样 品 承 认 书

APPROVED SHEET

客户料号(P/O) ： 0T-007-021700-01

品名(MATERIAL)： 锂充电电池

规格(SPECIFICATION)：锂充电电池 21700x2S/4800mAh/7.4V/带 7P2.54 带扣插头出口

承认说明：

广东微电新能源股份有限公司

承认签核（CUSTOMER APPROVAL）

制作(ORIGINATED BY)：

确认（CHECKED BY）：

核准（APPROVED BY）：

EDIFIER 漫步者

承认签核（CUSTOMER APPROVAL）

检验（INSPECTED BY）：陈颖 2025.3.4

确认（CHECKED BY）：黄伟胜 2025.3.4

核准（APPROVED BY）：

Product Specification

微电产品规格承认书

Customer Code 客户代码:	055
Customer Part Number 客户产品料号:	OT-007-021700-01
Mic-power Cell Model. 微电电芯型号:	INR21700-50E
Mic-power Battery Model.微电成品电池型号:	M2S1P-21700-R083
Mic-power Battery Part Number.微电成品电池料号:	109-00779-000

Prepared by 制作人	Checked by 审核人	Approved by 批准人
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广东微电新能源股份有限公司 外发文件章

Customer Approval 客户承认	Customer Signature/Date 客户签名/日期	Customer Company Stamp 客户公司盖章

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Revision History
版本履历表

Revision 版本	Description 内容描述	Issued by 发行人	Approved by 审批人	Date 日期
V1	首次发行 First Release	Miller	Devin	2024-8-23
V2	1. 变更保护 IC 和 MOS 1. Change protection ics and MOS	Miller	Devin	2024-8-28
V3	1. 变更保护 IC，支持 0V 充电 1. Change protection ics ， Support 0V charging	Miller	Devin	2024-8-30
V4	1. 变更保护 IC，放电截止电压 2.5V。 1. Change protection IC, discharge cut-off voltage of 2.5 V.	Miller	Devin	2024-9-20
V5	1. 应客户要求标称容量改为 4800mAh，最小容量改为 4900mAh。标签容量改为 4800mAh。 1. The nominal capacity should be changed to 4800mAh and the minimum capacity should be changed to 4900mAh. The label capacity is changed to 4800mAh.	Miller	Devin	2024-9-20
V6	1. 增加产品宽度和厚度公差值。 1.Increase product width and thickness tolerances	Miller	Devin	2024-11-23
V7	1. 更新标签 1. Update the label	Miller	Devin	2025-2-20

Contents 目录

1. Scope 概述

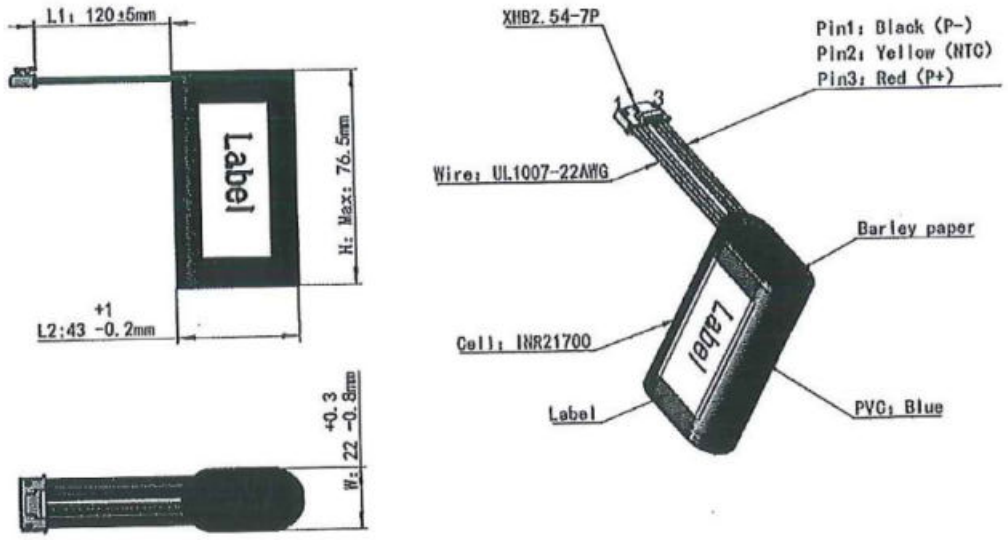
This document describes the specification of rechargeable Li-ion battery pack which is designed and manufactured by **Guangdong Mic-power New Energy Co., LTD.**

这文件描述由**广东微电新能源有限公司**设计制造的可充电锂离子电池成品的规格。

2.Battery specification 电池规格（温度=25±2℃，除非另有规定）：

No.	Item 项目	Parameters 参数	
1	Battery pack model 电池成品型号	M2S1P-21700-R083	
2	Combination mode组合方式	2S1P	
3	Nominal capacity标称容量	4800mAh	0.15C discharge current 0.15C放电电流
4	Minimum capacity最小容量	4900mAh	0.15C discharge current 0.15C放电电流
5	Nominal voltage标称电压	7.4V	
6	Shipment voltage 出货电压	7.8~8.0V	
7	Charge ending voltage充电限制电压	8.4V	充电方式：CC/CV
8	Discharge ending voltage 放电截止电压	5.0V	
9	Pack Impedance内阻	≤180mΩ (AC/1000Hz)	Note: The ex-factory less than 6 months, and the number of cycles is less than 30 times 备注：出厂时间小于6个月，循环次数小于30次
10	Battery weight 电池重量 (packed)	Approx 180g	
11	Standard charge current 标准充电电流	1A	0.2C
12	Standard discharge current 标准放电电流	1A	0.2C
13	Max constant charging current 最大连续充电电流	1C	
14	Max constant discharging current 最大连续放电电流	3C	
15	Operating temperature 工作温度范围	Charge 充电：0~55℃ Discharge 放电：-20~60℃	
16	Cycles life 循环寿命 (RT：25±2℃) (0.5C charge to 8.4V，1C discharge to 5.6V)	700次充放电后，电池恢复80%的初始容量 After 700 cycles charge discharge, battery can recover 80% of its initial capacity	
17	Storage Method 储存方式	1 Month at -20 to 60 °C	Capacity Recovery Rate > 85%
		3 Month at -20 to 45 °C	apacity Recovery Rate > 90%
		1 Year at -20 to 20 °C	apacity Recovery Rate > 90%
18	Battery Pairing Requirements电池配组要求	电压差10mV，内阻差≤3mΩ，容量差≤100mAh	
19	Certification requirement 认证要求	首批电池+电芯满足CCC（成品CCC认证按照4800mAh容量做），电芯满足UL1642。后续根据需求再做以下认证KC、UN38.3、IEC62133（CB）。	
20	Hazardous substances control requirements有害物质管控要求	RoHS2.0	
21	Communication mode 通讯方式	/	

2.1 Battery packed drawing 电池成品尺寸: (unit: mm)



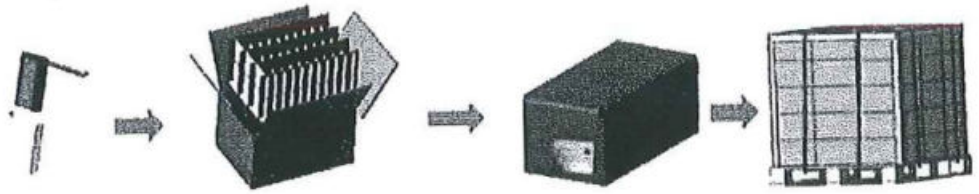
2.2 label 标贴:

Pack label
Font: Arial
Materials: Synthetic paper
Printing: Black font on white background
Size: 55*25*0.1mm

QR code: WD R083 D WW YY A XXXXX

- WD → Company name
- R083 → Model code
- D → Is the day of the week
- WW → Stands for week
- YY → Represents the year
- A → Stands for special distinguishing code
- XXXXX → Serial number

2.3 Schematic diagram of battery packaging 电池包装示意图:



每个电池装一个PE袋

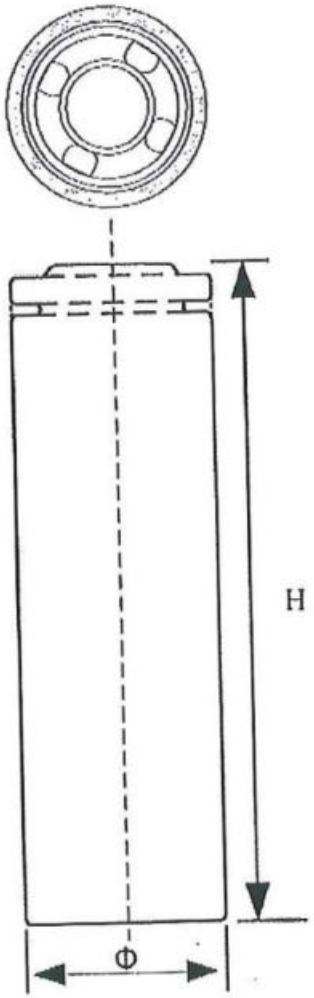
每箱装60PCS电池

封箱后空白处贴产品标签

每个卡板装5层，每层12箱，围护角，缠打包膜，再包装带拉紧

3.1 Cell specification 电芯规格:

No.	Item 项目	Parameter 参数
1	Cell model 电芯型号	INR21700-50E
2	Minimal capacity最小容量 (0.2C discharge current放电电流)	4900mAh
3	Typical capacity典型容量 (0.2C discharge current 放电电流)	5000mAh
4	Nominal voltage标称电压	3.7V
5	Cell charge ending voltage 电芯充电限制电压	4.2V
6	Cell Impedance 电芯内阻	≤30mΩ
7	Maximum Cell Diameter电芯最大直径	21.5mm
8	Maximum Cell Height 电芯最大高度	70.75mm



4. PCM Specification 保护板规格

4.1 PCM Characteristic 保护板特性 (at 25°C)

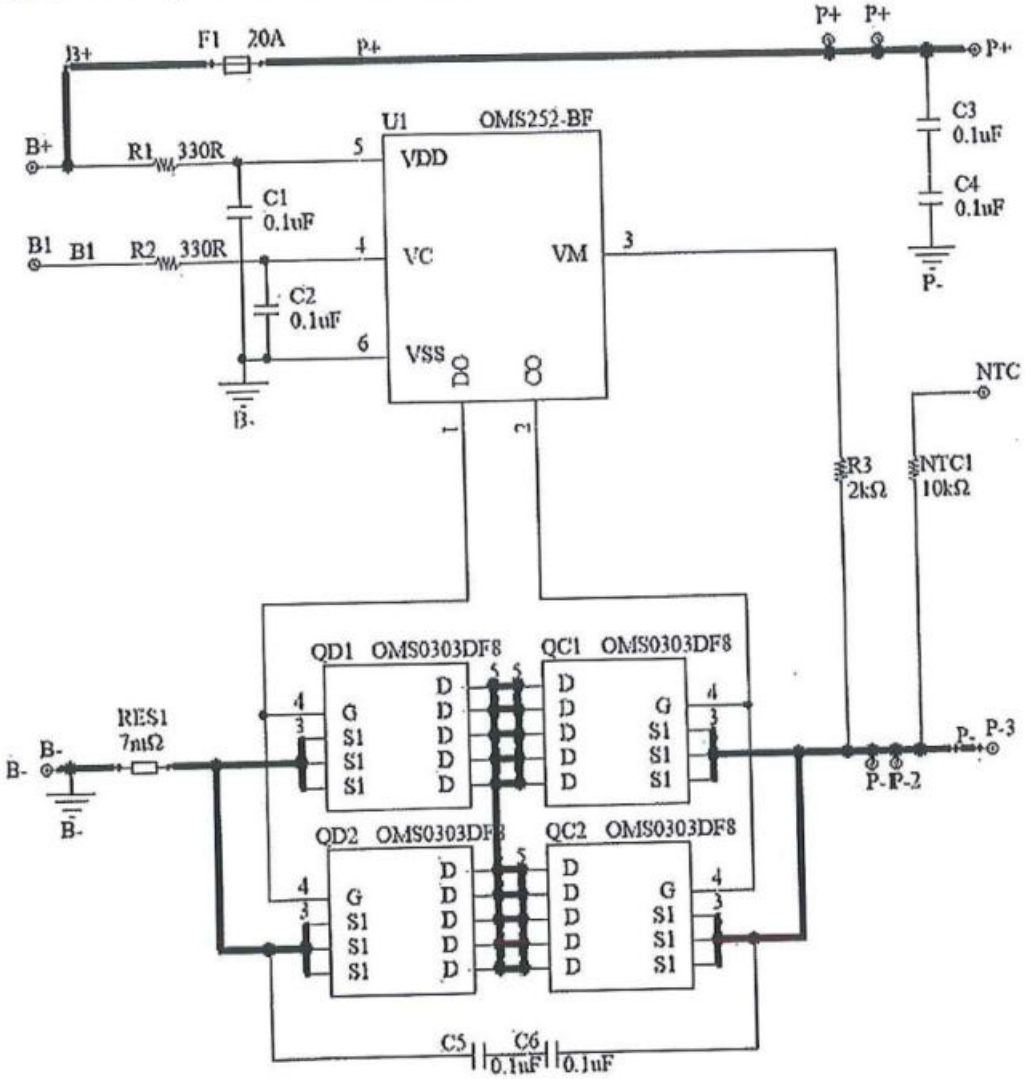
Items 项目		Min 最小值	Type 典型值	Max 最大值	unit 单位	特殊控制点
Cell Voltage Over-Charge Protection 单节过充保护	Over-Charge Voltage Protection(OVP) 过充保护电压	4225	4250	4275	mV	/
	Over-Charge Voltage Protection Delay Time (OVPDT) 过充保护延时	700	1000	1300	mS	/
	Over-Charge Voltage Protection Release (OVPR) 过充恢复电压	4000	4050	4100	mV	/
	Over-Charge Recovery policy 过充恢复策略	1、The maximum cell voltage is lower than the recovery voltage point 最高单体电压低于恢复电压 2、Discharge recovery 放电立即恢复				/
	Second Over-Charge Voltage Protection 二次过充保护电压	/	/	/	mV	/
	Second Over-Charge Voltage Protection Delay Time 二次过充保护延时	/	/	/	mS	/
Cell Voltage Over Discharge Protection 单体过放保护	Over-Discharge Voltage Protection (UVP) 过放电保护电压	2450	2500	2550	mV	/
	Over-Discharge Voltage Protection Delay Time (UVPDT) 过放电保护延时	64	128	256	mS	/
	Over-Discharge Voltage Protection Release (UVPR) 过放电恢复电压	2900	3000	3100	mV	/
	Over-Discharge Recovery Policy 过放电恢复策略	1、All cell voltages are greater than the recovery voltage point 最低单体电压高于恢复电压 2、Charge recovery 充电恢复				/
Over Charge Current	Over-Current Charge protection (OCDP) 充电过流保护电流	17	20	30	A	/

protection 充电过流保护	Over-Current Charge Protection Delay Time (OCPDT) 充电过流保护延时	4	8	20	mS	/
	Over-Current Charge Protection Release 充电过流保护恢复	Discharge Restore 放电恢复				/
Over Discharge Current Protection 放电过流保护	First Over Protection current 一级放电过流保护电流	17	20	30	A	/
	First Over Protection Delay Time 一级放电过流保护延时	4	8	20	mS	/
	Over- Discharge Charge Protection Release 放电过流保护恢复	1、Remove load 移除负载 2、Charge Restore 充电恢复				/
Charging function to 0 V battery 向0V电池的充电功能	/	ENABLE 允许				/
Short Circuit Protection 短路保护	Short Circuit Current Protection 短路保护电流	≥35A			A	/
	Short Circuit Current Protection Delay Time 短路保护延时	100	300	1000	μS	
	Short Circuit Protection Release 短路保护恢复	1、Charge Restore 充电恢复				
Balanced Voltage 均衡电压	Balanced Opening Voltage 均衡开启电压	/	/	/	V	/
	Balanced Opening Voltage Different 均衡开启压差	/			mV	/
	Equalizing closing differential pressure 均衡关闭压差	/			mV	/
	Balanced Opening Current均衡电流	/			mA	/
	Balanced Opening Mode均衡方式	/				/
Power Consumption 功耗	Working self consumption 工作自耗电	≤9			μA	/
Impedance空载内阻	≤60				mΩ	/
SOC linearity error SOC线性度误差	/					/
Current acquisition accuracy 电流采集精度	/					/

4.2 Port definition and connection 端口定义及连接图

端口名称	定义说明
B+	接电池组正极
B-	接电池组负极
P+	连接充放电正极
P-	连接充放电负极
B1	接电池1正极，电池2负极
NTC	连接NTC-10K

4.3 Circuit diagram and layout 电气原理图和布局图



5. Bill of Material (BOM) 物料清单

5.1 Battery Pack BOM 电池成品主要物料清单

No.	Material 物料	Description 描述	Quantity 用量	Manufactured 制造商
1	Cell 电芯	INR21700-50E	2	东磁
2	PCM 保护板	M2S1P-PCM-R083，38*21mm，FR4，双层，1oz	1	/
3	Connector 连接器	连接器 XHR-7P	1	/
4	保护 IC	OMS252-BF	1	万微
5	MOS transistor MOS 管	OMS0303DF8	4	万微
6	SMD NTC 贴片 NTC	10K,1%,B=3435K,1%,0603	1	卓英社

6.Environmental characteristics 环境特性

No.	Test item 测试项目	Test Method 测试方法	Pass Criteria 合格标准
1	Charged Storage Characteristics 荷电保持能力	Battery is fully charged by standard charge process. Battery idle at 25±2°C for 28days. At 25±2°C, Battery is discharged battery by 0.2C until 5V. 电池按标准充电流程满充电。在 25±2°C 放置 28 天。在 25±2°C 电池按 0.2C 放电到 5V.	Remain capacity≥standard capacity *90% 剩余容量≥标称容量*90%

7. Safety Test安全测试

Mic-power battery can meet several international safety standards. Below is part of safety tests which are referred to international standard.

广东微电新能源有限公司的电池能达到多个国际电池安全标准。以下是部分安全测试项目。

No.	Test item 测试项目	Test Method 测试方法	Criteria 标准
1	Constant Humidity and Temperature test 恒定湿热测试	Battery is fully charged by standard charge process. Then, Battery is put into chamber with constant humidity(90~95%) and temperature (40±2°C) for 48hrs. After test, battery idle for 2hrs at 25±2°C and discharge by 0.5C to Protection voltage. 电池按标准充电流程满充电。之后电池放在恒温箱 48 小时，湿度为 90~95%和温度为 40±2°C。测试后，电池在 25±2°C下搁置 2 小时 以 0.5C 放电至保护电压。	No fire, No leakage, No explosion 无起火，无漏液，无爆炸
2	Overcharge Test 过充电测试	The battery is charged according to the standard current, the charging voltage is higher than the overcharge protection voltage, and the battery pack has protection action. 电池按标准电流充电，充电电压高于过充保护电压，电池组有保护动作.	No fire, No explosion, Function should be OK 无起火，无爆炸，功能正常
3	Over discharge Test 过放电测试	After the battery is fully charged with the standard charging current under the condition of 25±2°C, the battery pack is discharged to the protection action at its maximum discharge current, and the battery pack is static for 10Min after discharge, and continues to be fully charged according to the standard charging current. 电池在 25±2°C条件下，用标准充电电流充满电后，以其最大放电电流恒流放电，将电池组放电至保护动作，放电后静止 10Min，并继续按照标准充电电流充满电。	No fire, No explosion, Function should be OK 无起火，无爆炸，功能正常
4	Short test 短路测试	Battery is fully charged by standard charge process. Then, Battery anode and cathode connected to 80±20mΩ load for 1hour. 电池按标准充电流程满充电。电池的正负极连接到 80±20mΩ负载 1 小时。	No fire, No explosion 无起火，无爆炸

5	Heating test 温度冲击试验	After battery is fully charged, placed in 72±2℃ for 6h, then -40±2℃ for 6h. The high temperature alternates with low temperature per 30min, carry out 10cycles. After the test, continue testing performance of the battery after being kept 24h at room temperature. 电池包充满电后放入 72±2℃保持 6h，-40±2℃保持 6h，高低温转换时间为 30min，循环 10 次，试验结束后，在常温条件搁置 24h 后测试电池包的性能。	No fire, No explosion 电池应不起火、不爆炸。
6	Drop Test 掉落测试	Battery is fully charged by standard charge process. Battery is free fall from a height of 1m on the cement floor, from X-axis、Y-axis positive and negative direction. Each direction is free fall 1 time. 电池按标准充电流程满充电。 电池从 1 米高处自由跌落到水泥地板上， 从 X 轴、Y 轴的正负方向，每个方向自由跌落一次。	No fire, No explosion 无起火，无爆炸
7	Vibration 振动	Battery is fully charged by standard charge process. Battery is secured to the testing machine by means of a rigid mount which will support all mounting surfaces of the Battery. The Battery is subjected to a total of two shocks of equal magnitude. The shocks are to be applied in each of two mutually perpendicular directions. For each shock the Battery is accelerated in such a manner that during the initial 3ms the minimum average acceleration is 75g. The peak acceleration shall be between 125 g and 175 g. Battery is tested at 20±5℃ 电池按标准充电流程满充电。 在环境温度下，将电池分别按二个轴向固定在测试台面上，前 3ms 内平均加速度最少达到 75g（g 为重力加速度），峰值加速度达 125g 至 175g。 电池测试温度为 20±5℃	No fire, No explosion, 无起火，无爆炸

8. Performance and Test Criteria 电池性能和测试标准

8.1 Standard Test Criteria标准测试标准

If test criteria is not defined, test should be done under the below standard test criteria.

如果测试标准没有定义，测试标准会按以下测试完成。

Test Criteria测试标准	Parameters 参数
Ambient Temperature 环境温度	25±2°C
Relative Humidity 相对湿度	65±20%
Atmospheric pressure 大气压力	86~106 kPa
Charge 充电	Standard charge process 标准充电流程
Discharge 放电	Standard discharge process 标准放电流程
Delivery Time from Mic-Power 从微电发出时间	Within 1month 一个月内

8.2 Visual Inspection 外观检查

No crack, no leakage

没有破裂，没有漏液

8.3 Measuring Instrument Standard 测量仪器标准

Instrument 仪器	Standard 标准
Instrument to measure dimension 测试尺寸仪器	Precision scale : 0.01mm 精度: 0.01mm
Voltmeter伏特计	Internal impedance < 10kΩ/V 内阻 < 10kΩ/V
Ammeter 安培计	Impedance of ammeter and wires < 0.01Ω 安培计和电线内阻 < 0.01Ω
Impedance meter 阻抗计	Impedance is measured by sinusoidal 1kHz AC current 内阻测试用1kHz正弦交流电流

8.4 Standard charge process 标准充电流程

Battery pack is charged by 0.2C constant current at 25±2°C until 8.4V,Then, Battery is charged by constant voltage until current drop to 0.02C.

在25±2°C，电池成品以0.2C恒流电流充电直到8.4V，电池用恒压充电直到电池电流降到0.02C。

8.5 Standard discharge process 标准放电流程

Battery pack is discharged by 0.2C continuous current at 25±2°C until the voltage drop to 5V。

在25±2°C，电池成品以0.2C连续放电电流放电直到5V。

8.6 Maximum charge current 最大充电电流

Battery pack is charged by 1C constant current at 25±2°C until 8.4V, Then, battery pack is charged by constant voltage at 8.4V until current drop to 0.02C.

在25±2℃，电池成品以1C恒流电流充电直到8.4V，电池用恒压充电直到电池电流降到0.02C。

8.7Maximum discharge current 最大放电电流

Battery pack is discharged by 3C continuous current at 25±2°C until the voltage drop to 5V.

在25±2℃，电池成品以3C连续放电电流放电直到5V。

8.8 Initial impedance 初始内阻值

Battery pack is fully charged by standard charge process.

The impedance of fully charged Battery is tested by AC impedance tester at 1kHz. The initial impedance should be≤180mΩ.

电池成品用标准充电流程充满电。再使用交流阻抗测试仪（at 1KHz）测量初始内阻。电池初始内阻应≤180mΩ.

8.9 Initial capacity 初始容量值

Battery pack is fully charged by standard charge process and then Battery is fully discharged by standard discharge process.

The initial capacity is≥4900mAh.

电池成品用标准充电流程充满电。电池再用标准放电流程放完电。电池初始容量≥4900mAh。

8.10 Cycle life 循环寿命 (RT:25±2°C)

Test procedure 测试步骤:

Step 1: Battery pack is charged by 0.5C constant current at 25±2°C until 8.4V .Then, Battery is charged by constant voltage at 8.4V until current drop to 0.05C.

Step 2: Wait for 10mins

Step 3: Battery pack is discharged by 1C continuous current at 25±2°C until the voltage drop to 5V.

Step 4: Wait for 10mins

Step 5: Repeat step1 to step 4 until discharge capacity is less than 80% of initial battery capacity. Cycle life should be more than or equal to 700 cycles.

1) 电池成品在 25±2°C 按 0.5C 恒流充电直到 8.4V。再用 8.4V 恒压充电直到充电电流小于 0.05C。
2) 等待 10 分钟
3) 电池成品在 25±2°C 按 1C 恒流放电直到 5V
4) 等待 10 分钟
5) 重复 1）到 4），直到放电容量小于初始容量 80%。
   循环寿命需要大于等于 700 周。

9. Usage of battery 使用电池

Guangdong Mic-power New Energy Co., LTD. Ltd **DO NOT** take responsibility if customer **DO NOT** follow the specification and below instruction using the battery.
如果客户**没有**按规格书和以下说明使用电池，广东微电新能源将**不负**任何责任。

To have good performance of battery, battery should follow this battery specification to use and storage.
Recommend to charge battery every 6months using standard charge process.
To use the battery safe, battery is prohibited to disassemble, drop, heat, burn, soak, crush, shock, short circuit.
Enough insulation inside the customer's end product is required to avoid the short circuit of the battery.
Battery should have enough space to install inside the customer's end product. Please use the maximum dimension of battery pack after cycle life to reserve the space.
To protect the battery, battery should be installed in the customer's end product with strong mechanical strength.
Any movement of the battery in the end product should be avoided.
Do not use any chargers other than those recommended.
Do not reverse the positive (+) and negative (-) terminals.
Do not use the battery in combination with primary batteries (such as dry-cell batteries) or batteries of different capacity, type or brand.
If battery has any abnormal feature such as battery cannot be charged and discharge, abnormal heat generate, deformation, smelling of electrolyte or leakage, battery should be stopped to use immediately. Battery with smelling of electrolyte or leakage should be placed away from fire. Electrolyte is harmful. If electrolyte is contacted the skin or eyes, please flush electrolyte by purified water and consult doctor.
为了电池保持良好的性能，电池需要按本规格书使用和储存。
建议电池每6个月按标准充电流程充电一次。
为了安全使用电池，电池禁止拆解，掉落，加热，焚烧，浸泡，挤压，撞击，短路。
客户终端产品需要有足够的绝缘，避免电池被短路。
客户终端产品需要有足够的空间组装电池。空间需求请按规格书中循环后的电池成品最大尺寸进行设计。
客户终端产品需要有强力的结构保护电池。
请避免电池在客户终端产品中能移动。
请使用专用充电器。
勿将正负极接反。
禁止与一次电池（如干电池）或不同容量、型号、品种电池组合使用。
如果电池有异常特征，比方说电池不能充放电，发热异常，变形，有电解液气味或漏夜，电池应马上停止使用。
电池有电解液气味或漏夜须要远离火种。电解液是有害的。如果电解液接触到皮肤或眼睛，请马上用纯净水冲洗和就医。

10. Warranty 保证期

Guangdong Mic-power New Energy Co., LTD guarantees the battery at good condition within **12months** when battery is delivered from Mic-power factory.

广东微电新能源保证电池从出厂日起**12个月内**功能良好

11. Others 其他

11.1 Prohibition of disassembly 禁止拆卸

1) Never disassemble the cells The disassembling may generate internal short circuit in the cell, which may cause gassing, firing, explosion, or other problems.

2) Electrolyte is harmful LIP battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.

1) 不要拆卸电池。 拆卸电池会发生电池内部短路，会引起起火、爆炸、有害气体或者其它问题。

2) 电解液是有害的万一电解液沾到皮肤、进入眼睛，应立即用清水冲洗以及求助医生。

11.2 Prohibition of dumping of battery into fire 不要把电池倾倒于火中

Never incinerate nor dispose the cells in fire. These may cause explosion of the cells, which is very Dangerous and is prohibited.

不要焚烧电池，否则会致电池爆炸，这很危险，必须禁止。

11.3 Prohibition of use of damaged battery 禁止使用损坏的电池

The cells might be damaged during shipping by shock. If any abnormal features of the cells are found such as damages in a plastic envelop of the cell, deformation of the cell package, smelling of an electrolyte, an electrolyte leakage and others, the cells shall never be used any more. The Cells with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing or explosion.

电池可能在出货途中碰撞而受损。如果发现电池有异常，例如包装损坏、电池包裹变形，有电解液的味道、发现漏液等等，不要再使用这些电池。电池如果有电解液的味道或者出现漏液，电池放置应该远离 火源避免起火及爆炸。

11.4 Any other items are not covered in the specification shall be agreed by both parties. The right of final interpretation belongs to Guangdong Mic-power New Energy Co., LTD.

任何本规格书没有包括的事项，需要双方协议确定。最终解释权归广东微电新能源有限公司所有。