.046	O
C07	第 25 次完全充电 25th CYC Fully Charged	51.372	4.306	51.371	4.305	0.002	0.023	O
C08	第 25 次完全充电 25th CYC Fully Charged	51.839	4.309	51.837	4.307	0.004	0.046	O
C09	第 25 次完全充电 25th CYC Fully Charged	51.730	4.304	51.728	4.302	0.004	0.046	O
C10	第 25 次完全充电 25th CYC Fully Charged	51.933	4.307	51.931	4.305	0.004	0.046	O
以下空白								

注： L-泄露； V-排气； D-解体； R-破裂； F-起火； O-无泄露、无排气、无解体、无破裂、无起火  
 Note: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire  
 O-No leakage, no venting, no disassembly, no rupture, no fire.

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起 15 日内对提出投诉或要求进行复测。











附表 8

Appendix 8

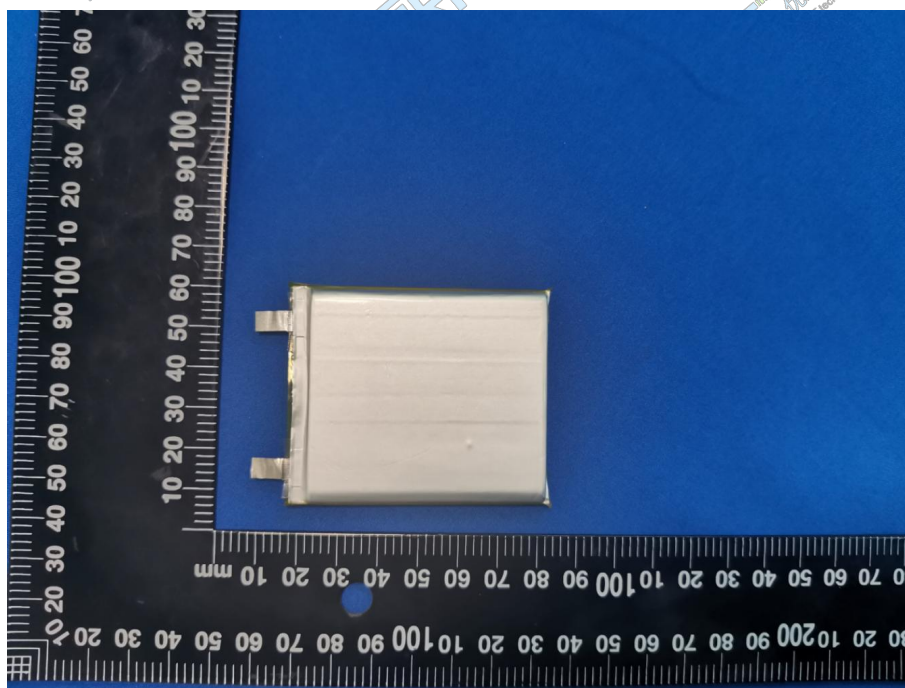
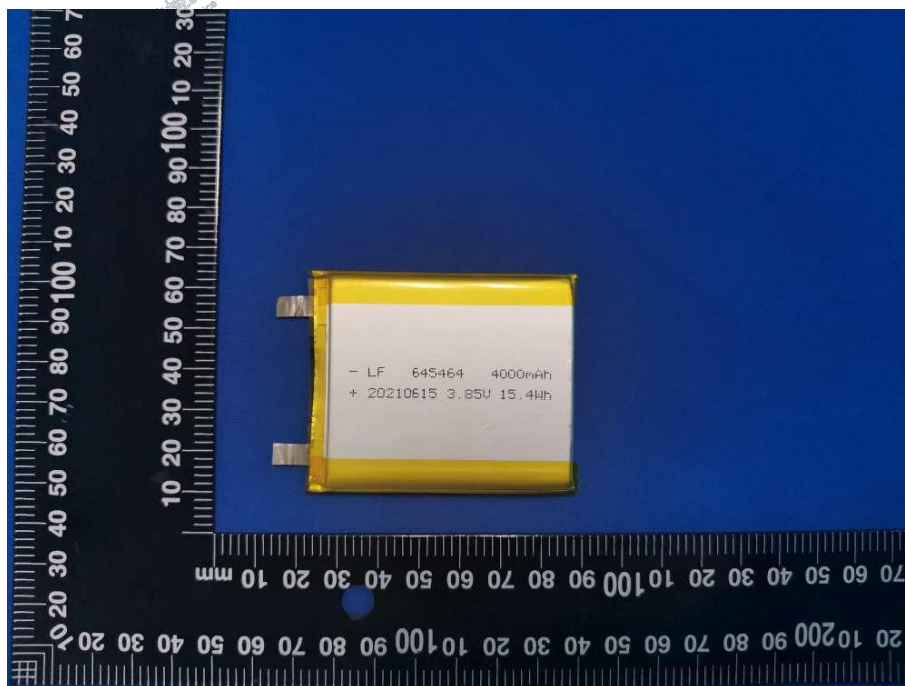
序号 No.	8	测试项目名称 Name of Test Items	强制放电 Forced discharge
编号 No	样品状态 Sample status	测试结果 Test result	备注 Remark
C21	首次完全放电 1st CYC Fully Discharged	O	/
C22	首次完全放电 1st CYC Fully Discharged	O	/
C23	首次完全放电 1st CYC Fully Discharged	O	/
C24	首次完全放电 1st CYC Fully Discharged	O	/
C25	首次完全放电 1st CYC Fully Discharged	O	/
C26	首次完全放电 1st CYC Fully Discharged	O	/
C27	首次完全放电 1st CYC Fully Discharged	O	/
C28	首次完全放电 1st CYC Fully Discharged	O	/
C29	首次完全放电 1st CYC Fully Discharged	O	/
C30	首次完全放电 1st CYC Fully Discharged	O	/
C31	第 25 次完全放电 25th CYC Fully Discharged	O	/
C32	第 25 次完全放电 25th CYC Fully Discharged	O	/
C33	第 25 次完全放电 25th CYC Fully Discharged	O	/
C34	第 25 次完全放电 25th CYC Fully Discharged	O	/
C35	第 25 次完全放电 25th CYC Fully Discharged	O	/
C36	第 25 次完全放电 25th CYC Fully Discharged	O	/
C37	第 25 次完全放电 25th CYC Fully Discharged	O	/
C38	第 25 次完全放电 25th CYC Fully Discharged	O	/
C39	第 25 次完全放电 25th CYC Fully Discharged	O	/
C40	第 25 次完全放电 25th CYC Fully Discharged	O	/

注：D-解体；F-起火；O-无解体、无起火  
 Note: D-Disassembly, F-Fire, O- No disassembly, no fire.

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起 15 日内对提出投诉或要求进行复测。

III 样品图片 Sample Photo

电芯 Cell



备注 note: 仅对原报告照片中的样品负责 Authenticate the photo on original report only

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起15日内对提出投诉或要求进行复测。

**IV 试验设备 Test Equipment**

编号 No	名称 Name	规格参数 Model specifications	设备编号 Device No.	有效期至 Calibration validity
1	电池低压高空模拟试验机 Battery low pressure high altitude simulation testing machine	GX-3020-ZC80	ORT-DQY-01	2021-07-18
2	电子天平 Electronic balance	HZK-JA510S	ORT-DZTP-02	2021-07-18
3	振动试验台 Electromagnetic vibration tester	MPA406/M232A	ORTZD2000-01	2022-01-03
5	万用表 Multimeter	17B+	ORT-WYB-01	2021-07-20
6	快速温变试验箱 Rapid temperature change test chamber	F15H1000-70W	ORTKWB1000-0 2	2022-03-03
7	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-21	2021-07-20
8	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-22	2021-07-20
9	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-23	2021-07-20
10	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-24	2021-07-20
11	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-25	2021-07-20
12	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-26	2021-07-20
13	高性能电池检测系统 High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-27	2021-07-20
14	冲击试验台 Mechanical Shock tester	IS500	ORTCJ-01	2022-05-27
15	数据采集仪 Data acquisition instrument	DC5508U	ORT-CJY-01	2022-05-27
16	温控型电池短路试验机 Temperature controlled External short-circuit testing system	GX-6055-B	ORT-WDL-01-01	2021-07-18
17	温控型电池短路试验机 Temperature controlled External short-circuit testing system	GX-6055-B	ORT-WDL-01-02	2021-07-20
18	电池挤压针刺试验机 Crush / needle tester	GX-5067-BM3T	ORT-JYZC-01	2022-05-27
19	电子负载 Electronic load	EL160LB	ORT-DZFF-03	2021-07-20
20	直流电源 DC power supply	IT6723	ORT-DY-03	2022-05-27

\*\*\* End of Report \*\*\*

声明:本测试报告无检测报告专用章,签名无效;本测试报告检测结果仅对被测样品负责;未经优瑞特检测书面许可,不得部分复制本报告;报告中带“\*”的项目为分包检验项目;未取得资质认定或认可的检测项目,仅作为科研、教学或内部质量控制之用;委托方对检测结果有异议时,须在收到报告之日起15日内对提出投诉或要求进行复测。

Shenzhen ORT Technical Services Co., Ltd.

# TEST REPORT

<b>Report Number</b> <b>ORTSZB01210602002</b>					
Sample name:	Li-ion Cell	Model:	645464		
Ratings	3.85V, 4000mAh, 15.4Wh	Sample status	Received intact		
Brand:	N/A	Sample source:	Submitted by applicant		
Testing Laboratory	Shenzhen ORT Technical Services Co., Ltd. F1, Building 15, Fangxing Science and Technology Park, Nanlian No. 6 Industrial Zone, Longgang Street, Longgang District, Shenzhen				
Applicant and address	Yunnan Lufei New Energy Materials Co., Ltd. No.1 high tech Industrial Park, Tengchong border economic development and cooperation zone, 678000 Baoshan City, Yunnan Province, PEOPLE'S REPUBLIC OF CHINA				
Manufacturer and Address	Yunnan Lufei New Energy Materials Co., Ltd. No.1 high tech Industrial Park, Tengchong border economic development and cooperation zone, 678000 Baoshan City, Yunnan Province, PEOPLE'S REPUBLIC OF CHINA				
Received date:	2021-07-06	Testing date:	2021-07-06 to 2021-07-19	Report date:	2021-07-19
Test Requirement:	IEC 62133-2:2017 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems				
Tested by:	Jeff Liu	Date:	 Shenzhen ORT Technical Services Co., Ltd. (stamp) 2021-07-19		
Signature:		2021-07-19			
Checked by:	Gary Wu	Date:			
Signature:		2021-07-19			
Approved by:	Leo Zhou	Date:			
Signature:		2021-07-19			

Declaration: this test report is invalid without special seal for test report. The test results of this test report are only responsible for the tested samples; This report shall not be partially copied without the written permission of urrette testing; The items with "\*" in the report are subcontracted inspection items; The project with "☆" in the report has not obtained qualification recognition or recognition, and is only used for scientific research, teaching or internal quality control; Without the qualification identification mark (CMA), it does not have the function of proving the society; If the client has any objection to the test results, it shall make a complaint or request for retesting within 15 days after receiving the report.

**Test specification**

Standard..... IEC 62133-2:2017

Test procedure ..... Test report

Procedure deviation..... N/A

Non-standard test method..... N/A

**Test Report Form/blank test report**

Test Report Form No..... ORT62133-2-2017A

Test Report Form(s) Originator..... ORT

Master TRF..... Dated 2019-05

**Summary of testing:**

**Tests performed (name of test and test clause):**

- cl.7.1 Charging procedure for test purposes (for cells)
- cl.7.2.1 Continuous charging at constant voltage (cells)
- cl.7.3.1 External short circuit (cells)
- cl.7.3.3 Free fall (cells)
- cl.7.3.4 Thermal abuse (cells)
- cl.7.3.5 Crush (cells)
- cl.7.3.7 Forced discharge (cells)
- cl.7.3.9 Forced internal short-circuit (cell)

**Testing location:**

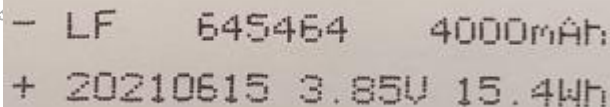
Shenzhen ORT Technical Services Co., Ltd.  
F1, Building 15, Fangxing Science and Technology Park, Nanlian No. 6 Industrial Zone, Longgang Street, Longgang District, Shenzhen

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**Copy of marking plate**

This is reference label, final label should be including the content of it.



- LF 645464 4000mAh  
+ 20210615 3.85V 15.4Wh

Remark: By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked.

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**Test item particulars**

Classification of installation and use..... Build-in and use in portable applications

Supply connection..... Supply by Tap

Recommend charging method declared by the manufacturer..... Charging the battery with 800mA constant current and 4.4V constant voltage until the current reduces to 40mA at ambient 20°C±5°C.

Discharge current(0.2I<sub>A</sub>)..... 800mA

Specified final voltage ..... 3.0V

Upper limit charging voltage per cell..... 4.4V

Maximum charging current..... 2000mA

Charging temperature upper limit..... 45°C

Charging temperature lower limit..... 5°C

Polymer cell electrolyte type.....  gel polymer  solid polymer  N/A

**Test case verdicts**

Test case does not apply to the test object..... N/A

Test item does meet the requirement..... P (Pass)

Test item does not meet the requirement..... F (Fail)

**List of Attachments**

Appendix 1..... Photos of product

Appendix 2..... Test Equipments

**General remarks**

This report shall not be reproduced except in full without the written approval of the testing laboratory.

The test results presented in this report relate only to the item tested.

“(See remark #)” refers to a remark appended to the report.

“(See appended table)” refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

The product fulfils the requirements of EN 62133-2: 2017

**Report Revise Record:**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2021-07-19	Valid	Original report

Name and address of factory (ies): Same as manufacturer

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### General product information

The product covered by this report is Li-ion Cell.

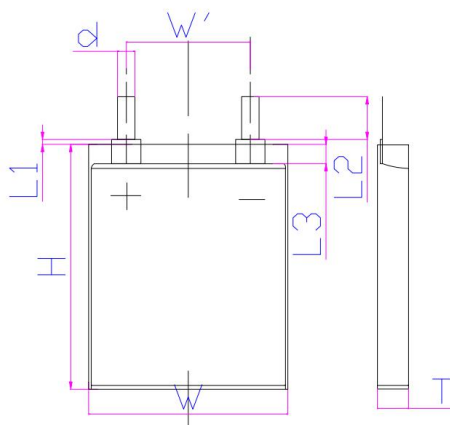
The main features of the cell are shown as below (clause 7.1.1):

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
645464	4000mAh	3.85V	800mA	800mA	2000mA	2000mA	4.4V	3.0V

The main features of the cell are shown as below (clause 7.1.2):

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
645464	4.4V	200mA	5°C	45°C

### Construction



T	6.5
W	55.0
H	65.0

Cell (Unit: mm)

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
4	Parameter measurement tolerances		P
	Parameter measurement tolerances	Comply with relevant requirements.	P
5	General safety considerations		P
5.1	General		P
	Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		P
5.2	Insulation and wiring		N/A
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ	No metal case exists.	N/A
	Insulation resistance (MΩ) :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		N/A
	Orientation of wiring maintains adequate clearance and creepage distances between conductors		N/A
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		N/A
5.3	Venting		P
	Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition		P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		N/A
5.4	Temperature, voltage and current management		N/A
	Batteries are designed such that abnormal temperature rise conditions are prevented		N/A
	Batteries are designed to be within temperature,		N/A

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	voltage and current limits specified by the cell manufacturer		
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified		N/A
5.5	Terminal contacts		N/A
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		N/A
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		N/A
	Terminal contacts are arranged to minimize the risk of short-circuit		N/A
5.6	Assembly of cells into batteries		N/A
5.6.1	General		N/A
	Each battery have an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region		N/A
	This protection may be provided external to the battery such as within the charger or the end devices		N/A
	If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation		N/A
	If there is more than one battery housed in a single battery case, each battery have protective circuitry that can maintain the cells within their operating regions		N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/ designer may ensure proper design and assembly		N/A
	Batteries that are designed for the selective discharge of a portion of their series connected		N/A

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer		
	Protective circuit components added as appropriate and consideration given to the end-device application		N/A
	The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance		N/A
5.6.2	Design recommendation		N/A
	For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2		N/A
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Table 2, by monitoring the voltage of every single cell or the single cellblocks		N/A
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that charging is stopped when the upper limit of the charging voltage is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks		N/A
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection		N/A
	For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		N/A
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's		N/A

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	specified final voltage		
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system		N/A
5.6.3	Mechanical protection for cells and components of batteries		N/A
	Mechanical protection for cells, cell connections and control circuits within the battery provided to prevent damage as a result of intended use and reasonably foreseeable misuse		N/A
	The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product		N/A
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		N/A
	For batteries intended for building into a portable end product, testing with the battery installed within the end product considered when conducting mechanical tests		N/A
5.7	Quality plan		P
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery	Complied. Quality plan provided.	P
5.8	Battery safety components		N/A
	According annex F	See TABLE: Critical components information.	N/A
6	Type test and sample size		P
	Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old		P
	Coin cells with resistance $\leq 3 \Omega$ (measured according annex D) are tested according table 1	Not coin cells	N/A
	Unless otherwise specified, tests are carried out in		P

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	an ambient temperature of 20 °C ± 5 °C		
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and overdischarge protection		N/A
	When conducting the short-circuit test, consideration given to the simulation of any single fault condition that is likely to occur in the protecting circuit that would affect the short-circuit test	See clause 7.3.2.	N/A

7	Specific requirements and tests		P
7.1	Charging procedure for test purposes		P
7.1.1	First procedure		P
	This charging procedure applies to subclauses other than those specified in 7.1.2		P
	Unless otherwise stated in this document, the charging procedure for test purposes is carried out in an ambient temperature of 20 °C ± 5 °C, using the method declared by the manufacturer	See page 5.	P
	Prior to charging, the battery have been discharged at 20 °C ± 5 °C at a constant current of 0,2 It A down to a specified final voltage	See page 5.	P
7.1.2	Second procedure		P
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		P
	After stabilization for 1 h and 4 h, respectively, at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant voltage charging method	Charging temperature specified by client is: 5 ~ 45°C 45°C used for upper limit tests; 0°C used for lower limit tests.	P
7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)		P
	Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer	Charging for 7 days with 800mA	P

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	Results: No fire. No explosion. No leakage :	(See appended table 7.2.1)	P
7.2.2	Case stress at high ambient temperature (battery)		N/A
	Oven temperature (°C) :		—
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells		N/A
7.3	Reasonably foreseeable misuse		P
7.3.1	External short-circuit (cell)	Tested complied.	P
	The cells were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		P
	Results: No fire. No explosion :	(See appended table 7.3.1)	P
7.3.2	External short-circuit (battery)	Tested complied.	N/A
	The batteries were tested until one of the following occurred:		N/A
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		N/A
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		N/A
	A single fault in the discharge protection circuit conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test		N/A
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor		N/A
	Results: No fire. No explosion :	(See appended table 7.3.2)	N/A
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion	No fire. No explosion.	P
7.3.4	Thermal abuse (cells)	Tested complied.	P

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	Oven temperature (°C) :	130°C	—
	Results: No fire. No explosion	No fire. No explosion.	P
7.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: No fire. No explosion :	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery		N/A
	The supply voltage which is:		N/A
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or		N/A
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		N/A
	- Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached		N/A
	Test was continued until the temperature of the outer casing:		N/A
	- Reached steady state conditions (less than 10°C change in 30-minute period); or		N/A
	- Returned to ambient		N/A
	Results: No fire. No explosion :	(See appended table 7.3.6)	N/A
7.3.7	Forced discharge (cells)	Tested complied.	P
	If the discharge voltage reaches the negative value of upper limit charging voltage within the testing duration, the voltage is maintained at the negative value of the upper limit charging voltage by reducing the current for the remainder of the testing duration		N/A
	If the discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration, the test is terminated at the end of the testing duration		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Results: No fire. No explosion :	(See appended table 7.3.7)	P
7.3.8	Mechanical tests (batteries)		N/A
7.3.8.1	Vibration	Tested complied.	N/A
	Results: No fire, no explosion, no rupture, no leakage or venting. :	(See appended table 7.3.8.1)	N/A
7.3.8.2	Mechanical shock	Tested complied.	N/A
	Results: No leakage, no venting, no rupture, no explosion and no fire :	(See appended table 7.3.8.2)	N/A
7.3.9	Design evaluation – Forced internal short-circuit (cells)		P
	The cells complied with national requirement for:		
	The pressing was stopped upon:		P
	- A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	400N	P
	Results: No fire :	(See appended table 7.3.9)	P

8	Information for safety		P
8.1	General		P
	Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products	Information of safety mentioned in manufacturer's specification.	P
	Manufacturers of batteries ensure that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards		N/A
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product.		N/A
	As appropriate, any information relating to hazard avoidance resulting from a system analysis provided to the end user		N/A
	Do not allow children to replace batteries without adult supervision		N/A
8.2	Small cell and battery safety information		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N/A
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N/A
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N/A

9	Marking		P
9.1	Cell marking		P
	Cells marked as specified in IEC 61960, except coin cells		N/A
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity	Not coin cells	N/A
	By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked		P
9.2	Battery marking		N/A
	Batteries marked as specified in IEC 61960, except for coin batteries		N/A
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement	Not coin batteries	N/A
	Terminals have clear polarity marking on the external surface of the battery		N/A
	Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	Caution for ingestion of small cells and batteries		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Coin cells and batteries identified as small batteries according to 8.2 include a caution statement regarding the hazards of ingestion in accordance with 8.2		N/A
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package		N/A
9.4	Other information		P
	Storage and disposal instructions	Information for storage and disposal instructions mentioned in manufacturer's specifications.	P
	Recommended charging instructions	Information for recommended charging instructions mentioned in manufacturer's specifications.	P

10	Packaging and transport		P
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cell	N/A
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		P

Annex A	Charging and discharging range of secondary lithium ion cells for safe use		P
A.1	General		P
A.2	Safety of lithium ion secondary battery	Complied.	P
A.3	Consideration on charging voltage	Complied.	P
A.3.1	General		P
A.3.2	Upper limit charging voltage	4.4V	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint	4.4V applied.	N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N/A
A.4	Consideration of temperature and charging current		P

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
A.4.1	General		P
A.4.2	Recommended temperature range	Charging temperature declared by client is: 5 ~45°C	P
A.4.2.1	General		N/A
A.4.2.2	Safety consideration when a different recommended temperature range is applied		N/A
A.4.3	High temperature range	Charging high temperature declared by client is 45°C	N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint		N/A
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range	45°C applied.	N/A
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range		N/A
A.4.4	Low temperature range	Charging low temperature declared by client is 5°C	P
A.4.4.1	General		P
A.4.4.2	Explanation of safety viewpoint		P
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	0°C applied.	P
A.4.5	Scope of the application of charging current		P
A.4.6	Consideration of discharge		P
A.4.6.1	General		P
A.4.6.2	Final discharge voltage and explanation of safety viewpoint	Battery specified final discharge voltage 3.0V, not exceed 3.0V specified by cell manufacturer.	P
A.4.6.3	Discharge current and temperature range		P
A.4.6.4	Scope of application of the discharging current		P
A.5	Sample preparation		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P

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Clause	Requirement – Test	Result – Remark	Verdict
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle in cylindrical cell		N/A
A.5.5.1	Insertion of nickel particle in winding core		N/A
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		N/A
A.5.6	Insertion of nickel particle in prismatic cell		P
A.6	Experimental procedure of the forced internal short-circuit test		P
A.6.1	Material and tools for preparation of nickel particle		P
A.6.2	Example of a nickel particle preparation procedure		P
A.6.3	Positioning (or placement) of a nickel particle		P
A.6.4	Damaged separator precaution		P
A.6.5	Caution for rewinding separator and electrode		P
A.6.6	Insulation film for preventing short-circuit		P
A.6.7	Caution when disassembling a cell		P
A.6.8	Protective equipment for safety		P
A.6.9	Caution in the case of fire during disassembling		P
A.6.10	Caution for the disassembling process and pressing the electrode core		P
A.6.11	Recommended specifications for the pressing device		P
Annex B	Recommendations to equipment manufacturers and battery assemblers		N/A
Annex C	Recommendations to the end-users		N/A
Annex D	Measurement of the internal ac resistance for coin cells		N/A
D.1	General	Not coin cells	N/A
D.2	Method		N/A
	A sample size of three coin cells is required for this		N/A

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IEC 62133-2: 2017			
Clause	Requirement – Test	Result – Remark	Verdict
	measurement :		
	Coin cells with an internal resistance of less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N/A
Annex E	Packaging and transport		P
Annex F	Component standards references		N/A

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Table: Critical components information					P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity
-Electrolyte	Zhuhai Guangrui New Material Co., Ltd	CR-ATJ005A	LiPF <sub>6</sub> , DMC, EMC, EC	IEC6213 3-2:2017	Test with cell
-Separator	Shenzhen Zhuolang New Energy Technology Co., Ltd	7+2.5+3*60	PP+PE+PP three layers, Shutdown temperature: 130°C	IEC6213 3-2:2017	Test with cell
-Positive electrode	Shenzhen Walworth Technology Co., Ltd	ZH5000B	LiCoO <sub>2</sub> , Conductive Additive PVDF, Aluminum Foil	IEC6213 3-2:2017	Test with cell
-Negative electrode	Yuanjiang Ducheng New Material Technology Co., Ltd	AG-1	Graphite, Conductive Additive, Copper Foil	IEC6213 3-2:2017	Test with cell
-Positive electrode tab	Dongguan xinjingyuan Electronic Technology Co., Ltd	0.08*5*56*4.5*4.5	Aluminum belt, 5mm*0.08mm	IEC6213 3-2:2017	Test with cell
-Negative electrode tab	Dongguan xinjingyuan Electronic Technology Co., Ltd	0.08*5*56*4.5*4.5	Nickel belt, 5mm*0.08mm	IEC6213 3-2:2017	Test with cell
-Aluminium plastic film	Shenzhen anborui New Material Co., Ltd	0.113μm	Nylon, PP, Aluminum	IEC6213 3-2:2017	Test with cell
Supplementary information:--					

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7.2.1	TABLE: Continuous charging at constant voltage (cells)				P
Sample no.	Recommended charging voltage Vc (Vdc)	Recommended charging current I <sub>rec</sub> (A)	OCV before test (Vdc)	Results	
C01	4.4	0.8	4.393	P	
C02	4.4	0.8	4.393	P	
C03	4.4	0.8	4.393	P	
C04	4.4	0.8	4.393	P	
C05	4.4	0.8	4.393	P	
<b>Supplementary information:</b>					
- No fire or explosion					
- No leakage					

7.3.1	TABLE: External short-circuit (cell)					P
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (°C)	Results	
<b>Samples charged at charging temperature upper limit ( 45°C)</b>						
C06	56.0	4.365	81	107.3	P	
C07	56.0	4.362	85	103.5	P	
C08	56.0	4.363	80	106.7	P	
C09	56.0	4.365	80	105.9	P	
C10	56.0	4.364	83	114.3	P	
<b>Samples charged at charging temperature lower limit ( 0°C)</b>						
C11	56.3	4.261	86	98.5	P	
C12	56.3	4.264	82	98.0	P	
C13	56.3	4.263	81	95.2	P	
C14	56.3	4.263	84	103.9	P	
C15	56.3	4.266	81	103.6	P	
<b>Supplementary information:</b>						
- No fire or explosion						

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7.3.2 TABLE: External short-circuit (battery)						N/A
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (°C)	Component single fault condition	Results
<b>Supplementary information:</b>						
- No fire or explosion						

7.3.5 TABLE: Crush (cells)					P
Sample no.	OCV before test (Vdc)	OCV at removal of crushing force (Vdc)	Maximum force applied to the cell during crush (kN)	Results	
<b>Samples charged at charging temperature upper limit ( 45°C)</b>					
C26	4.359	4.358	13.10	P	
C27	4.362	4.361	13.09	P	
C28	4.358	4.357	13.11	P	
C29	4.365	4.364	13.08	P	
C30	4.360	4.359	13.10	P	
<b>Samples charged at charging temperature lower limit ( 0°C)</b>					
C31	4.261	4.260	13.11	P	
C32	4.259	4.258	13.13	P	
C33	4.262	4.261	13.09	P	
C34	4.264	4.263	13.10	P	
C35	4.261	4.260	13.11	P	
<b>Note:</b>					
<b>Supplementary information:</b>					
- No fire or explosion					

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7.3.6		TABLE: Over-charging of battery			N/A
Constant charging current (A).....:					—
Supply voltage (Vdc).....:					—
Sample no.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results	
<b>Supplementary information:</b>					
- No fire or explosion					

7.3.7		TABLE: Forced discharge (cells)			P
Sample no.	OCV before application of reverse charge (Vdc)	Measured reverse charge I <sub>t</sub> (A)	Lower limit discharge voltage (Vdc)	Results	
C36	3.448	4.0	3.0	P	
C37	3.457	4.0	3.0	P	
C38	3.450	4.0	3.0	P	
C39	3.435	4.0	3.0	P	
C40	3.461	4.0	3.0	P	
<b>Supplementary information:</b>					
- No fire or explosion					

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7.3.8.1	TABLE: Vibration					N/A
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results	
<b>Supplementary information:</b> - No fire or explosion - No rupture - No leakage - No venting						

7.3.8.2	TABLE: Mechanical shock					N/A
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results	
<b>Supplementary information:</b> - No fire or explosion - No rupture - No leakage - No venting						

Declaration: this test report is invalid without special seal for test report. The test results of this test report are only responsible for the tested samples; This report shall not be partially copied without the written permission of urrette testing; The items with "\*" in the report are subcontracted inspection items; The project with "☆" in the report has not obtained qualification recognition or recognition, and is only used for scientific research, teaching or internal quality control; Without the qualification identification mark (CMA), it does not have the function of proving the society; If the client has any objection to the test results, it shall make a complaint or request for retesting within 15 days after receiving the report.

7.3.9	TABLE: Forced internal short circuit (cells)					P
Sample no.	Chamber ambient T (°C)	OCV before test (Vdc)	Particle location <sup>1)</sup>	Maximum applied pressure (N)	Results	
<b>Samples charged at charging temperature upper limit</b>						
C44	45	4.363	1	400	P	
C45	45	4.363	1	400	P	
C46	45	4.365	1	400	P	
C47	45	4.362	1	400	P	
C48	45	4.364	1	400	P	
<b>Samples charged at charging temperature lower limit</b>						
C49	0	4.260	1	400	P	
C50	0	4.266	1	400	P	
C51	0	4.263	1	400	P	
C52	0	4.261	1	400	P	
C53	0	4.262	1	400	P	
<b>Supplementary information:</b>						

D.2	TABLE: Internal AC resistance for coin cells				N/A
Sample no.	Ambient T (°C)	Store time (h)	Resistance Rac (Ω)	Results <sup>1)</sup>	
<b>Supplementary information:</b>					
<sup>1)</sup> Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables					

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### Appendix 1 Photos of product

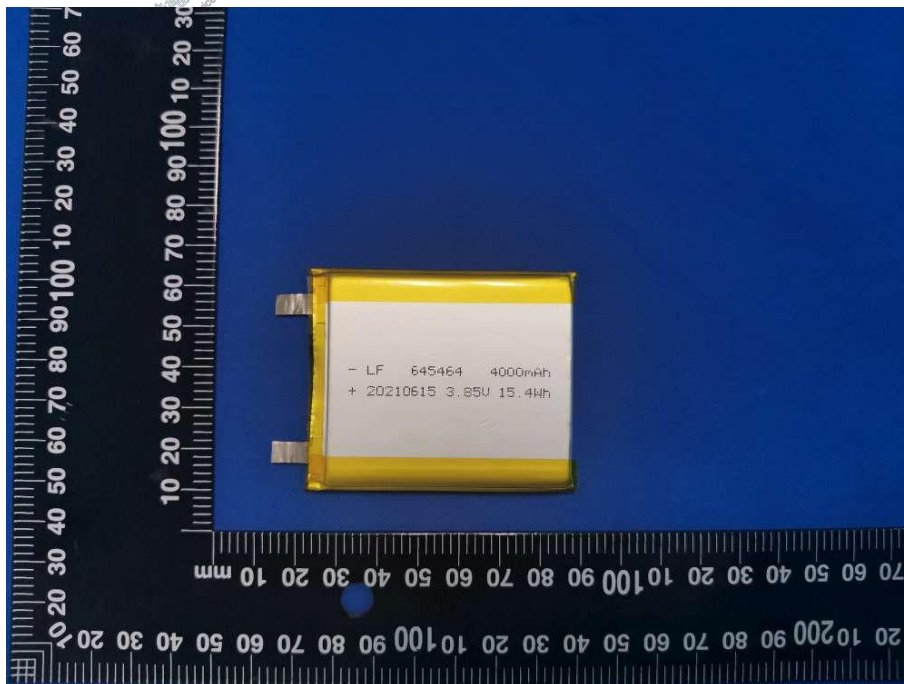


Fig. 1—Front view of Cell

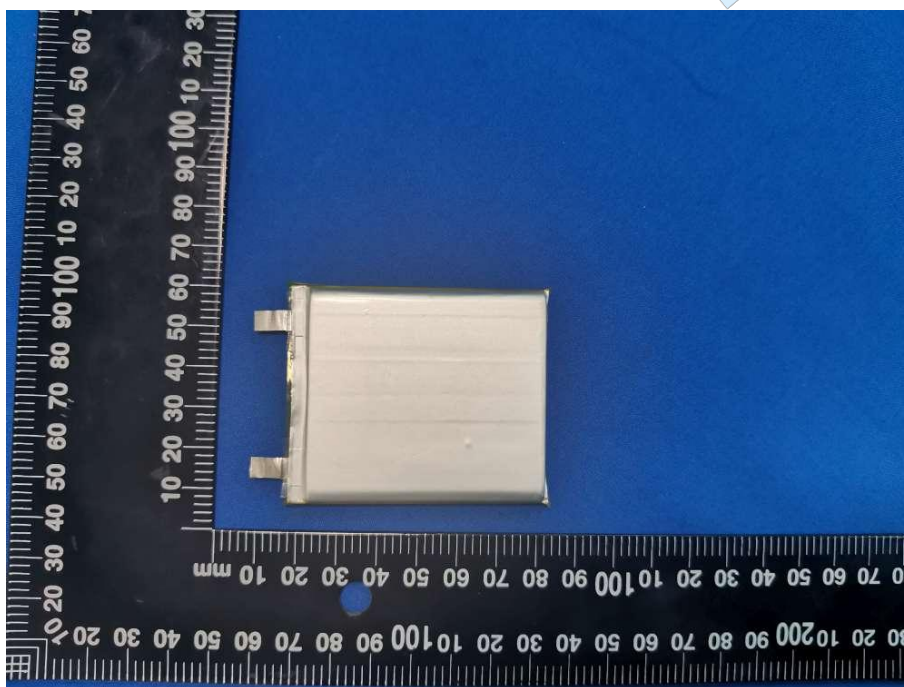


Fig. 2—Back view of Cell

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## Appendix 2

### Test Equipment

No	Name	Model specifications	Device Number	Calibration validity
1	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-01	2022-07-13
2	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-10	2022-07-13
3	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-11	2022-07-13
4	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-12	2022-07-13
5	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-13	2022-07-13
6	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-14	2022-07-13
7	High-performance battery testing system	CT-4008-5V6A-S1	ORT-5V/6A-15	2022-07-13
8	Programmable constant temperature and humidity test chamber	WTH-225-40-OYO	ORTWD225-01	2022-05-27
9	Multimeter	17B+	ORT-WYB-01	2022-07-13
10	DC power supply	IT6723	ORT-DY-01	2022-05-27
11	Temperature controlled External short-circuit testing system	GX-6055-B	ORT-WDL-01-01	2022-07-13
12	Temperature controlled External short-circuit testing system	GX-6055-B	ORT-WDL-01-02	2022-07-13
13	Data acquisition instrument	2635A	ORT-CJY-02	2022-07-13
14	Drop test table	LX-DL-315	ORT-DL-01	2022-03-03
15	Thermal shock tester	GX-3020-B150T	ORT-RCJ-01	2022-07-13
16	Crush / needle tester	GX-5067-BM3T	ORT-JYZC-01	2022-05-27
17	Electromagnetic vibration tester	MPA406/M232A	ORTZD2000-01	2022-01-03
18	Electronic balance	HZK-JA510S	ORT-DZTP-02	2022-07-13
19	Mechanical Shock tester	IS500	ORTCJ-01	2022-03-03

\*\*\* End of Report \*\*\*

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# 材料安全数据表

## Material Safety Data Sheet

本报告本年度有效  
有效期至 2023 年 12 月 31 日

样品名称: 锂离子电芯

Sample name: Lithium ion cell

样品型号: 645464

Sample model:

委托单位: 云南路飞新能源材料有限公司

Applicant: Yunnan Road Fei New Energy Materials  
Co.,Ltd.

签发时间 Date of issue: 2022.12.29 Dec. 29, 2022

Written by 陈伟悦 Approved by 段江涛

深圳天溯计量检测股份有限公司

Shenzhen Tiansu Calibration and Testing Co., Ltd.



\* The MSDS is prepared based on the information provided by client. The contents and formats of this MSDS are revised as per client's request. 这份材料安全数据表是根据客户提供的信息编辑，其内容和格式按客户要求来修订。

## 第一部分-化学品及企业标识

**Section 1-Chemical Product and Company Identification**

产品名称 <b>Product Name</b>	锂离子电芯 Lithium ion cell
型号 <b>Model</b>	645464
商标 <b>Trade Mark</b>	--
额定参数 <b>Ratings</b>	3.85V/4000mAh/15.4Wh
重量 <b>Weight</b>	51.9g
制造商 <b>Manufacturer</b>	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.
制造商地址 <b>Manufacturer Address</b>	云南省保山市腾冲市边境经济开发合作区高新技术产业园1号 NO.1 high tech industrial Park, Tengchong border economic development and cooperation zone ,Baoshan City, yunnan Province
应急电话 <b>Emergency Telephone</b>	0875-5189928
传真 <b>Fax</b>	--

## 第二部分-成分信息

**Section 2- Composition Information**

化学成分 <b>Chemical Composition</b>	化学式 <b>Chemical Formula</b>	CAS号 <b>CAS No.</b>	重量含量 (%) <b>Weight (%)</b>
钴酸锂 Lithium cobaltate	LiCoO <sub>2</sub>	12190-79-3	15 - 40
石墨 Graphite	C	7782-42-5	10 - 30
六氟磷酸锂 Lithium hexafluorophosphate	LiPF <sub>6</sub>	21324-40-3	10 - 30
铜箔 Copper	Cu	7440-50-8	7-13



铝箔 Aluminium	Al	7429-90-5	5-10
镍 Nickel	Ni	7440-02-0	1-5

## 第三部分-危险性概述

**Section 3- Hazards Identification**

紧急情况概述 <b>Emergency overview</b>	不适用 N/A
标签元素 <b>Label elements:</b>	
危险标签图 <b>Hazard pictogram(s)</b>	不适用 Not Applicable
提示语 <b>Signal word</b>	不适用 Not Applicable
危险声明 <b>Hazard statement(s)</b>	不适用 Not Applicable
预防声明 <b>Precautionary statement(s):</b>	
预防 <b>Prevention</b>	不适用 Not Applicable
反应 <b>Response</b>	不适用 Not Applicable
废弃处理 <b>Disposal</b>	不适用 Not Applicable
环境危害 <b>Environmental hazards:</b>	无相关信息 No relevant information
重要症状 <b>Important symptoms:</b>	见第11部分更多信息 See section 11 for more information

## 第四部分-急救措施

**Section 4- First Aid Measures**

眼睛接触 <b>Eye contact</b>	万一接触，立即用大量的清水冲洗至少15分钟，翻起上下眼睑，直到化学的残留物消失为止，迅速就医。 Flush eyes with plenty of water for least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
皮肤接触 <b>Skin contact</b>	万一接触，用大量的水冲洗至少15分钟，同时除去污染的衣物和鞋子，迅速就医。 Remove contaminated clothes and rinse skin with plenty of water or shower for 15 minutes. Get medical aid.
吸入 <b>Inhalation</b>	立即从暴露处移至空气清新处，如果呼吸困难给予输氧，立即就医。 Remove from exposure and move to fresh air immediately. Use oxygen if available.
摄入 <b>Ingestion</b>	饮用两杯牛奶或水，如果当事人仍然清晰可以采取催吐的方法，并且立即就医。 Give at least 2 glasses of milk or water. Induce vomiting unless patient is unconscious. Call a physician.



第五部分-消防措施

**Section 5- Fire Fighting Measures**

燃点 <b>Flash Point</b>	不适用 N/A
自燃温度 <b>Auto-Ignition Temperature</b>	不适用 N/A
灭火介质 <b>Extinguishing Media</b>	水, 二氧化碳 H <sub>2</sub> O, CO <sub>2</sub>
特殊灭火程序 <b>Special Fire-Fighting Procedures</b>	自给式呼吸器 Self-contained breathing apparatus
异常火灾或爆炸 <b>Unusual Fire and Explosion Hazards</b>	当电芯暴露于过热的环境中时, 安全阀可能会打开 Cell may vent when subjected to excessive heat-exposing battery contents
燃烧产生的危险物品 <b>Hazardous Combustion Products</b>	一氧化碳, 二氧化碳, 锂氧化物烟气 Carbon monoxide, carbon dioxide, lithium oxide fumes.

第六部分-泄露应急处理

**Section 6- Accidental Release Measures**

**个人预防措施、保护设备和应急程序:**

如果电池被泄露, 让人员离开该区域直到烟雾消散。提供最大限度的通风, 清除有害气体。首选的反应就是离开这个地区并消散气体, 避免皮肤和眼睛接触或吸入气体。用吸收剂清除溢出的液体然后焚烧。如果电池泄漏发生时, 液体可以用砂、泥土或其他惰性物质来吸收, 污染区域应该保持通风。

**Personal precautions, protective equipment and emergency procedures:**

If the battery is released, remove personnel from area until fumes dissipate. Provide maximum ventilation to clear out hazardous gases. The preferred response is to leave the area and allow the vapors to dissipate, Avoid skin and eyes contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerated. If leakage of the battery happens, liquid could be absorbed by using sand, earth or other inert substance and contaminated area should be ventilated meantime.

**环境预防措施:**

不允许产品到达排水系统或任何水源。  
如果渗透进排水系统或任何水源, 通知相应的部门。  
不允许进入下水道/表面或地下水。

**Environment precautions:**

Do not allow product to reach sewage system or any water source.  
Inform respective authorities in case of seepage into water course or sewage system.  
Do not allow to enter sewers/ surface or ground water.

**抑制和清理材料的方法:**

如果电池外壳被拆除, 少量电解液可能会泄漏。收集所有材料放进一个塑料容器。根据当地的法律法规来处置, 避免可溶物质进入大地、下水道或水源。

**Methods and material for containment and cleaning up:**

If battery casing is dismantled, small amounts of electrolyte may leak. Collect all released material in a plastic



lined container. Dispose off according to the local law and rules, Avoid leached substances to get into the earth, canalization or waters.

### 第七部分-操作处置和储存

## Section 7- Handling and Storage

操作处置 <b>Handling</b>	<p>禁止打开、毁坏或焚烧电池，因为电池有可能在这些处理过程中发生爆炸、破裂或泄露等事故。</p> <p>禁止将电池短路、过充、强制放电或扔入火中。</p> <p>禁止挤压或刺穿电池，或将电池浸入溶液中。</p> <p>The battery should not be opened, destroyed or incinerate, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container.</p> <p>Do not short circuit terminals, or over charge the battery, forced over-discharge, throw to fire.</p> <p>Do not crush or puncture the battery, or immerse in liquids.</p>
储存 <b>Storage</b>	<p>禁止物理或电滥用，禁止高温储存，最好将电池储存在阴凉、干燥、通风及温度变化较小的环境中。</p> <p>禁止将电池接触加热设备，或将电池长时间直接暴露在阳光中。</p> <p>Avoid mechanical or electrical abuse. Storage preferably in cool, dry and ventilated area, which is subject to little temperature change. Storage at high temperatures should be avoided.</p> <p>Do not place the battery near heating equipment, nor expose to direct sunlight for long periods.</p>
其他要注意的防范措施 <b>Other Precautions</b>	<p>拆解、挤压、直接放入火中或高温条件下，电池可能发生爆炸和燃烧。</p> <p>禁止短接或将电池正负极错误的安装在设备中。</p> <p>The battery may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures. Do not short or install with incorrect polarity.</p>

### 第八部分-接触控制和个体防护

## Section 8- Exposure Controls/Personal Protection

设计控制 <b>Engineering Controls</b>	<p>设计局部排气通风或其它设计来控制粉尘、雾、烟雾和气体。</p> <p>Use local exhaust ventilation or other engineering controls to control sources of dust, mist, fumes and vapor.</p> <p>Keep away from heat and open flame. Store in a cool, dry place.</p>
-------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



<p>个人防护装备 <b>Personal Protective Equipment</b></p>	<p>呼吸防护: 在正常情况下不需要。          皮肤和身体防护: 在正常情况下不需要, 如果处理一个裂开的或泄漏的电池需要穿戴适当的防护服和手套。          手保护: 如果处理一个裂开的或泄漏的电池需要戴适当手套。          眼睛保护: 在正常情况下不需要, 如果处理一个裂开的或泄漏的电池需要戴上安全眼镜。  <b>Respiratory Protection:</b> Not necessary under normal conditions.  <b>Skin and body Protection:</b> Not necessary under normal conditions, Wear suitable protective clothing and gloves if handling an open or leaking battery.  <b>Hand protection:</b> Wear suitable gloves if handling an open or leaking battery.  <b>Eye Protection:</b> Not necessary under normal conditions, Wear safety glasses if handling an open or leaking battery.</p>
<p>其它防护装备 <b>Other Protective Equipment</b></p>	<p>在工作区域应该有一个立即可以使用的安全淋浴和喷水洗眼器。  <b>Have a safety shower and eye wash fountain readily available in the immediate work area.</b></p>
<p>卫生措施 <b>Hygiene Measures</b></p>	<p>在工作区域不得进食, 饮水或吸烟。  <b>Do not eat, drink, or smoke in work area. Maintain good housekeeping.</b></p>

第九部分-物理和化学特性

**Section 9- Physical and Chemical Properties**

<p>颜色 <b>Color</b></p>	<p>银色 <b>Silver</b></p>
<p>气味 <b>Odour</b></p>	<p>不适用 <b>Not Applicable</b></p>
<p>酸碱度 <b>pH</b></p>	<p>不适用 <b>Not Applicable</b></p>
<p>熔点/凝固点 <b>Melting point/freezing point</b></p>	<p>不适用 <b>Not Applicable</b></p>
<p>沸点、沸点范围: <b>Boiling Point and Boiling range</b></p>	<p>不适用 <b>Not Applicable</b></p>
<p>易燃度 <b>Flash Point</b></p>	<p>不适用 <b>Not Applicable</b></p>
<p>自燃或爆炸的上、下极限 <b>Upper/lower flammability or explosive limits</b></p>	<p>不适用 <b>Not Applicable</b></p>
<p>蒸汽压 <b>Vapor Pressure</b></p>	<p>不适用 <b>Not Applicable</b></p>



蒸汽密度 <b>Vapor Density</b>	不适用 Not Applicable
相对密度 <b>Relative density</b>	不适用 Not Applicable
水溶性 <b>Solubility in Water</b>	不适用 Not Applicable
自燃温度 <b>Auto-ignition temperature</b>	不适用 Not Applicable
分解温度 <b>Decomposition temperature</b>	不适用 Not Applicable
蒸发速率 <b>Evaporation rate</b>	不适用 Not Applicable
易燃性(土壤、天然气) <b>Flammability (soil, gas)</b>	不适用 Not Applicable
粘性 <b>Viscosity</b>	不适用 Not Applicable
第十部分 稳定性和反应活性 <b>Section 10- Stability and reactivity</b>	
稳定性 <b>Stability</b>	产品在第七部分所述的条件下稳定 The product is stable under conditions described Section 7
应避免的条件 <b>Conditions to Avoid</b>	加热 70°C 以上或焚烧、变形、毁坏、粉碎、拆卸、过充电、短路，长时间暴露在潮湿的条件下。 Heat above 70°C or incinerate. Deform, Mutilate, Crush, Disassemble, Overcharge, Short circuit, Expose over a long period to humid conditions.
不兼容的材料 <b>Incompatible Materials</b>	氧化剂，酸，碱。 Oxidizing agents, acid, base.
危险分解物 <b>Hazardous Decomposition Products</b>	一氧化碳、二氧化碳、氧化锂烟雾。 Carbon monoxide, carbon dioxide, lithium oxide fumes.
危险反应的可能性 <b>Possibility of Hazardous Reaction</b>	不适用 Not Applicable
第十一部分-毒理学资料 <b>Section 11 - Toxicological Information</b>	
刺激	如果电芯的外壳受到机械、热或电的滥用到达一定程度，会发生刺激的风险。



<b>Irritation</b>	如果发生这种情况，可能会刺激皮肤、眼睛和呼吸道。 Risk of irritation occurs only if the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, irritation to the skin, eyes and respiratory tract may occur.
致过敏 <b>Sensitization</b>	不适用 Not Applicable
影响神经系统 <b>Neurological Effects</b>	不适用 Not Applicable
致畸 <b>Teratogenicity</b>	不适用 Not Applicable
再生毒性 <b>Reproductive Toxicity</b>	不适用 Not Applicable
诱变(遗传效应) <b>Mutagenicity (Genetic Effects)</b>	不适用 Not Applicable
附带材料毒理性 <b>Toxicologically Synergistic Materials</b>	不适用 Not Applicable

第十二部分-生态学资料

**Section 12- Ecological Information**

生态毒性 <b>Ecological Toxicity</b>	不适用 Not Applicable
在土壤中的流动性 <b>Mobility in soil</b>	不适用 Not Applicable
持久性和分解性 <b>Persistence and Degradability</b>	不适用 Not Applicable
生物聚积 <b>Bioaccumulation potential</b>	不适用 Not Applicable
其他不利影响 <b>Other Adverse Effects</b>	不适用 Not Applicable

第十三部分-废弃处置





## Section 13- Disposal Considerations

<b>产品废弃处理建议</b> <b>Product disposal recommendation</b>	遵守当地、州和联邦法律和法规。 Observe local, state and federal laws and regulations.
<b>包装处理建议</b> <b>Packaging disposal recommendation</b>	废弃处理必须根据当地法规 Disposal must be made according to official regulations

### 第十四部分-运输信息

## Section 14 - Transport Information

<b>运输标签</b> <b>Label for conveyance</b>	锂电池标签 Lithium Battery Label
<b>UN 编号</b> <b>UN Number</b>	UN 3480 或 UN 3481 UN 3480 or UN 3481
<b>运输风险类别</b> <b>Transport hazard class(es)</b>	9
<b>包装等级</b> <b>Packing group</b>	---
<b>海洋污染物</b> <b>Marine pollutant</b>	无污染 No
<b>联合国运输专用名称</b> <b>UN Proper shipping name</b>	锂离子电池(包括锂离子聚合物电池) Lithium ion Batteries (Including lithium ion polymer batteries) 锂离子电池和设备包装在一起(包括锂离子聚合物电池) Lithium ion Batteries packed with equipment (Including lithium ion polymer batteries) 设备里内含锂离子电池(包括锂离子聚合物电池) Lithium ion Batteries contained in equipments (Including lithium ion polymer batteries)
<b>ICAO/IATA</b>	可根据国际民用航空组织(ICAO), TI 或国际航空协会(IATA) DGR 64 版本包装说明 965 第 IB 节规定或 966~967 第 II 节规定进行空运 Can be shipped by air in accordance with international Civil Aviation Organization (ICAO), TI or International Air Transport Association (IATA) DGR 64 <sup>th</sup> Packing Instructions Section IB of 965 or Section II of 966~967 appropriately.



<b>IMDG CODE</b>	《国际海运危险货物规则》特殊规定 188 IMDG CODE (Amdt 41-22) International Maritime Dangerous Goods Code under Special Provision 188 IMDG CODE (Amdt 41-22)
<b>ADR</b>	《国际危险货物道路运输欧洲协定》(ADR) 根据特殊规定 188 European Agreement concerning the International Carriage of Dangerous Goods by Road under Special Provision 188
<b>RID</b>	《国际危险货物铁路运输欧洲协定》(RID) 根据特殊规定 188 Regulations concerning the International Carriage of Dangerous Goods by Rail under Special Provision 188

危险品规例规定，运输前，每一个电池设计须通过联合国试验和标准手册38.3节所载的测试。

The dangerous goods regulations require that each battery design be subject to tests contained in Section 38.3 of the UN Manual of Tests and Criteria prior to being offered for transport.

第十五部分 法规信息

**Section 15- Regulatory information**

法律信息

Law information

- 《危险物品规则》
- 《Dangerous Goods Regulations》
- 《对危险货物运输的有关规定的建议》
- 《Recommendation on the Transport of Dangerous Goods Model Regulations》
- 《国际海运危险货物规则》
- 《International Maritime Dangerous Goods》
- 《危险品安全运输技术指令》
- 《Technical Instructions for the Safe Transport of Dangerous Goods》
- 《危险货物分类和品名编号》
- 《Classification and code of dangerous Goods》
- 《消费产品安全法》
- 《Consumer Product Safety Act》(CPSA)
- 《联邦环境污染控制法》
- 《Federal Environmental Pollution Control Act》(FEPCA)
- 《资源保护及恢复法案》
- 《Resource Conservation and Recovery Act》(RCRA)
- 《国际危险货物道路运输欧洲协定》
- 《European Agreement concerning the International Carriage of Dangerous》
- 《国际危险货物铁路运输欧洲协定》
- 《Regulations concerning the International Carriage of Dangerous》

根据所有联邦、州和地方法律。

In according with all Federal, State and local laws.



## Section 16- Other Information

上面的信息被认为是准确代表了目前最好的信息提供给我们。然而,飞机没有对商品性能保证或任何其他保证,包括明示或暗示,对这类信息的使用我们不承担责任。用户应作出自己的调查,以确定是否适合其特定用途的信息。虽然在此处所包含的数据的准备已经采取了合理的预防措施,这是仅为你提供提供的信息、考虑和调查。这个化学品安全技术说明书为本产品提供了安全操作指南和使用指南,它并不能对所有可能发生的情况提供建议,因此,您特殊使用该产品应先进进行评估,以确定是否需要额外的预防措施。

The information above is believed to be accurate and represents the best information currently available to us. However, concorde makes no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. This material safety data sheet provides guidelines for the safe handling and use of this product; it does not and cannot advise on all possible situations, therefore, your specific use of this product should be evaluated to determine if additional precautions are required.

-- End of Report --

-- 报告结束 --





中国认可  
国际互认  
检测  
TESTING  
CNAS L5138

# 1. 2m 跌落测试报告

## 1. 2m Drop Test Report

样品名称: 锂离子电芯

Sample name: Lithium ion cell

样品型号: 645464

Sample model:

委托单位: 云南路飞新能源材料有限公司  
Applicant: Yunnan Road Fei New Energy Materials  
Co.,Ltd.



深圳天溯计量检测股份有限公司

Shenzhen Tiansu Calibration and Testing Co., Ltd.



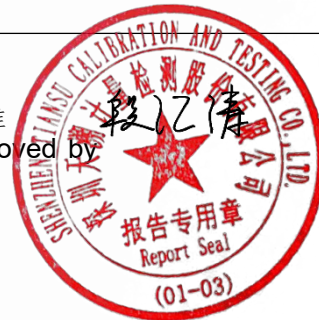
委托单位 Applicant	名称 Name	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.		
	地址 Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province		
制造单位 Manufacturer	名称 Name	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.		
	地址 Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province		
	电话 Phone number	0875-5189928	邮箱 Email address	2411318566@qq.com
	网址 Website	--		
测试实验室 Testing laboratory	名称 Name	深圳天溯计量检测股份有限公司 Shenzhen Tiansu Calibration and Testing Co. , Ltd.		
	地址 Address	深圳市龙岗区宝龙街道锦龙大道 2 号 1 栋、4 栋 B/1,4, NO.2 Jinlong Road, Longgang District, Shenzhen, China		
测试标准 Test Standard	联合国《关于危险货物运输的建议书—规章范本》第 3.3 章节 188 款 ST/SG/AC. 10/1/Rev. 21 Chapter3. 3/Special provisions 188 United nations “recommendations on the TRANSPORT OF DANGEROUS GOODS” model Regulations (21 Rev. Edition) Chapter3. 3/Special provisions 188.			
测试日期 Test date	2022.12.14 to 2022.12.16			
Test conclusion: 检测结论: 由 云南路飞新能源材料有限公司送检的锂离子电芯 的包装件 1.2m 跌落测试依据《关于危险货物运输的建议书》规章范本第 21 修订版进行检测。试验结果符合《关于危险货物运输的建议书》规章范本第 21 修订版相关要求。 The 1.2m drop test of the packages for Lithium ion cell submitted by Yunnan Road Fei New Energy Materials Co.,Ltd. is tested according to the 21st Revised Edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC. 10/1/Rev. 21). 签发日期 Date of issue: 2022.12.16				

 主检  
Tested by



 审核  
Reviewed by



 批准  
Approved by


**一、基本信息 Basic information**

样品名称 Sample name	锂离子电芯 Lithium ion cell	样品型号 Sample model	645464
标称电压 Nominal voltage	3.85V	额定能量 Ratings energy	15.4Wh
内含数量 Number	189 PCS	商标 Trade mark	--
包装件重量 Packaging weight	10.9kg	包装件尺寸 Packaging dimensions	L*W*T(365mm*270mm*160 mm)
外包装 Outer packing	瓦楞纸 Corrugated paper	内包装 Inside packing	塑料 Plastics
包装方式 Type of packing	单独运输电池 Cells or batteries only		
每包装件电池净重 Net quantity of batteries per package	9.809kg		

**二、1.2米跌落测试 1.2m drop test**

No. 序号	Test item 试验项目	Test method 试验依据	Result 结果	Remark 备注
1	1.2米跌落测试 1.2m drop test	联合国《关于危险货物运输的建议书—规章范本》第3.3 章节188款ST/SG/AC. 10/1/Rev. 21 Chapter3.3/Special provisions 188 United nations “recommendations on the TRANSPORT OF DANGEROUS GOODS” model Regulations (21 Rev. Edition) Chapter3.3/Special provisions 188.	合格 Pass	--

Drop position 跌落方向:

Drop position 跌落方向	Top 上面	Front 前面	Side 侧面	Edge 棱	Angle 角
Status 包装状态	合格/Pass	合格/Pass	合格/Pass	合格/Pass	合格/Pass

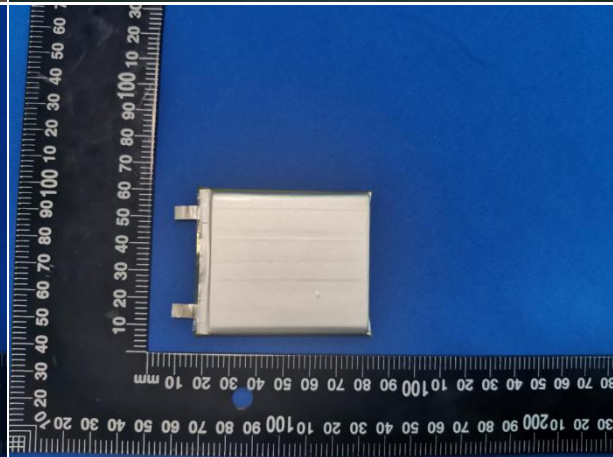
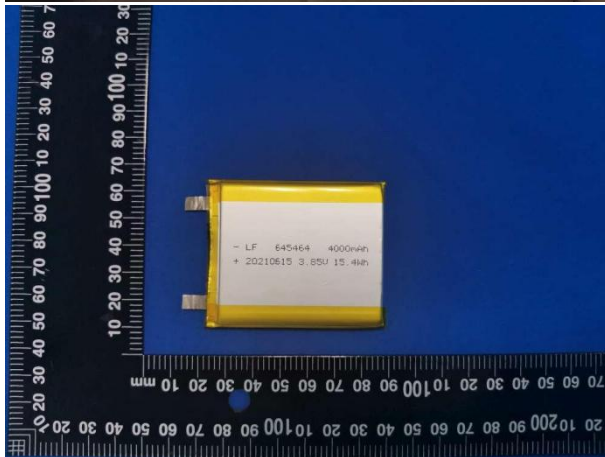
**三、测试要求描述 Testing requirements description:**

每个电芯或电池的包装件或者完全包装件必须能承受 1.2 米跌落测试，每个包装件进行 5 次不同方向的跌落测试，而不造成包含在其中的电池或电芯的损坏，不造成使电池与电池（电芯与电芯）接触的内含物的移动和内含物的释出。

The package of batteries is dropped from 1.2m 5 times per package. Each package is capable of withstanding a 1.2m drop test in any orientation without damage to cells or batteries contained therein, without shifting of the content so as to allow battery to battery (cell to cell) contact and without release of contents.



THE PHOTO OF SAMPLE 样品图片



## 声 明 STATEMENTS

1. 本报告无检测单位印章无效。  
The test report is invalid without the official stamp of Tiansu.
2. 除非全部复制，否则无深圳天溯计量检测股份有限公司书面批准本报告不得部分复制。  
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This report is invalid without the signature of the approver, reviewer, and tester.
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The report is invalid when anything of following happens - illegal transfer, reproduce, embezzlement, imposture, modification or tampering in any media form.
5. 本报告仅与送检样品有关。  
The test report is valid for the tested samples only.
6. 样品信息和客户信息由申请人提供，本实验室不对其真实性负责。  
Product information and customer information provided by the applicant, we are not responsible for its authenticity.
7. 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 Tiansu within 15 days.

-----报告结束-----

-- End of report --







中国认可  
国际互认  
检测  
TESTING  
CNAS L5138

# 堆码试验报告

## Stacking test Report

样品名称: 锂离子电芯

Sample name: Lithium ion cell

样品型号: 645464

Sample model:

委托单位: 云南路飞新能源材料有限公司  
Applicant: Yunnan Road Fei New Energy Materials  
Co.,Ltd.



Shenzhen Tiansu Calibration and Testing Co., Ltd.



委托单位 Applicant	名称 Name	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.
	地址 Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province
包装件 制造单位 Manufacturer	名称 Name	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.
	地址 Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province
包装容器 制造商 Manufacturer of packing containers	名称 Name	开平市开隆纸品包装有限公司 Kaiping Kailong Paper Packaging Co., LTD
	地址 Address	开平市水口镇新风开发区长安西街 6-8 号 No.6-8, West Chang 'an Street, Xinfeng Development Zone, Shuikou Town, Kaiping City
测试实验室 Testing laboratory	名称 Name	深圳天溯计量检测股份有限公司 Shenzhen Tiansu Calibration and Testing Co., Ltd.
	地址 Address	深圳市龙岗区宝龙街道锦龙大道 2 号 1 栋、4 栋 B/1,4, NO.2 Jinlong Road, Longgang District, Shenzhen, China
测试标准 Test Standard	联合国《关于危险货物运输的建议书》规章范本 UN/ST/SG/AC.10/1/Rev.22/6.1.5.6 条款。 Test standard: 22st Revised Edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC.10/1/Rev.22) Clause 6.1.5.6.	
测试日期 Test date	2022.12.14 to 2022.12.17	
<p>Test conclusion: 检测结论: 由 云南路飞新能源材料有限公司送检的锂离子电芯 的包装件堆码测试依据《关于危险货物运输的建议书》规章范本第 22 修订版进行检测。试验结果符合《关于危险货物运输的建议书》规章范本第 22 修订版相关要求。 The Stacking test of the packages for Lithium ion cell submitted by Yunnan Road Fei New Energy Materials Co.,Ltd. is tested according to the 22st Revised Edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC.10/1/Rev.22).</p> <p style="text-align: right;">签发日期 Date of issue: 2022.12.17</p>		

主检  
Tested by

陈伟悦

审核  
Reviewed by

邱伟超

批准  
Approved by



一、基本信息 Basic information

包装件信息 Information about the package	外包装材料 Outer packing materials	瓦楞纸 Corrugated paper	内包装材料 Inside packing materials	塑料 Plastics
	封闭装置 Closures	胶封	最大容量 Maximum capacity	189PCS
	包装件尺寸 Packaging dimensions	L*W*T(365mm*270mm*160mm)	包装件重量 Packaging weight	10.9kg
	制造方法 method of manufacture	/	每包装件电池净重 Net quantity of batteries per package	9.809kg
内部电池信息 Information about the battery inside	样品名称 Sample name	锂离子电芯 Lithium ion cell	样品型号 Sample model	645464
	标称电压 Nominal voltage	3.85V	额定能量 Ratings energy	15.4Wh
	尺寸 Dimension	L*W*T(65.0mm*55.0mm*6.5mm)	重量 Weight	51.9g

二、堆码测试 Stacking test

No. 序号	Test item 试验项目	Test method 试验依据	Result 结果	Remark 备注
1	堆码测试 Stacking test	联合国《关于危险货物运输的建议书》规章范本 UN/ST/SG/AC.10/1/Rev.22/6.1.5.6条款. Test standard: 22st Revised Edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC.10/1/Rev.22) Clause 6.1.5.6.	Pass 合格	--

测试时的温度	测试时的湿度	加载的负荷
21.8℃	51%RH	1922.8N



### 三、测试要求描述 Testing requirements description:

在试验样品的顶部表面施加一力量，此力相当于运输时可能堆叠在它上面的同样数量包装件的总重量。如果试验样品内装的液体相对密度与待运液体不同，则该力应按后者计算。包括试验样品在内的最小堆码高度应是 3 米。试验时间为 24 小时，但拟装的塑料桶、罐和复合包装 6HH1 和 6HH2，应在不低于 40℃ 的温度下经受 28 天的堆码试验。

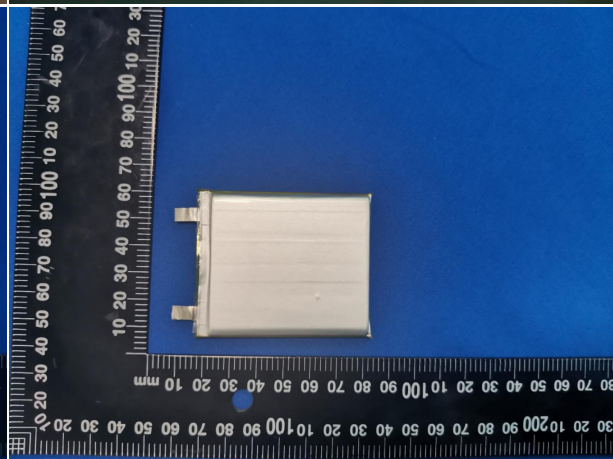
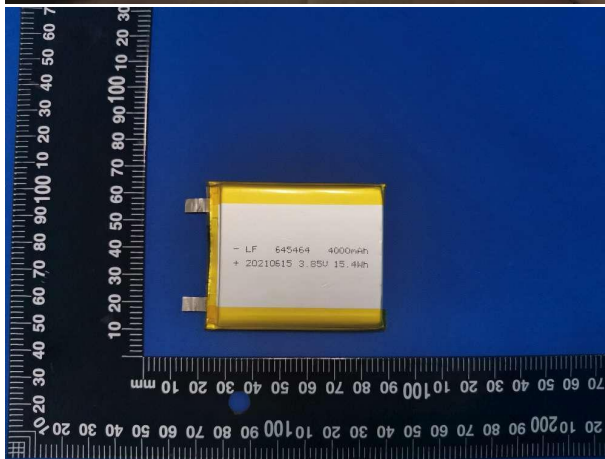
The test sample shall be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during transport; Where the contents of the test sample are liquids with relative density different from that of the liquid to be transported, the force shall be calculated in relation to the latter. The minimum height of the stack including the test sample shall be 3 meters. The duration of the test shall be 24 hours except that plastics drums, jerricans, and composite packagings 6HH1 and 6HH2 intended for liquids shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40°C.

试验样品不得泄漏。对复合或组合包装而言，不得有所装的物质从内贮器和内包装中漏出。试验样品不得显出可能对运输安全有不利影响的损坏，或者可能降低其强度或造成包装件堆码不稳定的变形。在进行评估之前，塑料包装应该冷却至环境温度。

No test sample may leak. In composite packagings or combination packagings, there shall be no leakage of the filling substance from the inner receptacle or inner packaging. No test sample may show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages. Plastics packagings shall be cooled to ambient temperature before the assessment.



THE PHOTO OF SAMPLE 样品图片



## 声 明

# STATEMENTS

1. 本报告无检测单位印章无效。  
The test report is invalid without the official stamp of Tiansu.
2. 除非全部复制，否则无深圳天溯计量检测股份有限公司书面批准本报告不得部分复制。  
This report shall not be copied partly without the written approval of Shenzhen Tiansu Calibration and Testing Co., Ltd.
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This report is invalid without the signature of the approver, reviewer, and tester.
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The report is invalid when anything of following happens – illegal transfer, reproduce, embezzlement, imposture, modification or tampering in any media form.
5. 本报告仅与送检样品有关。  
The test report is valid for the tested samples only.
6. 样品信息和客户信息由申请人提供，本实验室不对其真实性负责。  
Product information and customer information provided by the applicant, we are not responsible for its authenticity.
7. 准备提交运输的包装已按照本章的有关要求进行试验,使用其他打包方法或部件可能使其失效。  
The packaging prepared as for transport was tested in accordance with the appropriate requirements of this Chapter and that the use of other packaging methods or components may render it invalid.
8. 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 Tiansu within 15 days.

----- 报告结束 -----  
-- End of report --



锂电池

符合特殊规定 188

## 海运运输条件鉴别报告书

Identification and Classification Report for Sea Transport of Goods

本报告本年度有效  
有效期至 2023 年 12 月 31 日

样品名称: 锂离子电芯

Sample name: Lithium ion cell

样品型号: 645464

Sample model:

委托单位: 云南路飞新能源材料有限公司

Applicant: Yunnan Road Fei New Energy Materials  
Co.,Ltd.

深圳天溯计量检测股份有限公司

Shenzhen Tiansu Calibration and Testing Co., Ltd.



鉴别目的 Identification Purpose	是否属于海运危险品 Dangerous Goods or not restricted	鉴别日期 Identification Date	2022.12.29 Dec. 29, 2022
鉴别依据 Identification Criteria	IMDG CODE (Amdt 41-22)		
委托单位 Client	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.		
地址 Client Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province		
制造商 Manufacturer	云南路飞新能源材料有限公司 Yunnan Road Fei New Energy Materials Co.,Ltd.		
地址 Manufacturer Address	云南省保山市腾冲市边境经济开发合作区高新技术产业园 1 号 NO.1 high tech industrial Park,Tengchong border economic development and cooperation zone ,Baoshan City,yunnan Province		
物品名称 Name of Goods	锂离子电芯 Lithium ion cell		
物品信息 Nature of the goods	型号规格: Model/Type	645464/3.85V/15.4Wh	
	尺寸 Dimensions	65.0mm*55.0mm*6.5mm	
	外观 Appearance	近长方体 Approximate Cuboid	
	每包装件电池/电芯数目 Net number of batteries/cell per package	189 PCS	
	UN38.3 报告编号 UN38.3 report No.	ORTSZB01210601025	
	1.2m 跌落测试报告为 1.2m drop test report No.	TSZ22120267-P03-R03	
鉴别结论 Conclusion	非限制性 Not subject these Regulations 根据特殊规定 188, 该物品不受 IMDG CODE 限制。 The article is not restricted to IMDG CODE according to special provision 188		
备注 Comment	每一电池必须做好防短路措施, 并装入坚固外包装内。 Each single battery must be packed in such a way as to prevent short circuits normal conditions and packed in strong outer packaging.		

 主检  
Tested by



 审核  
Reviewed by



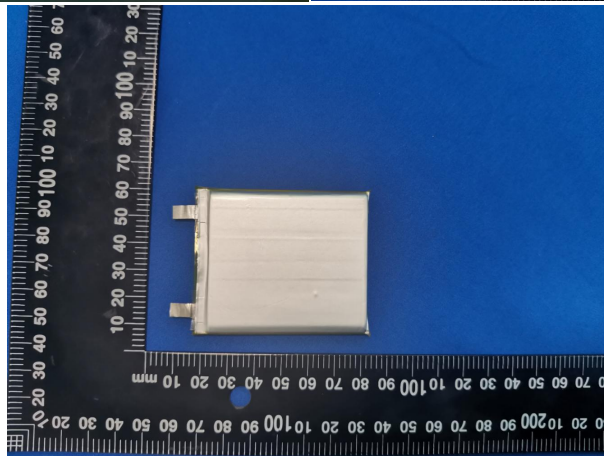
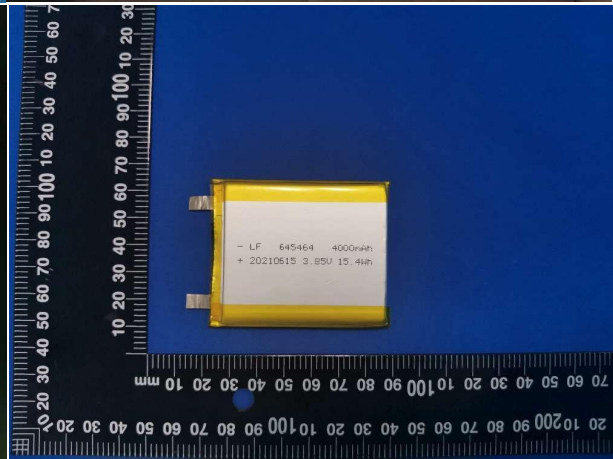
 批准  
Approved by




鉴别项目名称 Item	检查结果 Inspection Result
该电池额定瓦特小时数为 15.4Wh Watt-hour rating of the battery is 15.4Wh	$\leq 20$ Wh
该电池已通过 UN38.3 测试 Each battery is of a type proved to meet the Requirements of each test in the UN MANUAL OF TESTING AND CRITERIA, Part III, sub-section 38.3	符合 Conform
电池按照规定的质量管理体系进行制造 Batteries be manufactured under a quality management programmer.	符合 Conform
该锂电池不属于召回电池，不属于废弃和回收电池 The lithium batteries don't belong to batteries returned to the manufacturer for safety reasons, are not waste lithium batteries and not lithium cells being shipped for recycling or disposal.	符合 Conform
通过包装件 1.2 米跌落试验 Each package is capable of withstanding a 1.2m drop test in any orientation	符合 Conform
每个包装件上均有锂电池操作标签。 每票货物均有随附文件说明: 包装件内装锂离子电池; 必须小心操作。如包装件破损, 有易燃危险品; 包装件破损时应采取的特殊措施, 包括必要时的检查和重新包装; 应急电话号码。 Each package is labeled with lithium battery handing label. Each consignment is accompanied with a document with an indication that: The package contains lithium ion batteries; The package must be handled with care, and that a flammability hazard exists if the package is damaged; Special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and A telephone number for additional information	符合 Conform



THE PHOTO OF SAMPLE 样品图片



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-- End of report --



EMC TEST REPORT

For

Shenzhen yanbu technology co. LTD

Magnetic absorption wireless charging mobile power supply

Test Model: E29B

Additional Model No.: E29A



中国认可  
国际互认  
检测  
TESTING  
CNAS L4595

Prepared for : Shenzhen yanbu technology co. LTD  
Address : 6 / f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.  
Address : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao' an District, Shenzhen, Guangdong, China

Tel : (+86)755-82591330  
Fax : (+86)755-82591332  
Web : www.LCS-cert.com  
Mail : webmaster@LCS-cert.com

Date of receipt of test sample : March 11, 2021  
Number of tested samples : 1  
Serial number : Prototype  
Date of Test : March 11, 2021~ March 16, 2021  
Date of Report : March 17, 2021

**EMC TEST REPORT****EN 55032: 2015+A11: 2020**

Electromagnetic compatibility of multimedia equipment - Emission Requirements

**EN 55035: 2017+A11: 2020**

Electromagnetic compatibility of multimedia equipment – Immunity requirements

**Report Reference No. .... : LCS210310062AE**

Date of Issue..... : March 17, 2021

**Testing Laboratory Name..... : Shenzhen LCS Compliance Testing Laboratory Ltd.**

Address ..... : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao' an District, Shenzhen, Guangdong, China

Testing Location/ Procedure... : Full application of Harmonised standards ■  
Partial application of Harmonised standards □  
Other standard testing method □**Applicant's Name..... : Shenzhen yanbu technology co. LTD**

Address ..... : 6 / f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

**Test Specification**Standard ..... : EN 55032: 2015+A11: 2020  
EN 55035: 2017+A11: 2020  
EN IEC 61000-3-2: 2019  
EN 61000-3-3: 2013+A1: 2019

Test Report Form No. .... : LCSEMC-1.0

TRF Originator ..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF ..... : Dated 2011-03

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**Test Item Description. .... : Magnetic absorption wireless charging mobile power supply**

Trade Mark ..... : N/A

Test Model ..... : E29B

Ratings ..... : Please Refer to Page 9

**Result ..... : Positive****Compiled by:**

Cindy Nie

**Supervised by:**

Tom Wang



Cindy Nie/ File administrators

Tom Wang / Technique principal

Gavin Liang/ Manager

**EMC -- TEST REPORT****Test Report No. : LCS210310062AE**March 17, 2021

Date of issue

**Test Model..... : E29B**

EUT..... : Magnetic absorption wireless charging mobile power supply

**Applicant..... : Shenzhen yanbu technology co. LTD**

Address..... : 6 / f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

Telephone..... : /

Fax..... : /

**Manufacturer..... : Shenzhen weiduli technology co., LTD**

Address..... : 6 / f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

Telephone..... : /

Fax..... : /

**Factory..... : Shenzhen weiduli technology co., LTD**

Address..... : 6 / f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

Telephone..... : /

Fax..... : /

**Test Result****Positive**

The test report merely corresponds to the test sample.  
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

### Revision History

Revision	Issue Date	Revisions	Revised By
000	March 17, 2021	Initial Issue	Gavin Liang

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## 1. TEST STANDARDS

The tests were performed according to following standards:

EN 55032: 2015+A11: 2020 Electromagnetic compatibility of multimedia equipment - Emission Requirements

EN 55035: 2017+A11: 2020 Electromagnetic compatibility of multimedia equipment – Immunity characteristics

EN IEC 61000-3-2: 2019 Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)

EN 61000-3-3: 2013+A1: 2019 Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current  $\leq 16$  A per phase and not subject to conditional connection

## 2.SUMMARY OF STANDARDS AND RESULTS

### 2.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

<b>Emission (EN 55032: 2015+A11: 2020)</b>			
<b>Description of Test Item</b>	<b>Standard</b>	<b>Limits</b>	<b>Results</b>
Conducted disturbance at mains terminals	EN 55032: 2015+A11: 2020	Class B	PASS
Conducted disturbance at telecommunication port	EN 55032: 2015+A11: 2020	Class B	N/A
Radiated disturbance	EN 55032: 2015+A11: 2020	Class B	PASS
Harmonic current emissions	EN IEC 61000-3-2: 2019	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3: 2013+A1: 2019	-----	PASS
<b>Immunity (EN 55035: 2017+A11: 2020)</b>			
<b>Description of Test Item</b>	<b>Basic Standard</b>	<b>Performance Criteria</b>	<b>Results</b>
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Radio-frequency, Continuous radiated disturbance	EN 61000-4-3: 2006+A2: 2010	A	PASS
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	PASS
Surge (Input a.c. power ports)	EN 61000-4-5: 2014+A1: 2017	B	PASS
Surge (Telecommunication ports)		B	N/A
Radio-frequency, Continuous conducted disturbance	EN 61000-4-6: 2014	A	PASS
Power frequency magnetic field	EN 61000-4-8: 2010	A	PASS
Voltage dips, >95% reduction	EN 61000-4-11: 2004+A1: 2017	B	PASS
Voltage dips, 30% reduction		C	PASS
Voltage interruptions		C	PASS

\*\*\*Note: N/A is an abbreviation for Not Applicable.

<b>Test mode:</b>		
Mode 1	Charging	Record
Mode 2	Discharging	Pre-scan
***Note: All test modes were tested, but we only recorded the worst case in this report.		

## 2.2. Description of Performance Criteria

### General Performance Criteria

Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

- essential operational modes and states;

#### 2.2.1. Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacture when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

#### 2.2.2. Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacture, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operation state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

#### 2.2.3. Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacture's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

### 3. GENERAL INFORMATION

#### 3.1. Description of Device (EUT)

EUT : Magnetic absorption wireless charging mobile power supply

Trade Mark : N/A

Test Model : E29B

Additional Model : E29A

Model Declaration : PCB board, structure and internal of these model(s) are the same, So no additional models were tested.

Power Supply : Input: Type C: 9V $\overline{=}$ 2.25A  
Output: Type C: 9V $\overline{=}$ 2.25A  
PD-QC: 20W  
Wireless charging output: 15W

Highest internal frequency (F <sub>x</sub> )	Highest measured frequency
F <sub>x</sub> ≤ 108 MHz 108 MHz < F <sub>x</sub> ≤ 500 MHz 500 MHz < F <sub>x</sub> ≤ 1 GHz F <sub>x</sub> > 1 GHz	1 GHz 2 GHz 5 GHz 5 × F <sub>x</sub> up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, F <sub>x</sub> is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies. Where F <sub>x</sub> is unknown, the radiated emission measurements shall be performed up to 6 GHz	

#### 3.2. Description of Support Device

Name	Manufacturers	M/N	S/N
/	/	/	/

#### 3.3. Description of Test Facility

Site Description  
EMC Lab. : NVLAP Accreditation Code is 600167-0.  
FCC Designation Number is CN5024.  
CAB identifier is CN0071.  
CNAS Registration Number is L4595.

### 3.4. Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

### 3.5. Measurement Uncertainty

Test	Parameters	Expanded uncertainty ( $U_{lab}$ )	Expanded uncertainty ( $U_{cispr}$ )
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	$\pm 2.63$ dB $\pm 2.35$ dB	$\pm 3.8$ dB $\pm 3.4$ dB
Power Disturbance	Level accuracy (30MHz to 300MHz)	$\pm 2.90$ dB	$\pm 4.5$ dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	$\pm 3.60$ dB	$\pm 3.3$ dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	$\pm 3.68$ dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	$\pm 3.48$ dB	$\pm 5.3$ dB
Radiated Emission	Level accuracy (above 1000MHz)	$\pm 3.90$ dB	$\pm 5.2$ dB
Mains Harmonic	Voltage	$\pm 0.510\%$	N/A
Voltage Fluctuations & Flicker	Voltage	$\pm 0.510\%$	N/A
EMF	/	$\pm 21.59\%$	N/A

1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

## 4. MEASURING DEVICES AND TEST EQUIPMENT

### LINE CONDUCTED EMISSION

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	EZ	EZ-EMC	/	N/A	N/A
2	EMI Test Receiver	R&S	ESPI	101840	2020-06-22	2021-06-21
3	Artificial Mains	R&S	ENV216	101288	2020-06-22	2021-06-21
4	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-003 2	2020-06-22	2021-06-21
5	Impedance Stabilization Network	TESEQ	ISN T800	45130	2020-10-20	2021-10-19

### RADIATED DISTURBANCE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	E3	E3-EMC	/	N/A	N/A
2	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2021-07-25
3	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2021-07-01
4	EMI Test Receiver	R&S	ESR 7	101181	2020-06-22	2021-06-21
5	Broadband Preamplifier	/	BP-01M18G	P190501	2020-06-22	2021-06-21

### VOLTAGE FLUCTUATION AND FLICKER/HARMONIC CURRENT EMISSIONS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Analyzer Test System	Voltech	PM6000	200006700523	2020-06-22	2021-06-21

### ELECTROSTATIC DISCHARGE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESD Simulator	SCHLODER	SESD 230	604035	2020-07-21	2021-07-20

### RF ELECTROMAGNETIC FIELD

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESG Vector Signal Generator	Agilent	E4438C	MY42081396	2020-11-21	2021-11-20
2	RF POWER AMPLIFIER	OPHIR	5225R	1052	NCR	NCR
3	RF POWER AMPLIFIER	OPHIR	5273F	1019	NCR	NCR
4	Stacked Broadband Log Periodic Antenna	SCHWARZBEC K	STLP 9128	9128ES-145	NCR	NCR
5	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBEC K	STLP 9149	9149-484	NCR	NCR
6	Electric field probe	Narda S.TS./PMM	EP601	611WX80208	2020-03-26	2021-03-25

### ELECTRICAL FAST TRANSIENT IMMUNITY

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2020-06-22	2021-06-21

### SURGES, LINE TO LINE AND LINE TO GROUND

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2020-06-22	2021-06-21

### RF COMMON MODE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Simulator	FRANKONIA	CIT-10/75	A126A1195	2020-06-22	2021-06-21
2	CDN	FRANKONIA	CDN-M2+M3	A2210177	2020-06-22	2021-06-21
3	6dB Attenuator	FRANKONIA	DAM25W	1172040	2020-06-22	2021-06-21

## MAGNETIC FIELD SUSCEPTIBILITY TEST

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power frequency mag-field generator System	EVERFINE	EMS61000-8K	906003	2020-06-22	2021-06-21

## VOLTAGE DIPS/INTERRUPTIONS IMMUNITY TEST

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2020-06-22	2021-06-21

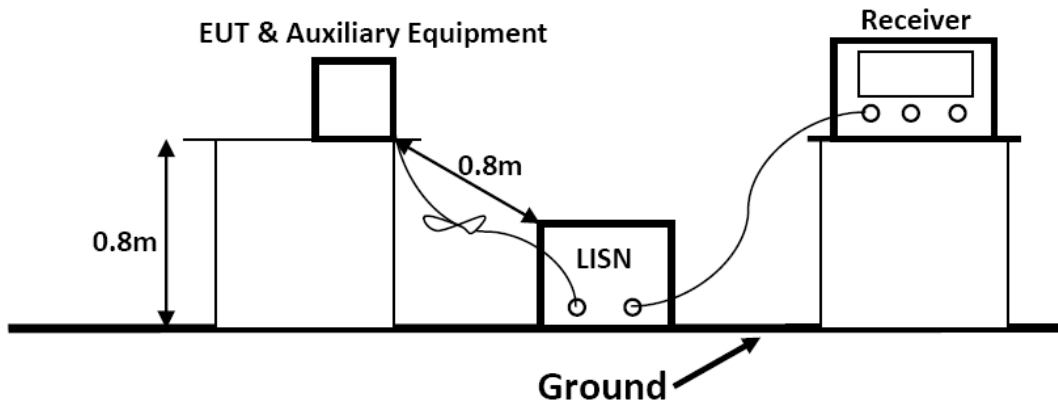
Note: All equipment is calibrated through CHINA CEPREI LABORATORY and GUANGZHOU LISAI CALIBRATION AND TEST CO., LTD.

NCR --- No calibration requirement.

## 5. TEST RESULTS

### 5.1. POWER LINE CONDUCTED EMISSION MEASUREMENT

#### 5.1.1. Block Diagram of Test Setup



#### 5.1.2. Test Standard

EN 55032: 2015+A11: 2020 Class B

Power Line Conducted Emission Limits (Class B)		
Frequency (MHz)	Limit (dB $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

NOTE1-The lower limit shall apply at the transition frequencies.  
NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

#### 5.1.3. EUT Configuration on Test

The following equipments are installed on Power Line Conducted Emission Measurement to meet the EN 55032 requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

#### 5.1.4. Operating Condition of EUT

5.1.4.1. Setup the EUT as shown on Section 5.1.1

5.1.4.2. Turn on the power of all equipments.

5.1.4.3. Let the EUT work in measuring mode(1) and measure it.



### 5.1.5. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided 50-ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55032 regulations during conducted emission measurement.

The bandwidth of the field strength meter is set at 9kHz in 150kHz~30MHz.

The frequency range from 150kHz to 30MHz is investigated.

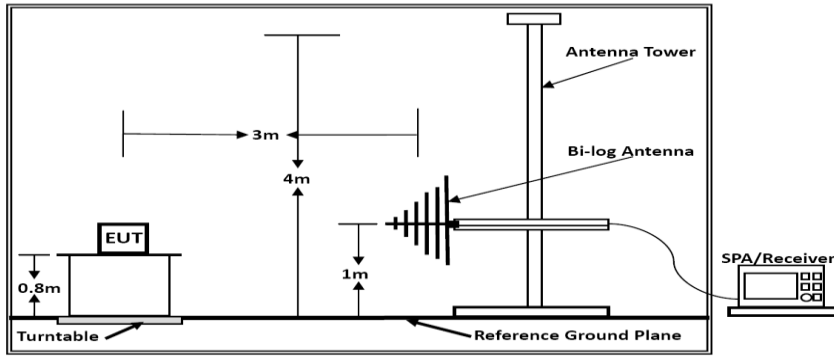
### 5.1.6. Test Results

**PASS.**

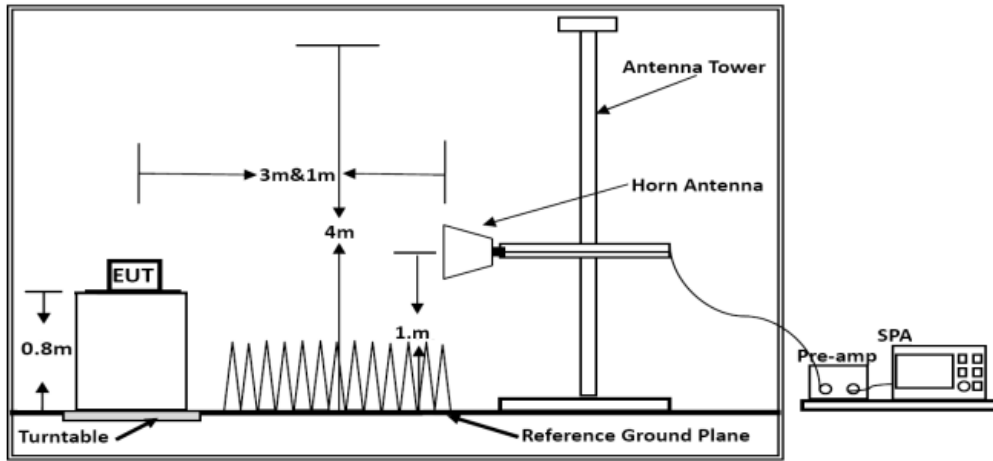
Refer to attached Annex B.1

## 5.2. RADIATED EMISSION MEASUREMENT

### 5.2.1. Block Diagram of Test Setup



Below 1GHz



Above 1GHz

### 5.2.2. Test Standard

EN 55032: 2015+A11: 2020 Class B

All emanations from a class B device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

Limits for Radiated Emission Below 1GHz			
Frequency (MHz)	Distance (Meters)	Field Strengths Limit (dB $\mu$ V/m)	
30 ~ 230	3	40	
230 ~ 1000	3	47	
***Note: (1) The smaller limit shall apply at the combination point between two frequency bands. (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.			
Limits for Radiated Emission Above 1GHz			
Frequency (MHz)	Distance (Meters)	Peak Limit (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)
1000 ~ 3000	3	70	50
3000 ~ 6000	3	74	54
***Note: The lower limit applies at the transition frequency.			

### 5.2.3. EUT Configuration on Test

The EN 55032 regulations test method must be used to find the maximum emission during radiated emission measurement.

### 5.2.4. Operating Condition of EUT

5.2.4.1. Turn on the power.

5.2.4.2. Let the EUT work in the test mode(1) and measure it.

### 5.2.5. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. By-log antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the EMI test receiver is set at RBW/VBW=120kHz/300kHz.

The frequency range from 30MHz to 1000MHz is checked.

The bandwidth of the Spectrum analyzer is set at RBW/VBW=1MHz/3MHz.

The frequency range from 1GHz to the frequency which about 5th carrier harmonic or 6GHz is checked.

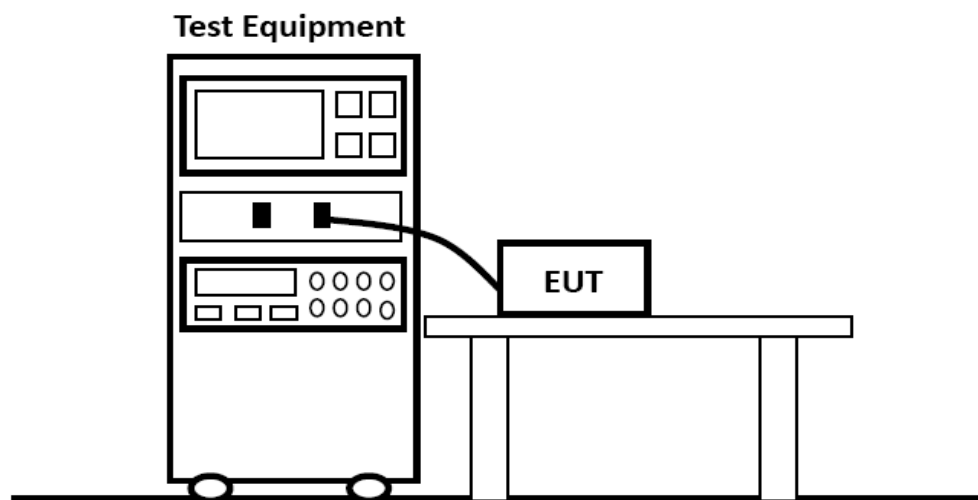
### 5.2.6. Test Results

**PASS.**

Refer to attached Annex B.2

### 5.3. HARMONIC CURRENT EMISSION MEASUREMENT

#### 5.3.1. Block Diagram of Test Setup



#### 5.3.2. Test Standard

EN IEC 61000-3-2: 2019

#### 5.3.3. Operating Condition of EUT

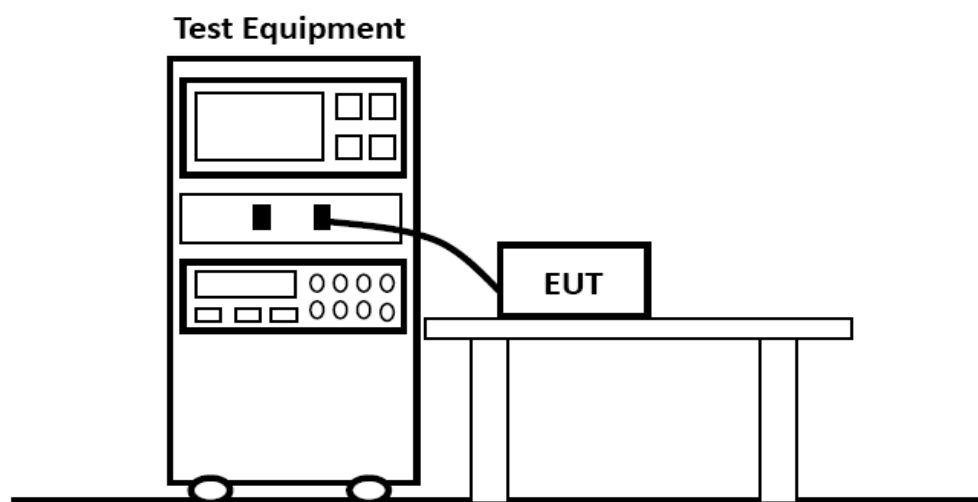
Same as Section 5.2.4, except the test setup replaced as Section 5.3.1.

#### 5.3.4. Test Results

Refer to attached Annex B.3

## 5.4. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

### 5.4.1. Block Diagram of Test Setup



### 5.4.2. Test Standard

EN 61000-3-3: 2013+A1: 2019

### 5.4.3. Operating Condition of EUT

Same as Section 5.2.4, except the test setup replaced as Section 5.4.1.

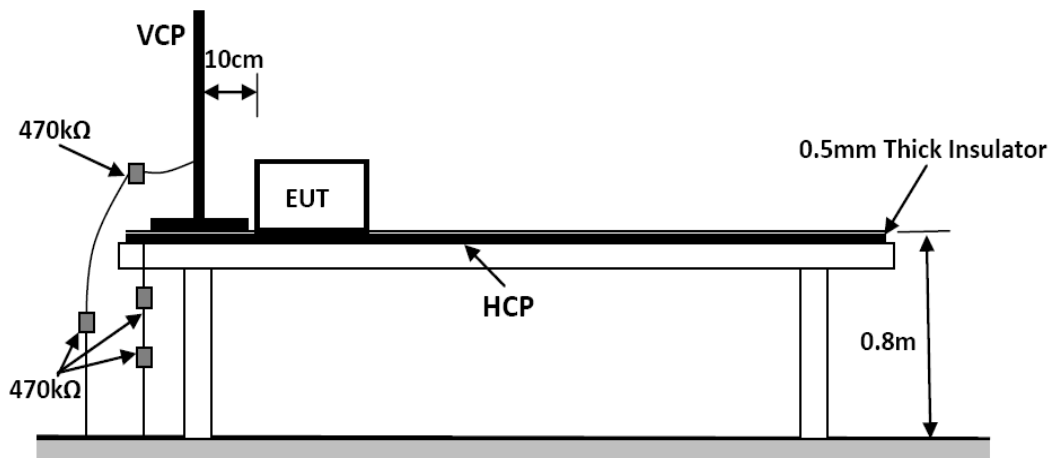
### 5.4.4. Test Results

**PASS.**

Refer to attached Annex B.4

## 5.5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

### 5.5.1. Block Diagram of Test Setup



### 5.5.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-2: 2009, Severity Level: 3 / Air Discharge:  $\pm 8$ KV, Level: 2 / Contact Discharge:  $\pm 4$ KV)

### 5.5.3. Severity Levels and Performance Criterion

#### 5.5.3.1. Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1	$\pm 2$	$\pm 2$
2	$\pm 4$	$\pm 4$
3	$\pm 6$	$\pm 8$
4	$\pm 8$	$\pm 15$
X	Special	Special

#### 5.5.3.2. Performance Criterion

Performance Criterion: B

### 5.5.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.5.1.

### 5.5.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 5.1.4. Except the test set up replaced by Section 5.5.1.

### 5.5.6. Test Procedure

#### 5.2.6.1. Air Discharge

This test is done on a non-conductive surfaces. The round discharge tip of the Electrostatic Discharge simulator shall be approached as fast as possible then to touch the EUT. After each discharge, the simulator shall be removed from the EUT. The simulator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

#### 5.2.6.2. Contact Discharge

All the procedure shall be same as air discharge, except using the acute discharge tip. The top end of the Electrostatic Discharge simulator is touch the EUT all the time when the simulator is re-triggered for a new single discharge and repeated 10 times for each pre-selected test point.

#### 5.2.6.3. Indirect Discharge For Horizontal Coupling Plane

The vertical coupling plane(VCP) is placed 0.1m away from EUT. The top end of Electrostatic Discharge simulator should aim at the center of one border of the VCP for at least 25 times discharge.

#### 5.2.6.4. Indirect Discharge For Vertical Coupling Plane

The top end of Electrostatic Discharge simulator should place at the point 0.1m away from EUT on the horizontal coupling plane(HCP). At least 25 times discharge should be done for every pre-selected point around EUT.

Record any performance degradation of the EUT during the test and judge the test result according to ce criterion.

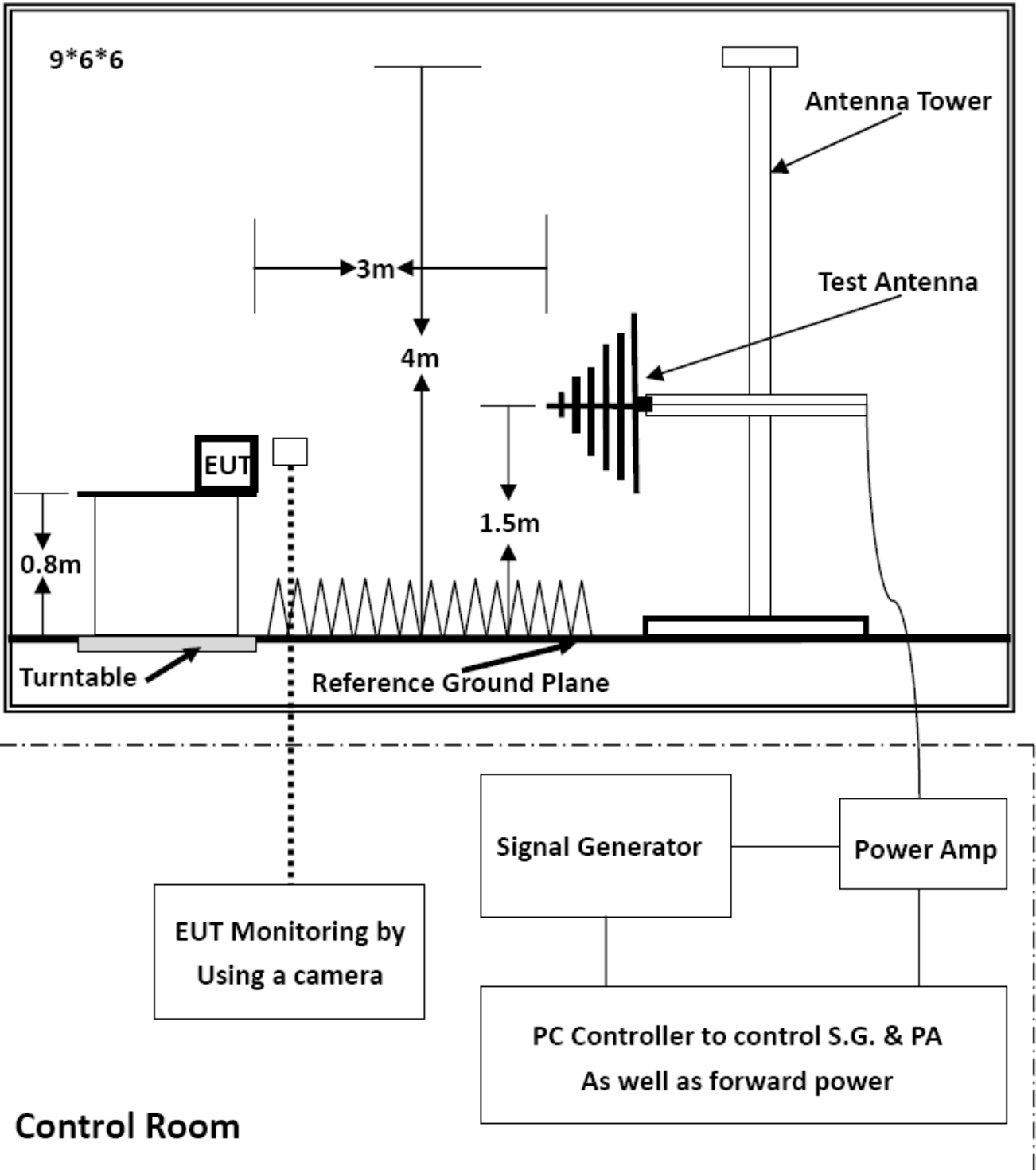
### 5.5.7. Test Results

**PASS.**

Refer to attached Annex B.5

### 5.6. RF FIELD STRENGTH SUSCEPTIBILITY TEST

#### 5.6.1. Block Diagram of Test Setup





### 5.6.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-3: 2006+A2: 2010 Severity Level: 2, 3V/m)

### 5.6.3. Severity Levels and Performance Criterion

#### 5.6.3.1. Severity level

Level	Field Strength (V/m)
1	1
2	3
3	10
X	1

#### 5.6.3.2. Performance Criterion

Performance Criterion: A

### 5.6.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.6.1.

### 5.6.5. Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 5.2.4, except the test setup replaced as Section 5.6.1.

### 5.6.6. Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD Recording is used to monitor its screen. All the scanning conditions are as following:

Condition of Test	Remark
Fielded Strength	3 V/m (Severity Level 2)
Radiated Signal	Unmodulated
Test Frequency Range (swept test)	80-1000MHz
Test Frequency (spot test)	1800MHz, 2600MHz, 3500MHz, 5000MHz
Dwell time of radiated	0.0015 decade/s
Waiting Time	3 Sec.

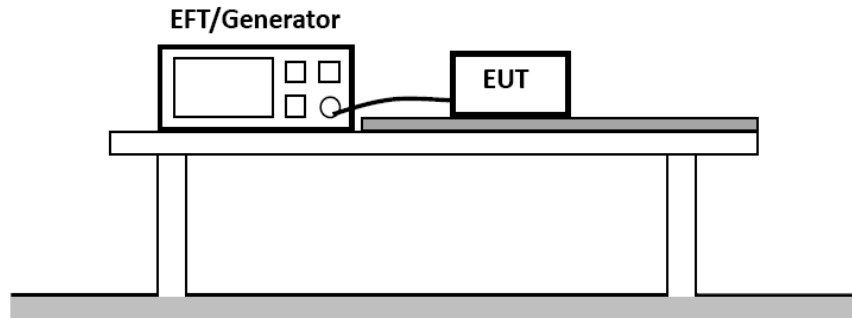
### 5.6.7. Test Results

**PASS.**

Refer to attached Annex B.6

## 5.7. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

### 5.7.1. Block Diagram of Test Setup



### 5.7.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-4: 2012, Severity Level, Level 2: 1KV)

### 5.7.3. Severity Levels and Performance Criterion

#### 5.7.3.1. Severity level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 KV	0.25 KV
2	1 KV	0.5 KV
3	2 KV	1 KV
4	4 KV	2 KV
X	Special	Special

#### 5.7.3.2. Performance Criterion

Performance Criterion: B

### 5.7.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.7.1.

### 5.7.5. Operating Condition of EUT

5.7.5.1. Setup the EUT as shown in Section 5.7.1.

5.7.5.2. Turn on the power of all equipments.

5.7.5.3. Let the EUT work in test mode(1) and measure it.

### 5.7.6. Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

#### 5.7.6.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 mins.

#### 5.7.6.2. For signal lines and control lines ports:

It's unnecessary to test.

#### 5.7.6.3. For DC output line ports:

It's unnecessary to test.

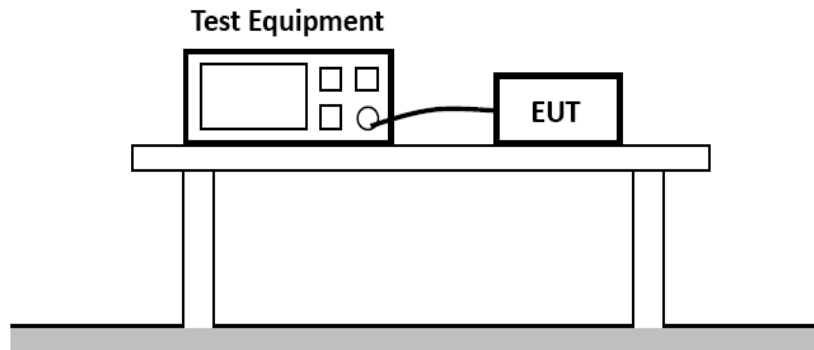
### 5.7.7. Test Results

**PASS.**

Refer to attached Annex B.7

## 5.8. SURGE IMMUNITY TEST

### 5.8.1. Block Diagram of Test Setup



### 5.8.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-5: 2014+A1: 2017, Severity Level: Line to Line: Level 2, 1.0KV, Line to Earth: Level 3, 2.0KV)

### 5.8.3. Severity Levels and Performance Criterion

#### 5.8.3.1. Severity level

Severity Level	Open-Circuit Test Voltage (KV)
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

#### 5.8.3.2. Performance Criterion

Performance Criterion: B

### 5.8.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.8.1.

### 5.8.5. Operating Condition of EUT

5.8.5.1. Setup the EUT as shown in Section 5.8.1.

5.8.5.1. Turn on the power of all equipments.

5.8.5.1. Let the EUT work in test mode (1) and measure it.

### 5.8.6. Test Procedure

5.8.6.1. Set up the EUT and test generator as shown on Section 5.8.1.

5.8.6.2. For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

5.8.6.3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.

5.8.6.4. Different phase angles are done individually.

5.8.6.5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

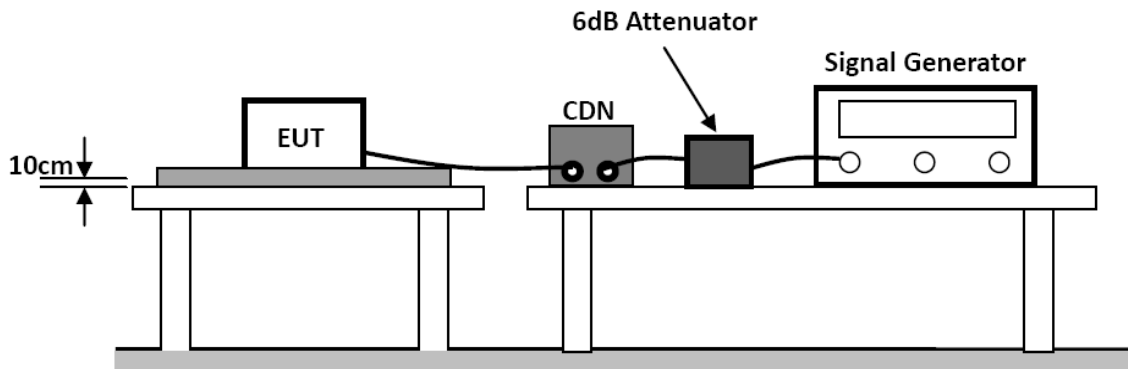
### 5.8.7. Test Results

**PASS.**

Refer to attached Annex B.8

## 5.9. INJECTED CURRENTS SUSCEPTIBILITY TEST

### 5.9.1. Block Diagram of Test Setup



### 5.9.2. Test Standard

EN 55035: 2017+A11: 2020(EN 61000-4-6: 2014, Severity Level: Level 2, (0.15MHz ~ 80MHz))

### 5.9.3. Severity Levels and Performance Criterion

#### 5.9.3.1. Severity level

Level	Field Strength (V)
1	1
2	3
3	10
X	Special

#### 5.9.3.2. Performance Criterion

Performance Criterion: A

### 5.9.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.9.1.

### 5.9.5. Operating Condition of EUT

5.9.5.1. Setup the EUT as shown in Section 5.9.1.

5.9.5.2. Turn on the power of all equipments.

5.9.5.3. Let the EUT work in test mode(1) and measure it.

### 5.9.6. Test Procedure

- 5.9.6.1. Set up the EUT, CDN and test generators as shown on Section 5.9.1.
- 5.9.6.2. Let the EUT work in test mode and measure it.
- 5.9.6.3. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 5.9.6.4. The disturbance signal described below is injected to EUT through CDN.
- 5.9.6.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 5.9.6.6. The frequency range is swept from 150kHz to 10MHz using 3V signal level, 10MHz to 30MHz using 3V to 1V signal level, 30MHz to 80MHz using 1V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
- 5.9.6.7. The rate of sweep shall not exceed  $1.5 \times 10^{-3}$  decades/s. where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 5.9.6.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

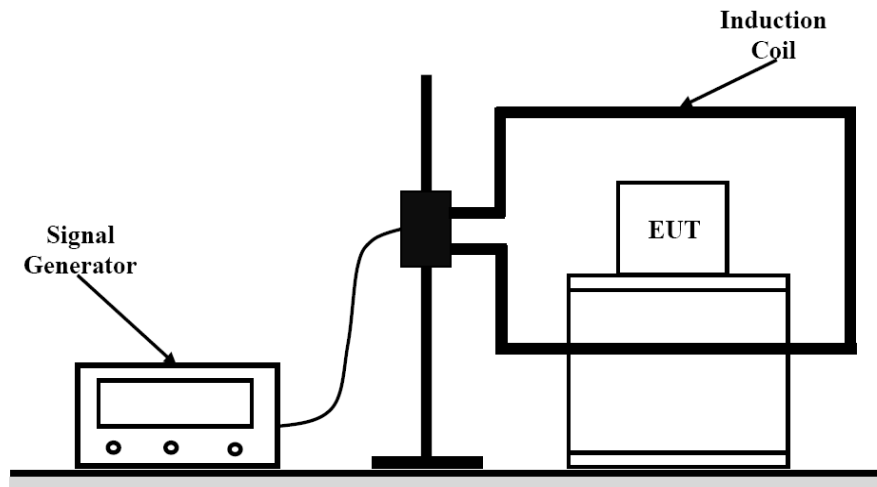
### 5.9.7. Test Results

**PASS.**

Refer to attached Annex B.9

## 5.10. MAGNETIC FIELD SUSCEPTIBILITY TEST

### 5.10.1. Block Diagram of Test Setup



### 5.10.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-8: 2010, Severity Level: Level 1, 1A/m)

### 5.10.3. Severity Levels and Performance Criterion

#### 5.10.3.1. Severity level

Level	Field Strength (A/m)
1	1
2	3
3	10
4	30
5	100
X	Special

#### 5.10.3.2. Performance Criterion

Performance Criterion: A

### 5.10.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.10.1.

### 5.10.5. Test Procedure

EUT is placed on an insulating support of 0.1m high above a table of 0.8m high. There is a minimum 1m\*1m ground metallic plane put on this table. EUT is put in the center of the magnetic coil then two orientations of the magnetic coil, horizontal and vertical, shall be rotated in order to expose the EUT to the difference polarization magnetic field.

Record any performance degradation of the EUT during the test and judge the test result according to performance criterion.

### 5.10.6. Test Results

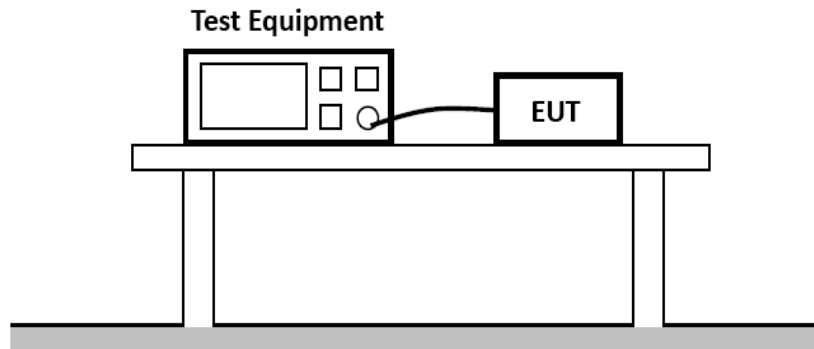
**PASS.**

Refer to attached Annex B.10



## 5.11. VOLTAGE DIPS AND INTERRUPTIONS TEST

### 5.11.1. Block Diagram of Test Setup



### 5.11.2. Test Standard

EN 55035: 2017+A11: 2020 (EN 61000-4-11: 2004+A1: 2017)

### 5.11.3. Severity Levels and Performance Criterion

#### 5.11.3.1. Severity level

Test Level		
Voltage Reduction %U <sub>T</sub>	Voltage Dips %U <sub>T</sub>	Duration (in Period)
100	0	0.5
100	0	1
30	70	5
Voltage Reduction %U <sub>T</sub>	Voltage Dips %U <sub>T</sub>	Duration (in Period)
100	0	250

#### 5.11.3.2. Performance Criterion

Performance Criterion: B&C

### 5.11.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.11.1.

### 5.11.5. Operating Condition of EUT

5.11.5.1. Setup the EUT as shown in Section 5.11.1.

5.11.5.2. Turn on the power of all equipments.

5.11.5.3. Let the EUT work in test mode (1) and measure it.

### 5.11.6. Test Procedure

5.11.6.1. Set up the EUT and test generator as shown on Section 5.11.1.

5.11.6.2. The interruptions are introduced at selected phase angles with specified duration.

5.11.6.3. Record any degradation of performance.

### 5.11.7. Test Results

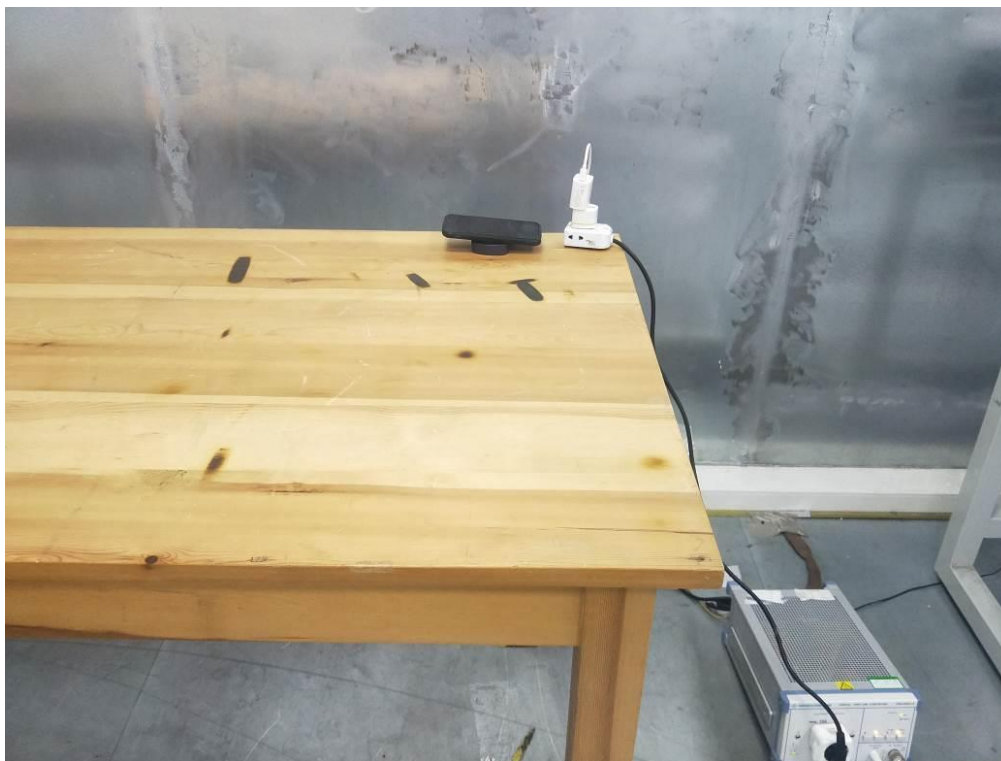
**PASS.**

Refer to attached Annex B.11

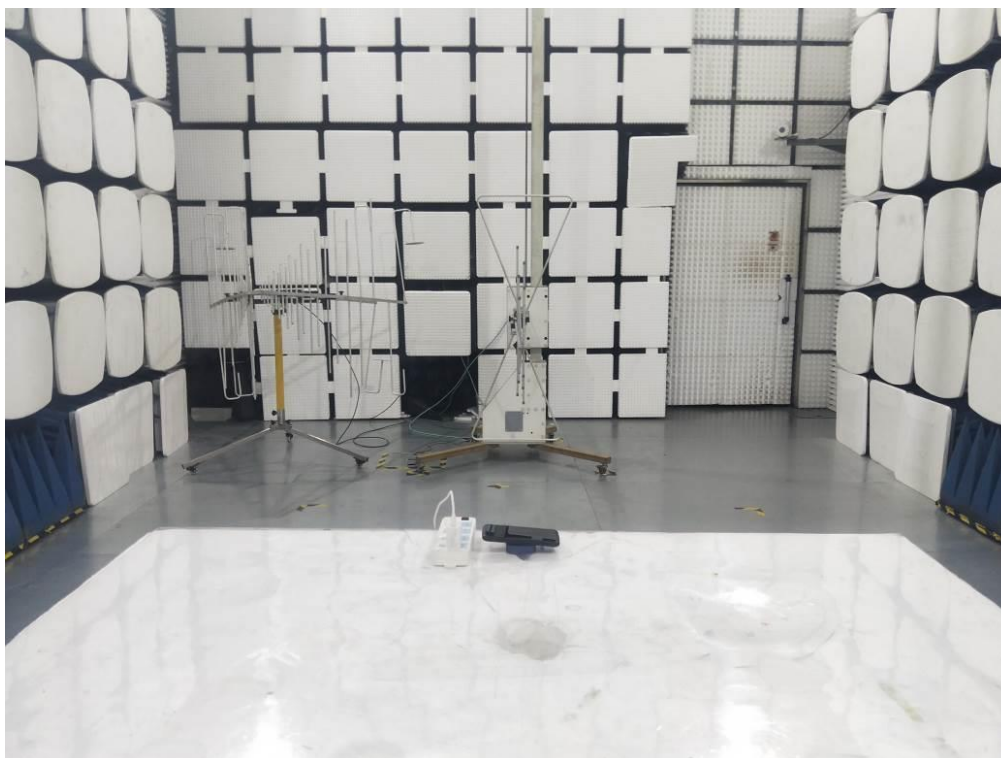
## ANNEX A

(Test photograph)

### A.1 Test Setup Photo of Power Line Conducted Measurement



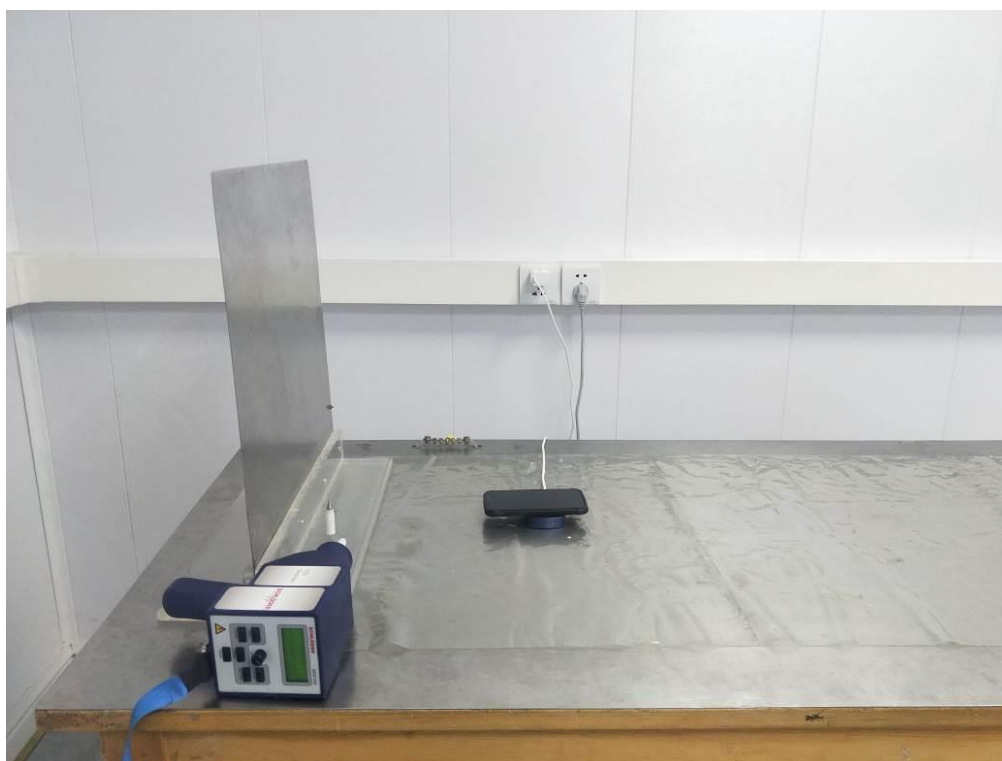
### A.2 Test Setup Photo of Radiated Measurement (30MHz~1GHz)



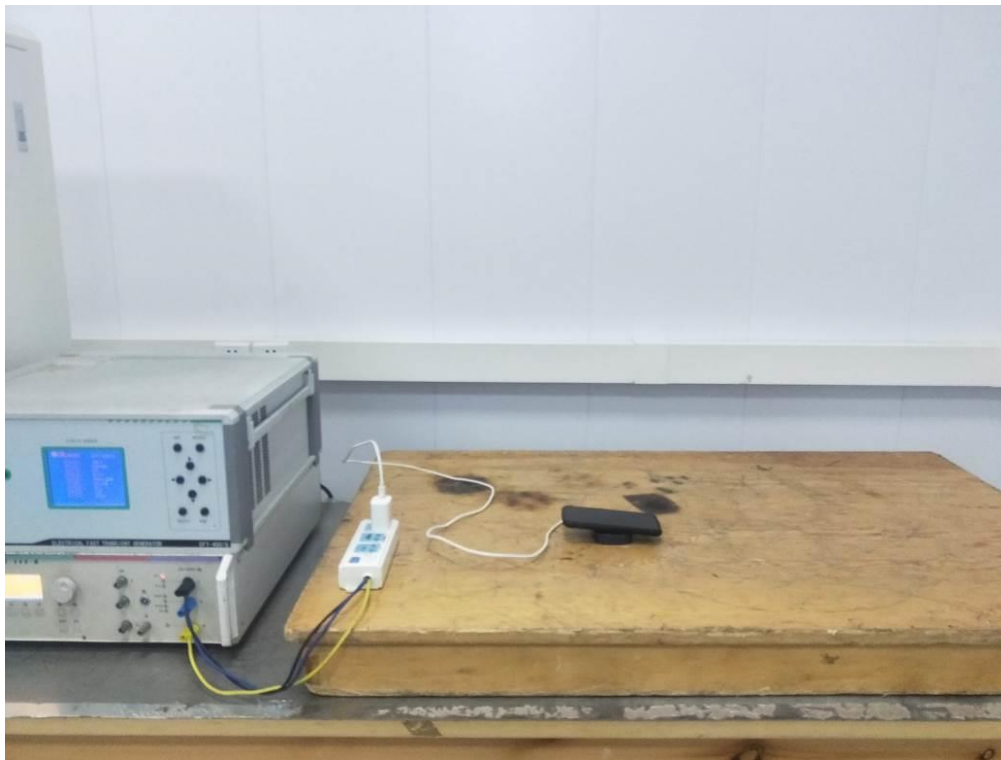
### A.3 Test Setup Photo of Harmonic & Flicker Measurement



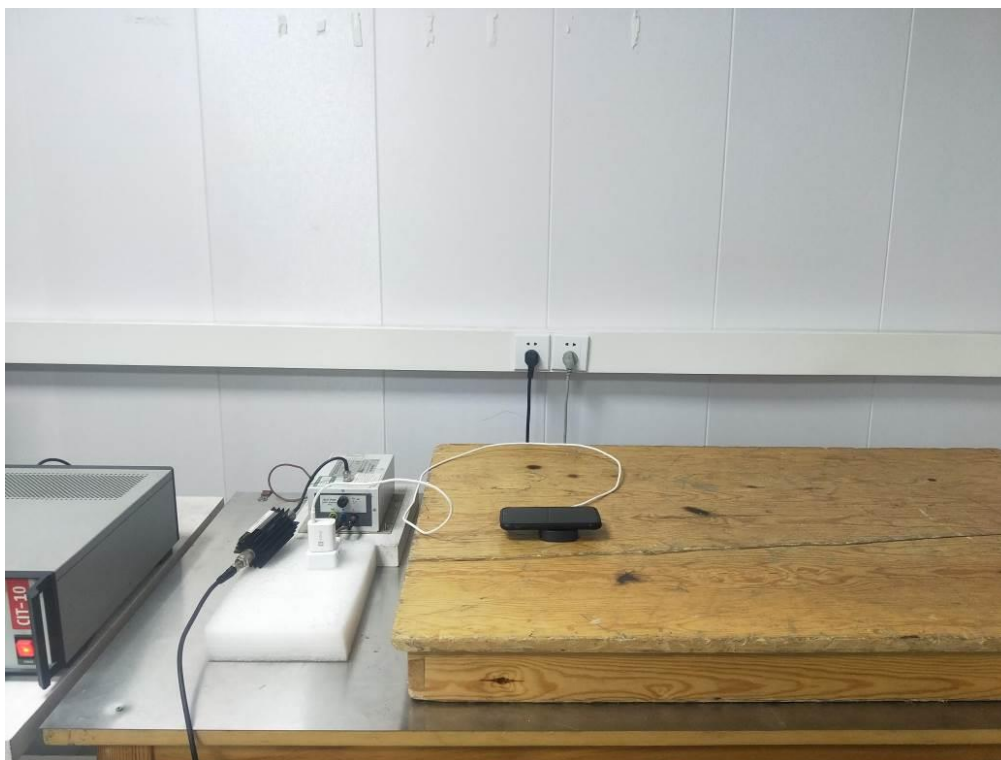
### A.4 Test Setup Photo of Electrostatic Discharge Test



A.5 Photo of Electrical Fast Transient/Burst Test & Surge Immunity Test



A.6 Test Setup Photo of Injected Currents Susceptibility Test



A.7 Test Setup Photo of Magnetic Field Immunity Test



A.8 Test Setup Photo of Voltage Dips and Interruptions Test



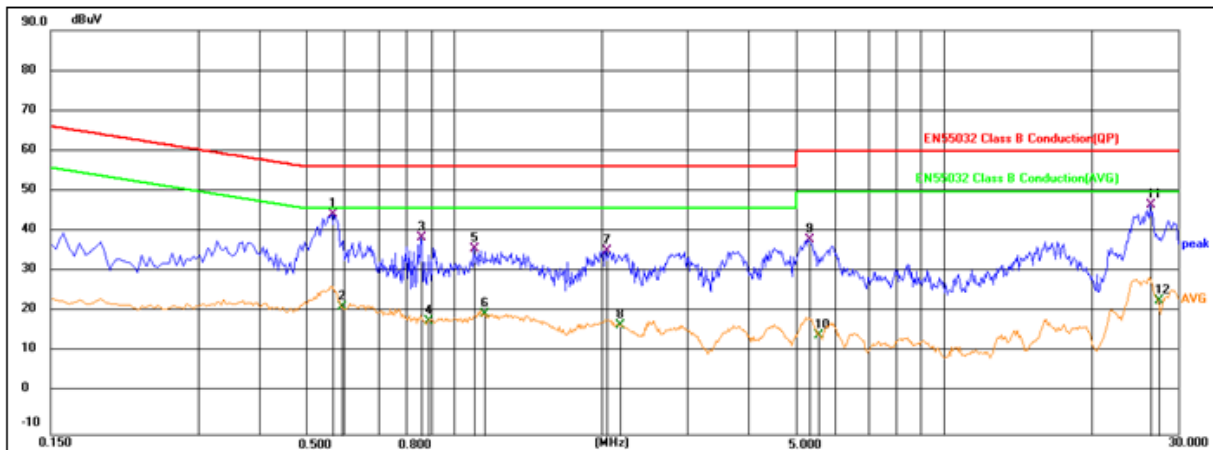
## ANNEX B

(Emission and Immunity test results)

### B.1 POWER LINE CONDUCTED EMISSION MEASUREMENT

Environmental Conditions:	22.7°C, 53.7 % RH
Test Voltage:	AC 230V, 50Hz
Test Model:	E29B
Test Mode:	Mode 1
Test Engineer:	DAIWEI DAI
Pol:	Line

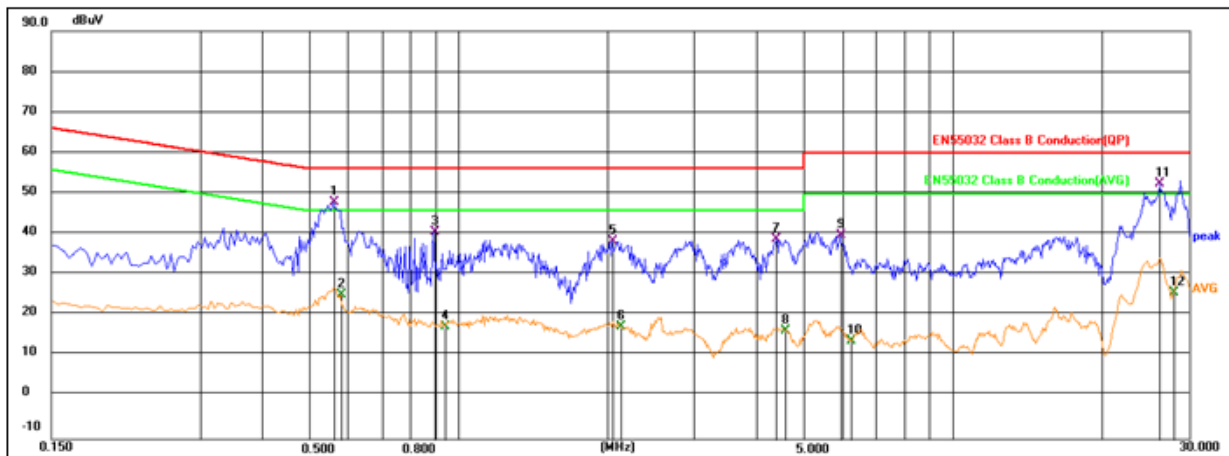
Detailed results are shown below



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.5641	23.94	20.67	44.61	56.00	-11.39	QP
2	0.5911	0.94	20.64	21.58	46.00	-24.42	AVG
3	0.8566	18.49	20.21	38.70	56.00	-17.30	QP
4	0.8881	-1.78	19.90	18.12	46.00	-27.88	AVG
5	1.0951	16.75	19.26	36.01	56.00	-19.99	QP
6	1.1491	0.55	19.27	19.82	46.00	-26.18	AVG
7	2.0446	16.16	19.40	35.56	56.00	-20.44	QP
8	2.1751	-2.43	19.41	16.98	46.00	-29.02	AVG
9	5.2936	18.71	19.50	38.21	60.00	-21.79	QP
10	5.5861	-5.08	19.52	14.44	50.00	-35.56	AVG
11	26.3311	26.72	20.08	46.80	60.00	-13.20	QP
12	27.3616	2.89	20.11	23.00	50.00	-27.00	AVG

Environmental Conditions:	22.7°C, 53.7 % RH
Test Voltage:	AC 230V,50Hz
Test Model:	E29B
Test Mode:	Mode 1
Test Engineer:	DAIWEI DAI
Pol:	Neutral

Detailed results are shown below

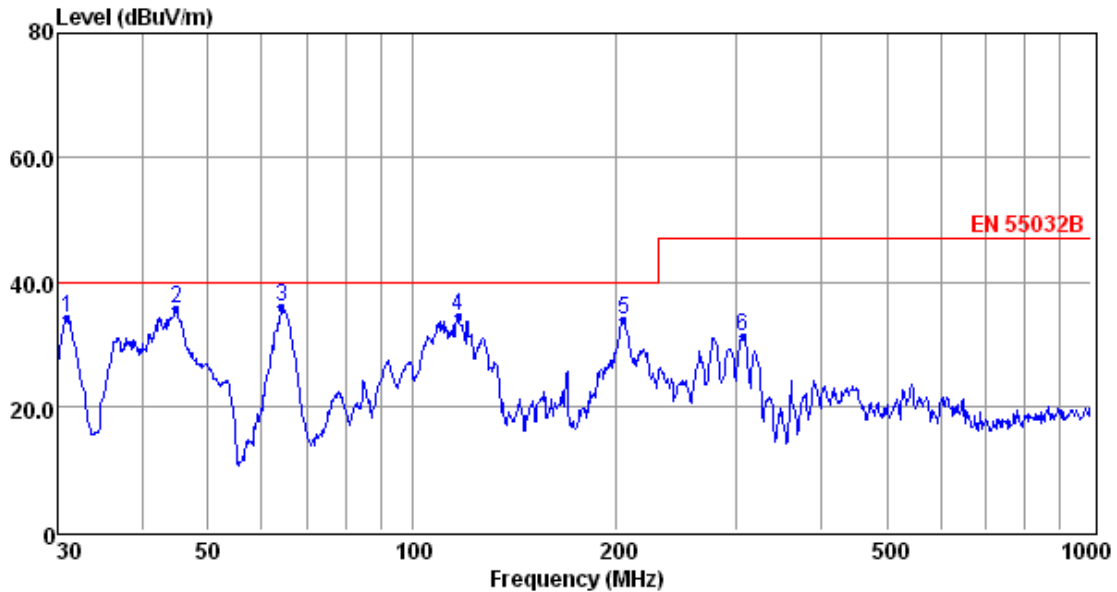


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.5596	27.26	20.68	47.94	56.00	-8.06	QP
2	0.5776	4.63	20.66	25.29	46.00	-20.71	AVG
3	0.8926	20.80	19.85	40.65	56.00	-15.35	QP
4	0.9376	-1.86	19.40	17.54	46.00	-28.46	AVG
5	2.0491	19.19	19.40	38.59	56.00	-17.41	QP
6	2.1301	-1.75	19.41	17.66	46.00	-28.34	AVG
7	4.3891	19.52	19.47	38.99	56.00	-17.01	QP
8	4.5781	-2.96	19.48	16.52	46.00	-29.48	AVG
9	5.9056	20.53	19.53	40.06	60.00	-19.94	QP
10	6.2431	-5.48	19.54	14.06	50.00	-35.94	AVG
11	26.2636	32.42	20.08	52.50	60.00	-7.50	QP
12	27.9421	5.85	20.15	26.00	50.00	-24.00	AVG

**B.2 Radiated Disturbance Test Results (30MHz to 1000MHz)**

Environmental Conditions:	22.1°C, 53.2% RH
Test Voltage:	AC 230V,50Hz
Test Model:	E29B
Test Mode:	Mode 1
Test Engineer:	DAIWEI DAI
Pol:	Vertical

Detailed results are shown below



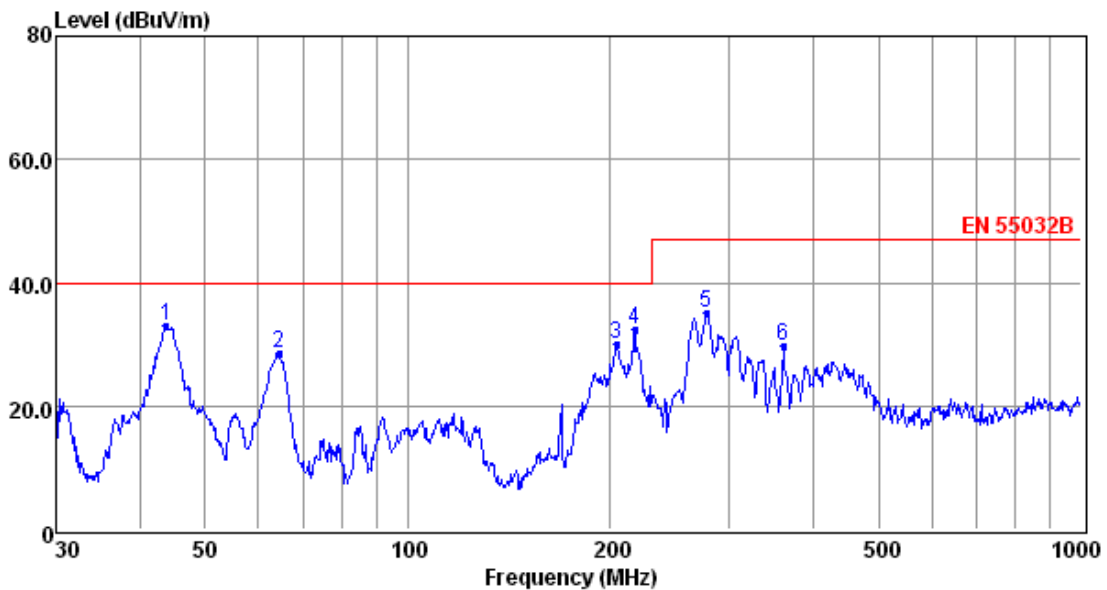
	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	30.96	51.46	0.39	12.32	34.22	40.00	-5.78	QP
2	44.90	51.76	0.41	13.55	35.73	40.00	-4.27	QP
3	64.21	54.36	0.52	11.02	35.85	40.00	-4.15	QP
4	116.95	52.83	0.68	11.02	34.37	40.00	-5.63	QP
5	204.96	52.49	0.99	10.73	33.85	40.00	-6.15	QP
6	306.75	47.56	1.05	13.15	31.23	47.00	-15.77	QP

Note: 1. All readings are Quasi-peak values.  
 2. Measured= Reading + Antenna Factor + Cable Loss  
 3. The emission that are 20db below the official limit are not reported



Environmental Conditions:	22.1°C, 53.2% RH
Test Voltage:	AC 230V,50Hz
Test Model:	E29B
Test Mode:	Mode 1
Test Engineer:	DAIWEI DAI
Pol:	Horizontal

Detailed results are shown below



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	43.81	49.07	0.41	13.56	33.05	40.00	-6.95	QP
2	64.43	47.15	0.52	10.93	28.55	40.00	-11.45	QP
3	204.24	48.77	0.99	10.70	30.10	40.00	-9.90	QP
4	217.54	50.69	0.88	11.12	32.31	40.00	-7.69	QP
5	278.07	51.91	1.01	12.61	35.06	47.00	-11.94	QP
6	361.71	44.94	1.17	14.44	29.83	47.00	-17.17	QP

- Note: 1. All readings are Quasi-peak values.  
 2. Measured= Reading + Antenna Factor + Cable Loss  
 3. The emission that are 20db below the official limit are not reported

### B.3 HARMONIC CURRENT EMISSION MEASUREMENT

**Pass**

Because the power of EUT is less than 75W, according to standard EN 61000-3-2, harmonic current unnecessary to test.

**B.4 VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT**

<b>Test Model</b>	E29B	<b>Test Engineer</b>	DAIWEI DAI	
<b>Test Voltage</b>	AC 230V/50Hz			
Overall Result:  <b>PASS</b>	Notes: Measurement method - Voltage			
	Pst	dc (%)	dmax (%)	Tmax(> 3.3%)(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.088	0.005	0.190	0

**B.5 ELECTROSTATIC DISCHARGE IMMUNITY TEST**

Electrostatic Discharge Test Results			
<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-2 <input checked="" type="checkbox"/> EN 61000-4-2		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	24.8℃
<b>M/N</b>	E29B	<b>Humidity</b>	53.8%
<b>Criterion</b>	B	<b>Pressure</b>	1021mbar
<b>Test Mode</b>	Mode 1	<b>Test Engineer</b>	DAIWEI DAI

Air Discharge						
Test Points	Test Levels			Results		
	± 2kV	± 4kV	± 8kV	Passed	Fail	Performance Criterion
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B

Contact Discharge						
Test Points	Test Levels		Results			
	± 2 kV	±4 kV	Passed	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B

Discharge To Horizontal Coupling Plane						
Side of EUT	Test Levels		Results			
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B

Discharge To Vertical Coupling Plane						
Side of EUT	Test Levels		Results			
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion	
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B

**B.6 RF FIELD STRENGTH SUSCEPTIBILITY TEST****RF Field Strength Susceptibility Test Results**

<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-3 <input checked="" type="checkbox"/> EN 61000-4-3		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	22.8℃
<b>M/N</b>	E29B	<b>Humidity</b>	53.0%
<b>Field Strength</b>	3 V/m	<b>Criterion</b>	A
<b>Test Mode</b>	Mode 1	<b>Test Engineer</b>	DAIWEI DAI
<b>Test Frequency</b>	80MHz to 1000MHz (swept test) 1800MHz, 2600MHz, 3500MHz, 5000MHz (spot test)		
<b>Modulation</b>	<input type="checkbox"/> None <input type="checkbox"/> Pulse	<input checked="" type="checkbox"/> AM 1KHz 80%	
<b>Steps</b>	1%		

	<b>Horizontal</b>	<b>Vertical</b>
<b>Front</b>	PASS	PASS
<b>Right</b>	PASS	PASS
<b>Rear</b>	PASS	PASS
<b>Left</b>	PASS	PASS

## Test Equipment:

- 1.ESG Vector Signal Generator
- 2.RF POWER AMPLIFIER
- 3.RF POWER AMPLIFIER
- 4.Stacked Broadband Log Periodic Antenna
- 5.Electric field probe

## Note:

**B.7 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST**

## Electrical Fast Transient/Burst Test Results

<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-4 <input checked="" type="checkbox"/> EN 61000-4-4		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	22.9°C
<b>M/N</b>	E29B	<b>Humidity</b>	53.4%
<b>Test Mode</b>	Mode 1	<b>Criterion</b>	B
<b>Test Engineer</b>	DAIWEI DAI		

Line	Test Voltage	Result (+)	Result (-)
L	1KV	PASS	PASS
N	1KV	PASS	PASS
L-N	1KV	PASS	PASS
L-PE			
N-PE			
L-N-PE			
Signal Line			
I/O Cable			

Note:

**B.8 SURGE IMMUNITY TEST**

Surge Immunity Test Result			
<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-5 <input checked="" type="checkbox"/> EN 61000-4-5		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	22.9℃
<b>M/N</b>	E29B	<b>Humidity</b>	53.4%
<b>Test Mode</b>	Mode 1	<b>Criterion</b>	B
<b>Test Engineer</b>	DAIWEI DAI		

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (KV)	Result
L-N	+	90°	5	1.0	PASS
	-	270°	5	1.0	PASS
L-PE					
N-PE					
Signal Line					
Note					

**B.9 INJECTED CURRENTS SUSCEPTIBILITY TEST**

Injected Currents Susceptibility Test Results			
<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-6 <input checked="" type="checkbox"/> EN 61000-4-6		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	23.5°C
<b>M/N</b>	E29B	<b>Humidity</b>	53.2%
<b>Test Mode</b>	Mode 1	<b>Criterion</b>	A
<b>Test Engineer</b>	DAIWEI DAI		

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 10	AC Mains	3V	A	PASS
10 ~ 30		3V ~ 1V		
30 ~ 80		1V		

Remark:

1. Modulation Signal: 1kHz 80% AM
2. Measurement Equipment :
  - Simulator: CIT-10 (FRANKONIA)
  - CDN : CDN-M2 (FRANKONIA)
  - CDN-M3 (FRANKONIA)

Note:



**B.10 MAGNETIC FIELD SUSCEPTIBILITY TEST**

Magnetic Field Immunity Test Result			
<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-8 <input checked="" type="checkbox"/> EN 61000-4-8		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	24.4°C
<b>M/N</b>	E29B	<b>Humidity</b>	54.1%
<b>Test Mode</b>	Mode 1	<b>Criterion</b>	A
<b>Test Engineer</b>	DAIWEI DAI		

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
1	5 mins	X	A	PASS
1	5 mins	Y	A	PASS
1	5 mins	Z	A	PASS

Note:

## B.11 VOLTAGE DIPS AND INTERRUPTIONS TEST

## Voltage Dips And Interruptions Test Results

<b>Standard</b>	<input type="checkbox"/> IEC 61000-4-11 <input checked="" type="checkbox"/> EN 61000-4-11		
<b>Applicant</b>	Shenzhen yanbu technology co. LTD		
<b>EUT</b>	Magnetic absorption wireless charging mobile power supply	<b>Temperature</b>	22.3°C
<b>M/N</b>	E29B	<b>Humidity</b>	54.4%
<b>Test Mode</b>	Mode 1	<b>Criterion</b>	B&C
<b>Test Engineer</b>	DAIWEI DAI		

Test Level % U <sub>T</sub>	Voltage Dips & Short Interruptions % U <sub>T</sub>	Duration (in periods)	Criterion	Result
0	100	0.5P	B	PASS
70	30	25P	C	PASS
0	100	250P	C	PASS

Note:

### ANNEX C

( External and internal photos of the EUT )



Fig. 1



Fig. 2

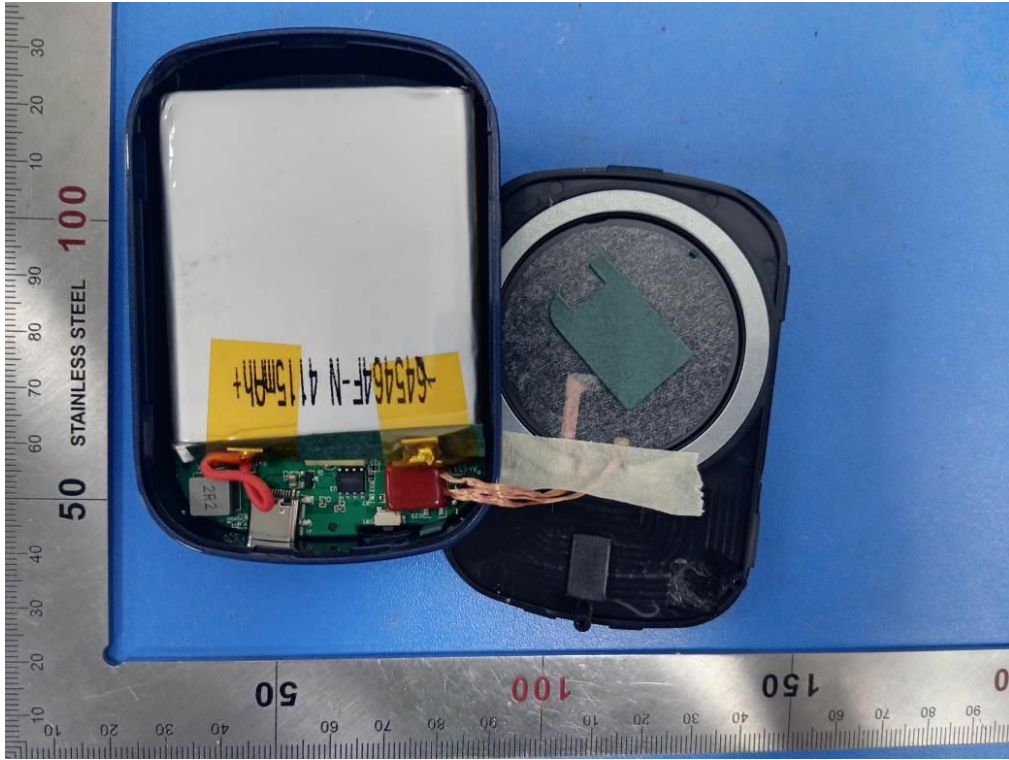


Fig. 3

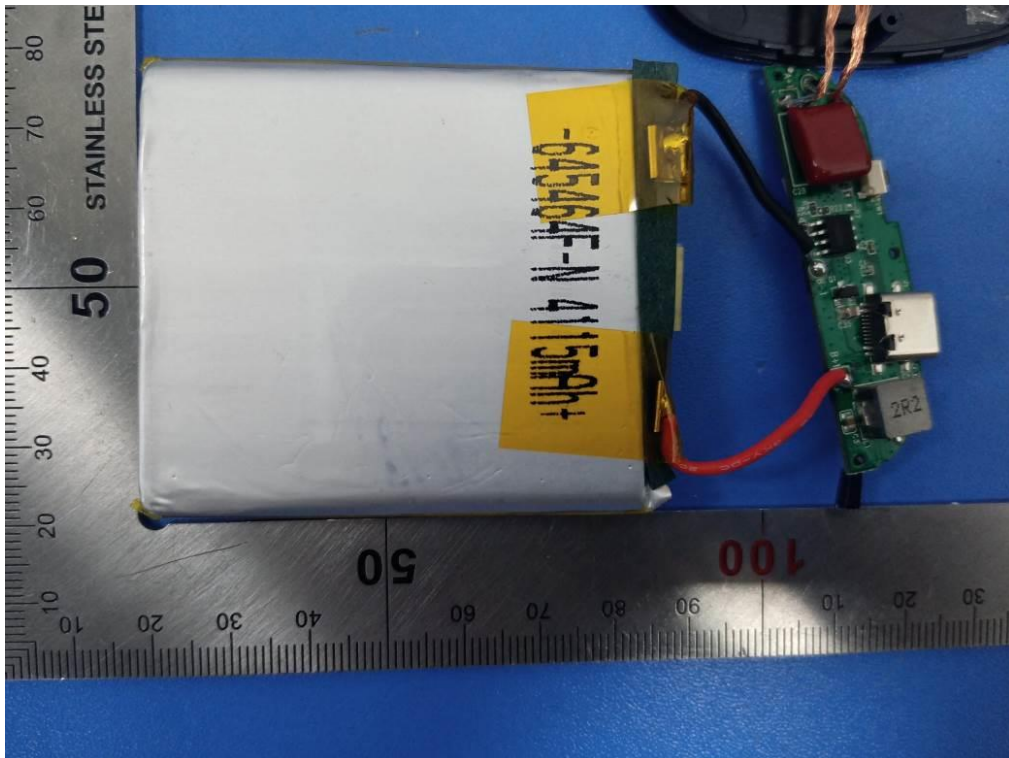


Fig. 4

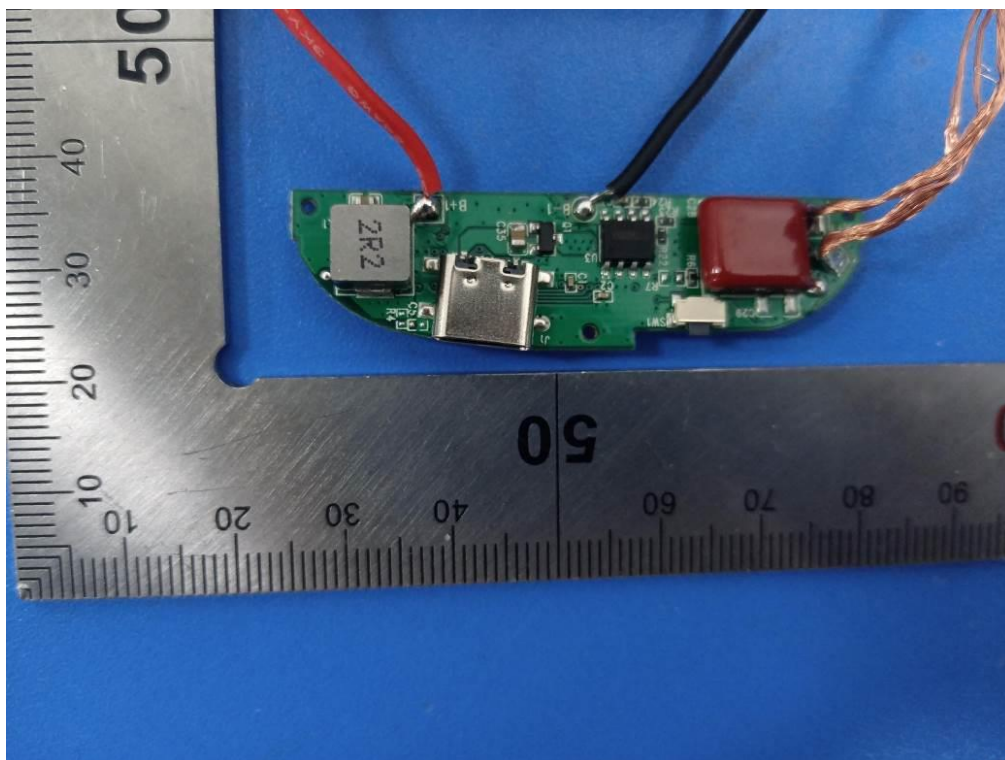


Fig. 5

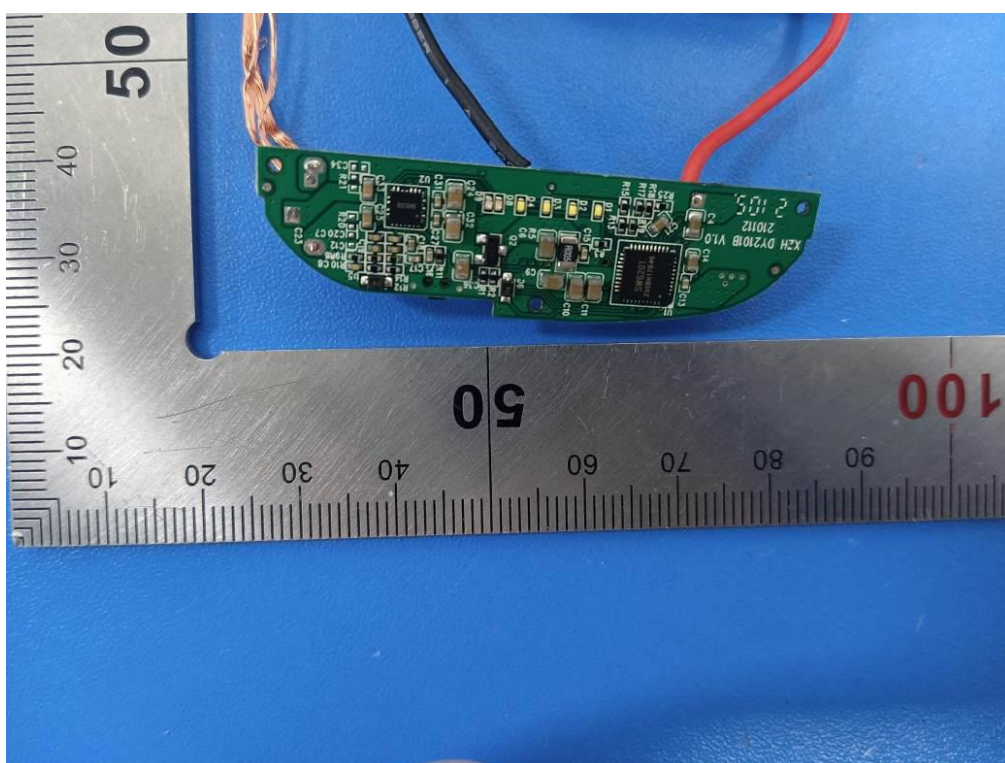


Fig. 6



Fig. 7

-----THE END OF TEST REPORT -----



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检测  
TESTING  
CNAS L4595

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**Applicant** : Shenzhen yanbu technology co. LTD  
**Address** : 6/f, building B, xinyongfeng industrial park, lezhujiao village, xixiang, baoan district, shenzhen

Report on the submitted samples said to be:

**Sample Name** : Magnetic absorption wireless charging mobile power supply  
**Trade Mark** : N/A  
**Style No.** : E29A, E29B  
**Testing Period** : February 25, 2021 ~ March 02, 2021  
**Results** : Please refer to next page(s).

TEST REQUEST	CONCLUSION
<p>According to the customer's request, based on the performed tests on submitted sample, the result of Lead(Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium(Cr(VI)), PBBs, PBDEs, Dibutyl Phthalate(DBP), Benzylbutyl Phthalate(BBP), Bis(2-ethylhexyl) Phthalate(DEHP), Diisobutyl phthalate(DIBP) content comply with the limit requirement as set of RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.</p>	<p>Pass</p>

Signed for and on behalf of LCS





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## Results:

### A.EU RoHS Directive 2011/65/EU and its amendment directives on XRF

Test method: With reference to IEC 62321-3-1:2013, Screening by X-ray Fluorescence Spectroscopy (XRF)

Seq. No.	Tested Part(s)	Results						Date of sample submission/resubmission
		Cd	Pb	Hg	Cr <sup>v</sup>	Br <sup>v</sup>		
						PBBs	PBDEs	
1	Blue plastic shell	BL	BL	BL	BL	BL	BL	2021-02-25
2	Black soft plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25
3	Black plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25
4	Silver metal ring	BL	BL	BL	BL	/	/	2021-02-25
5	White plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25
6	Black plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25
7	Silver metal shrapnel	BL	BL	BL	BL	/	/	2021-02-25
8	Silver sheet metal	BL	BL	BL	BL	/	/	2021-02-25
9	Black plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25
10	Silver metal needle	BL	BL	BL	BL	/	/	2021-02-25
11	Grey ceramics	BL	BL	BL	BL	BL	BL	2021-02-25
12	Red wire	BL	BL	BL	BL	/	/	2021-02-25
13	Red plastic thread	BL	BL	BL	BL	BL	BL	2021-02-25
14	Silver wire	BL	BL	BL	BL	/	/	2021-02-25
15	Black triode	BL	BL	BL	BL	BL	BL	2021-02-25
16	Black IC	BL	BL	BL	BL	BL	BL	2021-02-25
17	Red capacitor	BL	BL	BL	BL	BL	BL	2021-02-25
18	Black plastic thread	BL	BL	BL	BL	BL	BL	2021-02-25
19	Brown capacitor	BL	BL	BL	BL	BL	BL	2021-02-25
20	light-emitting diode	BL	BL	BL	BL	BL	BL	2021-02-25
21	Tin solder	BL	BL	BL	BL	/	/	2021-02-25
22	PCB board	BL	BL	BL	BL	BL	BL	2021-02-25
23	Black IC	BL	BL	BL	BL	BL	BL	2021-02-25
24	Chip resistor	BL	BL	BL	BL	BL	BL	2021-02-25
25	Black diode	BL	BL	BL	BL	BL	BL	2021-02-25
26	Silver plastic sheet	BL	BL	BL	BL	BL	BL	2021-02-25

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Note:

- (1) Results were obtained by XRF for primary screening, and further chemical testing by ICP (for Cd, Pb, Hg), UV-Vis (for Cr(VI)) and GC-MS (for PBBs, PBDEs) are recommended to be performed, if the concentration exceeds the below warning value according to IEC 62321-3-1:2013.

Element	Unit	Non-metal	Metal	Composite Material
Cd	mg/kg	$BL \leq 70 - 3\sigma < X < 130 + 3\sigma \leq OL$	$BL \leq 70 - 3\sigma < X < 130 + 3\sigma \leq OL$	$BL \leq 50 - 3\sigma < X < 150 + 3\sigma \leq OL$
Pb	mg/kg	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 500 - 3\sigma < X < 1500 + 3\sigma \leq OL$
Hg	mg/kg	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 500 - 3\sigma < X < 1500 + 3\sigma \leq OL$
Cr	mg/kg	$BL \leq 700 - 3\sigma < X$	$BL \leq 700 - 3\sigma < X$	$BL \leq 500 - 3\sigma < X$
Br	mg/kg	$BL \leq 300 - 3\sigma < X$	--	$BL \leq 250 - 3\sigma < X$

Note:

- BL = Below Limit
- OL = Over Limit
- X = Inconclusive

- (2) The XRF screening test for RoHS elements – The reading may be different to the actual content in the sample be of non-uniformity composition.
- (3) The maximum permissible limit is quoted from the document 2015/863/EC amending RoHS directive 2011/65/EU:
- (4) ▼=For restricted substances PBBs and PBDEs, the results show the total Br content; The restricted substance was Cr(VI), and the results showed the total Cr content

RoHS Restricted Substances	Maximum Concentration Value (mg/kg) (by weight in homogenous materials)
Cadmium (Cd)	100
Lead (Pb)	1000
Mercury (Hg)	1000
Hexavalent Chromium (Cr(VI))	1000
Polybrominated biphenyls (PBBs)	1000
Polybrominated diphenylethers (PBDEs)	1000
Dibutyl Phthalate(DBP)	1000
Benzylbutyl Phthalate(BBP)	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	1000
Diisobutyl phthalate(DIBP)	1000

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**Disclaimers:**

This XRF Screening report is for reference purposes only. The applicant shall make its/his/her own judgment as to whether the information provided in this XRF screening report is sufficient for its/his/her purposes.

The result shown in this XRF screening report will differ based on various factors, including but not limited to, the sample size, thickness, area, surface flatness, equipment parameters and matrix effect (e.g. plastic, rubber, metal, glass, ceramic etc.). Further wet chemical pre-treatment with relevant chemical equipment analysis are required to obtain quantitative data.

**B. EU RoHS Directive 2011/65/EU and its amendment Directives 2015/863/EU on Lead, Cadmium, Mercury, Hexavalent Chromium, PBBs, PBDEs, DBP, BBP, DEHP, DIBP content.**

Test method:

**Lead(Pb) & Cadmium(Cd) Content:**

With reference to IEC 62321-5:2013, by acid digestion and analysis was performed by inductively coupled plasma atomic emission spectrometer (ICP-OES)

**Mercury(Hg) Content:**

With reference to IEC 62321-4:2013+AMD1:2017 CSV, by acid digestion and analysis was performed by inductively coupled plasma atomic emission spectrometer (ICP-OES)

**Hexavalent Chromium(Cr(VI)) Content:**

With reference to IEC 62321-7-1:2015 or IEC 62321-7-2:2017, by alkaline digestion and analysis was performed by UV-visible spectrophotometer (UV-Vis)

**PBBs & PBDEs Content:**

With reference to IEC 62321-6:2015, by solvent extraction and analysis was performed by gas chromatographic-mass spectrometer (GC-MS)

**BBP DBP DEHP & DIBP Content:**

With reference to IEC 62321-8:2017, by solvent extraction and analysis was performed by gas chromatographic-mass spectrometer (GC-MS)

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Note:

- MDL = Method Detection Limit
  - /= Not apply
  - LOQ = Limit of Quantification, The LOQ of Hexavalent chromium is 0.10 µg/cm<sup>2</sup>
  - ▼ = a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13µg/cm<sup>2</sup>. The sample coating is considered to contain Cr(VI)  
 b. The sample is negative for Cr(VI) if Cr(VI) is N.D.(concentration less than 0.10µg/cm<sup>2</sup>). The sample coating is considered a non- Cr(VI) based coating  
 c. The result between 0.10µg/cm<sup>2</sup> and 0.13µg/cm<sup>2</sup> is considered to be inconclusive, unavoidable coating variations may influence the determination
  - Information on storage conditions and production date of the tested samples is unavailable and thus Cr(VI) results represent status of the sample at the time of testing
  - mg/kg = ppm=parts per million
  - N.D.=Not Detected(<MDL or LOQ)
- #1 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted in glass of cathode ray tubes, electronic components and fluorescent tubes.
- #2 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted in electronic ceramic parts (e.g. piezoelectronic devices).
- #3 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted as an alloying element in Copper containing up to 4% (40000ppm) by weight.
- #4 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead).
- #5 According to the statement provided by the customer, according to RoHS directive 2011/65/EU and its amendments, Lead is exempted as an alloying element in Aluminum containing up to 0.4% (4000ppm) by weight.
- #6 According to the statement provided by the customer, according to RoHS directive 2011/65/EU and its amendments, Cadmium and its compounds in electrical contact is exempted.
- #7 According to the statement provided by the customer, according to RoHS directive 2011/65/EU and its Amendments, Lead is exempted in steel for machining purposes and in galvanised steel containing up to 0.35% (3500ppm) by weight.

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## 1) The test results of DBP、BBP、DEHP & DIBP

Item	Unit	MDL	Results	Limit
			1+2+3+5+6+9	
Dibutyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

Item	Unit	MDL	Results	Limit
			11+13+15+16+17+18	
Dibutyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

Item	Unit	MDL	Results	Limit
			19+20+22+23+24+25+26	
Dibutyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

### Remark:

- mg/kg = ppm
- N.D. = Not detected
- MDL=Method detected limited
- Flow chart appendix is included
- Photo appendix is included.

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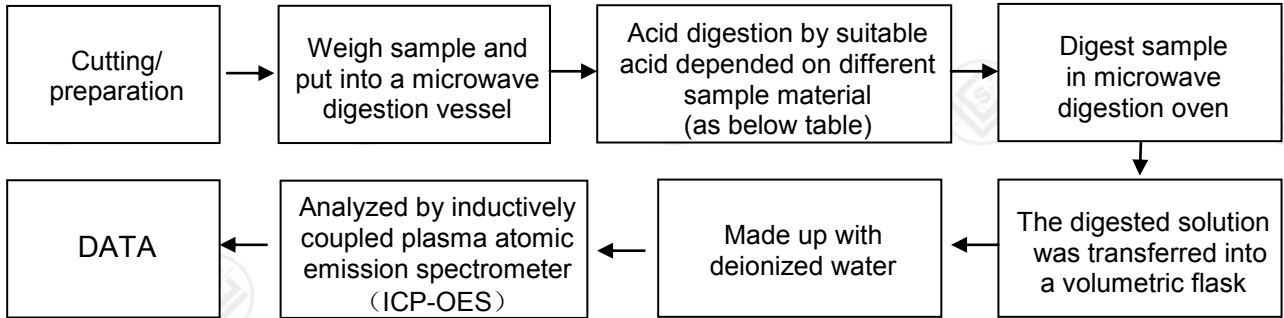
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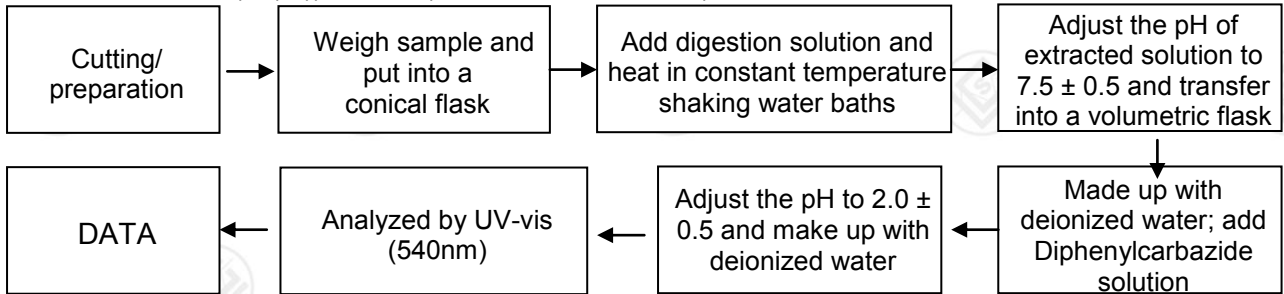
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## Appendix

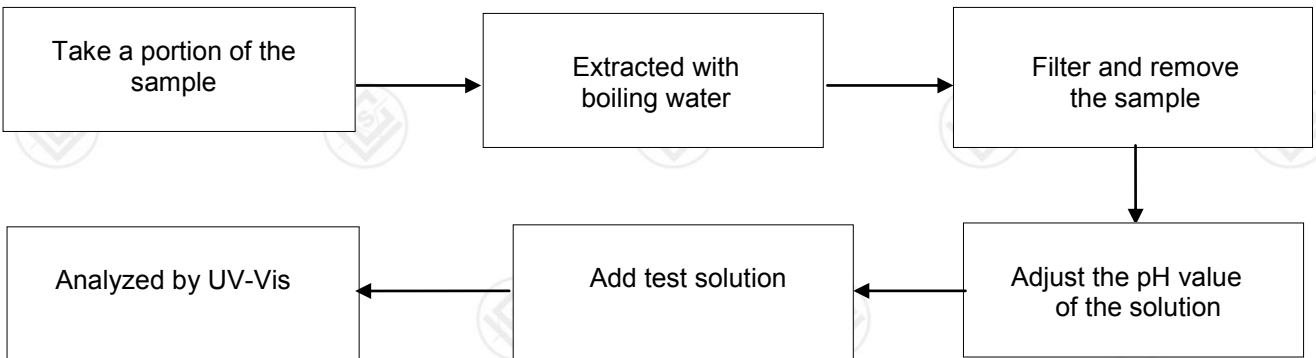
### 1. Test Flow chart for Cd/Pb /Hg content



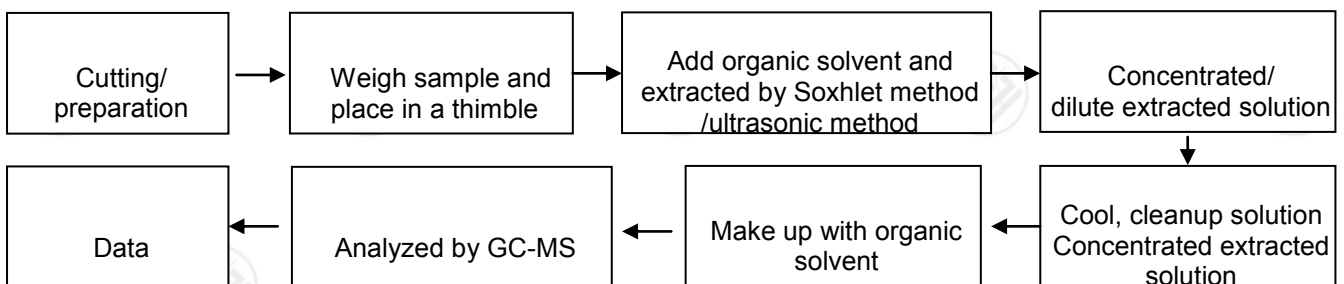
### 2. Test Flowchart for (Cr(VI)) content (For non-metal material)



### Test Flowchart for (Cr(VI)) content (For metal material)



### 3. Test Flow chart for PBBs & PBDEs & DBP & BBP & DEHP & DIBP content



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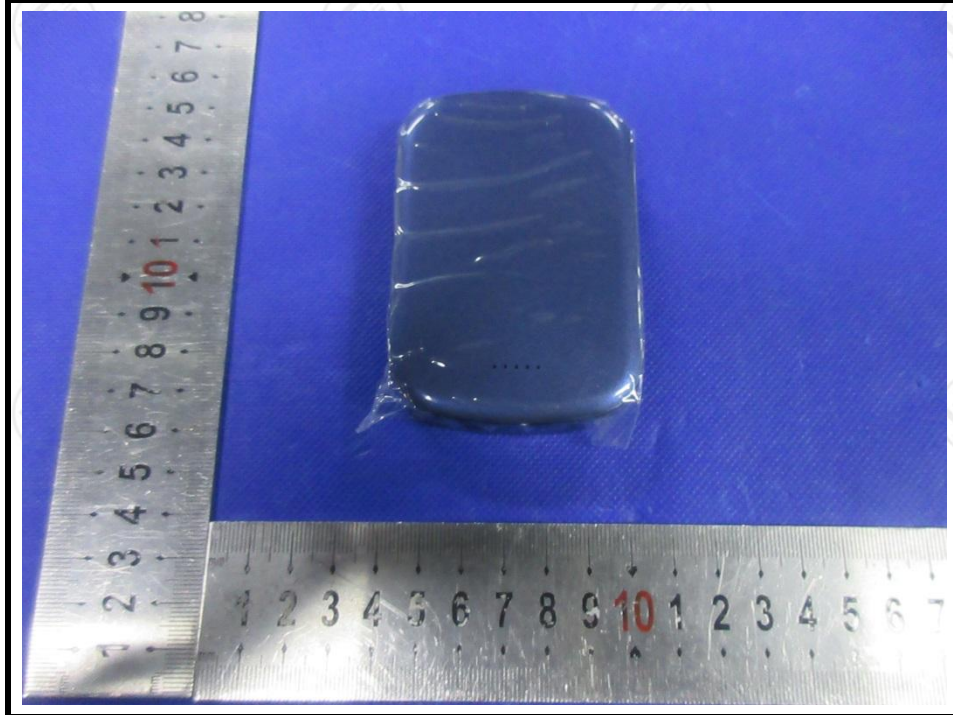
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The photo of the sample



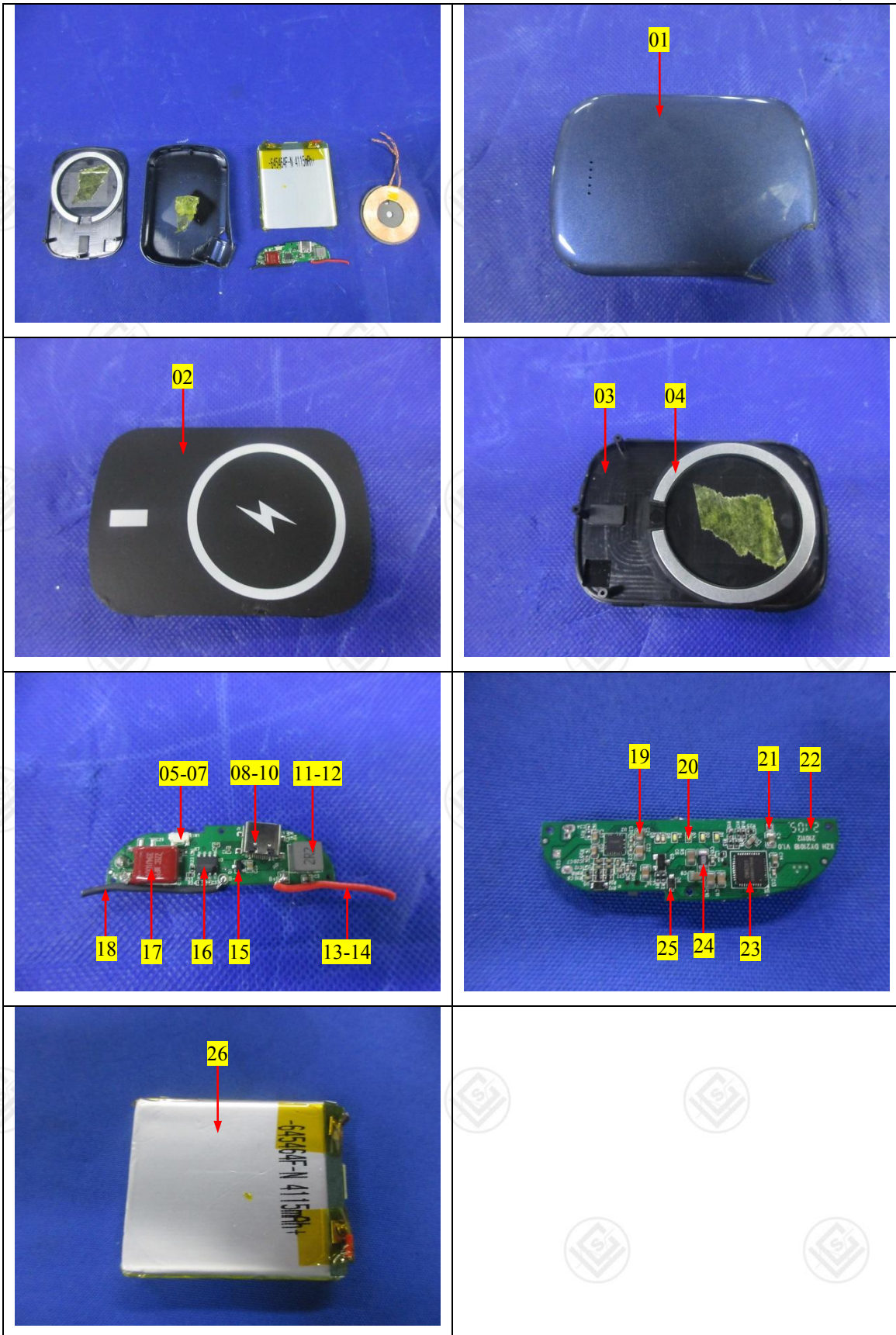


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Statement:

1. The test report is considered invalidated without approval signature, special seal on the perforation.
2. The result(s) shown in this report refer only to the sample(s) tested.
3. Without written approval of LCS, this report can't be reproduced except in full.
4. The sample(s) and sample information was/were provided by the client who should be responsible for the authenticity which LCS hasn't verified.
5. In case of any discrepancy between the English version and Chinese version of the testing reports(if generated), the Chinese version shall prevail.