



-EVE Power CO., LTD Confidential Proprietary-

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

# Product Specification

## 产品规格书

Prismatic LFP Li-ion Battery

方形铝壳磷酸铁锂电池

Model 型号: LF100LA

Drafted by 编制	Product Design Checked by 产品设计审核	Quality Checked by 品质审核	Sales Checked by 销售审核	Approved by 批准
陈鹏	王华	李嘉琪	刘恒	苑丁丁

Customer Recipient 客户接收栏

Company 公司名称:

Approved by 批准:

Date 日期:

April, 2022

EVE Power Co., Ltd 湖北亿纬动力有限公司



-EVE Power CO., LTD Confidential Proprietary-

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

### Customer Requirements

The specific requirements of customer should be provided and communicated with EVE Power. If the customer has special applications or working conditions other than those described in this specification, EVE can design and manufacture the product according to the customer's special requirements.

### 客户要求

要求客户写出他们的需求信息并提前与亿纬动力沟通。如果客户有一些特别的应用或者工作条件不同于此文件中所描述的，亿纬动力可以根据客户的特别要求进行产品的设计和生产。

No.	Requirements 特殊要求	Standards 标准
1		
2		
3		
4		
5		

Customer Code 客户代码: \_\_\_\_\_ Signature 签字: \_\_\_\_\_ Date 日期: \_\_\_\_\_



Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

## Contents

Customer Requirements .....	i
客户要求 .....	i
Change History .....	ii
Term Definition.....	v
术语定义 .....	v
1. Basic Information 基本信息.....	1
1.1. Scope 适用范围.....	1
1.2. Product Type 产品类型 .....	1
1.3. Model 产品名称 .....	1
2. Battery Specification 电池规格.....	1
2.1. Basic Parameters 电池基本参数 .....	1
2.2. Product Parameters 产品规格.....	2
2.2.1. Dimension and Weight 尺寸、重量标准 .....	2
2.2.2. Electrical Performance Index 电性能指标 .....	2
2.2.3. Safety Performance Index 安全性能指标 .....	3
2.3. Battery Drawing 电池图纸.....	4
2.4. Appearance 外观.....	4
3. Testing Conditions 试验条件 .....	4
3.1. Environmental Conditions 环境条件 .....	4
3.2. Measurement Instrument 测量设备.....	4
3.3. Testing Clamp Preparation 测试夹具准备 .....	5
3.4. Testing Clamp Installation 测试夹具安装 .....	5
3.5. Standard Charge 标准充电方式 .....	6
3.6. Standard Discharge 标准放电方式 .....	6
3.7. Testing Methods 测试方法 .....	6
3.7.1. Dimension 尺寸 .....	6
3.7.2. Weight 重量 .....	6
3.7.3. Electrical Performance 电性能 .....	7
3.7.4. Safety Performance 安全性能 .....	9
4. Charge and Discharge Parameters 充放电参数.....	11
4.1. Charge Mode 充电模式.....	11
4.1.1. 充电模式参数.....	11
4.1.2. 其它充电模式.....	12
4.2. Discharge Mode 放电模式 .....	12
4.2.1. 放电模式参数.....	12

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
4.2.2.	其它放电模式				13
4.3.	脉冲模式				13
4.3.1.	脉冲充电模式				13
4.3.2.	脉冲放电模式				14
5.	Safety Limits 安全限制				14
5.1.	Voltage Limits 电压限制				14
5.2.	Temperature Limits 温度限制				15
6.	Battery Operation Instruction and Precautions 电池操作说明及注意事项				16
6.1.	Product End-life Management 产品寿命终止管理				16
6.2.	Long-term Storage 长期存储				16
6.3.	Transportation 运输				16
6.4.	Operation Precautions 操作说明				16
6.5.	Disclaimer 免责声明				17
6.6.	Other 其它				18
7.	Contact Information 联系方式				18
7.1.	Warning Declaration 警示声明				18
7.2.	Types of Dangerous 危险类型				18
8.	Contact Information 联系方式				19
9.	LF100LA Drawing 电池图纸				19

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

**Term Definition**

**术语定义**

**Product 产品:**

Refers to rechargeable prismatic LF100LA LFP battery with aluminum shell manufactured by EVE Power Co., Ltd. in this specification.

本规格书中的“产品”是指湖北亿纬动力有限公司生产的 LF100LA 可充电方形铝壳 LFP 锂离子电池。

**Customer 客户:**

Refers to the buyer in EVE Power Sales Contract.  
指《湖北亿纬动力有限公司产品销售合同》中的买方。

**Environment Temperature 环境温度:**

Surrounding environmental temperature where the battery is located.  
电池所处的周围环境温度。

**Battery Temperature 电池温度:**

Temperature measure by the temperature sensor installed at the center of battery surface.  
由接入电池表面中心的温度传感器测量的电池的温度。

**Rate 倍率:**

The ratio of the charge-discharge current to the rated capacity of the battery is indicated by the letter C. For example, if the battery capacity is 100.0Ah, when the charging or discharging current is 100.0A corresponding to the charging or discharging rate of 1C.

充/放电电流与电池的额定容量值的比率，用字母 C 表示。例如，电池容量为 100.0Ah，当充电或放电电流为 100.0A 时，则充电或放电倍率为 1C。

**State of Charge 荷电状态:**

The ratio of the battery capacity state to the rated capacity can be abbreviated by SOC with the unit of ampere-hours or watt-hours under the unloaded conditions. For example, if the capacity of 100.0Ah is regarded as 100% SOC, the capacity is 0Ah corresponding to 0% SOC at a current of 0.5C.

在无负载的情况下，以安培小时或者以瓦特小时为单位计量的电池容量状态与额定容量的比值，缩写用 SOC 表示。如：若将容量为 100.0Ah 的状态视为 100%SOC，则容量为 0Ah 时，SOC 为 0%（电流为 0.5C）。

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

**Cycle 循环：**

The battery is charged and discharged once time according to the prescribed charging and discharging standards for a cycle.

电池按规定的充放标准充放一次为一个循环。

**Standard Charge 标准充电：**

The charging mode is described in 3.5 of this specification.

本规格书第 3.5 条所述的充电模式。

**Standard Discharge 标准放电：**

The discharge mode is described in 3.6 of this specification.

本规格书第 3.6 条所述的放电模式。

**Open Circuit Voltage 开路电压：**

Open-circuit voltage refers to the potential difference between the positive and negative electrodes when the battery passes without any current. The abbreviation is expressed by OCV.

开路电压是指电池无电流通过时正负极之间的电位差，缩写用 OCV 表示。

**DC Resistance 直流电阻：**

The ratio of the battery voltage change to the corresponding current change under operating conditions is indicated by DCR, and the test method is shown in section 3.7.3.4 of this specification.

工作条件下电池的电压变化与相应的电流变化之比，缩写用 DCR 表示，测试方法如本规格书第 3.7.3.4 条所述。

**Pulse Current 脉冲电流：**

The current that appears periodically is called pulse current, the pulse current appears either in the same direction or in alternating positive and negative directions.

以周期重复出现的电流称为脉冲电流，脉冲电流或是以同一方向出现，或是以正、负交替变换方向出现。

**Compression Force 预紧力：**

When the module is assembled, the safety margin of the compressive force which the battery can withstand.

模组组装时，电池可承受压缩力的安全边界。

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

**Units:** Refer to following table

**测量单位:** 见下

Table 1 Unit of measurement

表 1 测量单位

No.	Unit 单位	Abbreviation 简写	Type 单位类型
1	Volt 伏特	V	Voltage 电压
2	Ampere 安培	A	Current 电流
3	Ampere-Hour 安培-小时	Ah	Capacity 容量
4	Watt-Hour 瓦特-小时	Wh	Energy 能量
5	Ohm 欧姆	$\Omega$	Resistance 电阻
6	MilliOhm 毫欧姆	m $\Omega$	Resistance 电阻
7	Degree Celsius 摄氏度	$^{\circ}\text{C}$	Temperature 温度
8	Millimeter 毫米	mm	Length 长度
9	Second 秒	s	Time 时间
10	Hertz 赫兹	Hz	Frequency 频率

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

## 1. Basic Information 基本信息

### 1.1. Scope 适用范围

This specification is applied to prismatic LFP battery of LF100LA with aluminum shell manufactured by EVE Power Co., Ltd.

本产品规格书适用于湖北亿纬动力有限公司生产的 LF100LA 方形铝壳锂离子电池。

### 1.2. Product Type 产品类型

Prismatic LFP Battery with aluminum shell 方形铝壳锂离子电池。

### 1.3. Model 产品名称

LF100LA

## 2. Battery Specification 电池规格

### 2.1. Basic Parameters 电池基本参数

Table 2 Basic parameters of battery

表 2 电池基本参数

Items 项目	Parameters 参数	Remarks 备注
Rated Capacity 额定容量	102Ah	0.2C, 25°C±2°C, 2.5-3.65V
Rated Energy 额定能量	320Wh	0.2C, 25°C±2°C, 2.5-3.65V
ACR 交流内阻	≤0.5mΩ	AC, 1kHz, 25%SOC
Nominal Voltage 标称电压	3.2V	0.2C, 25°C±2°C, 2.5-3.65V
Weight 重量	1985±100 g	/
Charging Cut-off Voltage 充电限制电压(U <sub>max</sub> )	3.65V	/
Discharging Cut-off Voltage 放电截止电压(U <sub>min</sub> )	2.5 (0°C<T≤65°C) 2.0 (-20°C<T≤0°C)	/
Charging/ Discharging 充/放电	Standard Charging/Discharging Current 标准充/放电电流	0.2C/0.2C 25°C±2°C

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
	Maximum charging current 最大充电电流	1C	25°C±2°C		
Cycling Performance 循环性能	25°C Standard Cycle 25°C标准循环	5000 Cycles, 0.5C/0.5C	Capacity Retention≥80%. 容量保持率≥80%		
	35°C Standard Cycle 35°C标准循环	3500 Cycles, 0.5C/0.5C			
	45°C Standard Cycle 45°C标准循环	2000 Cycles, 0.5C/0.5C			
Operation Temperature 工作温度	Charging Temperature 充电温度	0~65°C	/		
	Discharging Temperature 放电温度	-20~65°C	/		
Storage Temperature 存储温度	>1 month, >1 个月	0~35°C	Delivery SOC State (20~40%) 出货 SOC 状态(20~40%)		
	≤1 month, ≤1 个月	-20~45°C			

2.2. Product Parameters 产品规格

2.2.1. Dimension and Weight 尺寸、重量标准

Table 3 Battery size and weight index  
表 3 电池尺寸重量指标

No.	Items 项目		Parameters 参数	Testing Methods 测试方法章节
1	Dimension 尺寸	Terminal Height 总高(H)	118.5±0.5mm	3.7.1
		Shoulder Height 肩高(h)	115.7±0.5mm	
		Width 宽度(L)	160.0±0.8mm	
		Thickness 厚度(T)	50.1±0.5mm (200kgf, Delivery SOC)	
2	Weight 重量	/	1985±100g	3.7.2

2.2.2. Electrical Performance Index 电性能指标

Table 4 Battery electrical performance index  
表 4 电池电性能指标

No.	Items 项目	Parameters 参数	Testing Methods
-----	----------	---------------	-----------------

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
				测试方法章节	
1	Capacity 容量	0.2C Capacity 0.2C 容量	$\geq 102\text{Ah}$	3.7.3.1	
2	Temperature Discharge Performance 高低温放电性能	-20°C Capacity Retention -20°C 容量保持率	$\geq 55\%$	3.7.3.2	
		0°C Capacity Retention 0°C 容量保持率	$\geq 80\%$		
		10°C Capacity Retention 10°C 容量保持率	$\geq 85\%$		
		55°C Capacity Retention 55°C 容量保持率	$\geq 99\%$		
3	Rate Discharge Performance 倍率放电性能	25°C, 0.5C Capacity Retention 25°C, 0.5C 容量保持率	$\geq 100\%$	3.7.3.3	
		25°C, 1C Capacity Retention 25°C, 1C 容量保持率	$= 100\%$		
		25°C, 2C Capacity Retention 25°C, 2C 容量保持率	$\geq 98\%$		
		25°C, 2.5C Capacity Retention 25°C, 2.5C 容量保持率	$\geq 95\%$		
4	DCR 直流内阻	25°C_0.2C_30s & 1C_5s @50%SOC	$\leq 1.5\text{m}\Omega$	3.7.3.4	
5	Energy Efficiency 能量效率	25°C, Energy Efficiency 25°C, 0.5C 能量效率	$\eta \geq 93\%$	3.7.3.5	
6	Floating Charge 浮充性能	25°C 15 Years 25°C 浮充 15 年	$\geq 70\%$	3.7.3.6	
7	Cycling Performance 循环性能	25°C 0.5C/0.5C, 5000 Cycles 25°C 0.5C/0.5C, 5000 次	Capacity Retention $\geq 80\%$ 容量保持率 $\geq 80\%$	3.7.3.7	
		35°C 0.5C/0.5C, 3500 Cycles 35°C 0.5C/0.5C, 3500 次			
		45°C 0.5C/0.5C, 2000 Cycles 45°C 0.5C/0.5C, 2000 次			
8	Storage Performance 存储性能	100%SOC, 25°C, 28 days 100%SOC, 25°C, 28 天	Capacity Recovery $\geq 96\%$ 容量恢复率 $\geq 96\%$	3.7.3.8	
		100%SOC, 45°C, 28 days 100%SOC, 45°C, 28 天	Capacity Recovery $\geq 90\%$ 容量恢复率 $\geq 90\%$		

### 2.2.3. Safety Performance Index 安全性能指标

Table 5 Battery safety performance index  
表 5 电池安全性能指标

No.	Items 项目	Standard 标准	Testing Methods 测试方法章节
-----	----------	-------------	------------------------

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
1	Overcharge 过充电	No fire, No explosion 不起火、不爆炸		3.7.4.1	
2	Overdischarge 过放电	No fire, No explosion 不起火、不爆炸		3.7.4.2	
3	External Short Circuit 外部短路	No fire, No explosion 不起火、不爆炸		3.7.4.3	
4	Extrusion 挤压	No fire, No explosion 不起火、不爆炸		3.7.4.4	
5	Drop 跌落	No fire, No explosion 不起火、不爆炸		3.7.4.5	
6	Low Pressure 低气压	No fire, No explosion, No liquid leakage 不起火、不爆炸、不漏液		3.7.4.6	

### 2.3. Battery Drawing 电池图纸

See Figure 5.

见图 5。

### 2.4. Appearance 外观

The battery should have no obvious scratches, cracks, rust stains, discoloration, or electrolyte leakage, which have any defects that affect the commercial value of the battery.

电池应无明显擦伤、裂痕、锈渍、变色或电解液泄漏这类对电池商用价值有影响的缺陷。

## 3. Testing Conditions 试验条件

### 3.1. Environmental Conditions 环境条件

Unless otherwise specified, the test should be carried out in an environment with a temperature of  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , a relative humidity of 15%-90% RH, and an atmospheric pressure of 86 kPa to 106 kPa. The ambient temperature mentioned in this specification refers to  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ .

除另有规定外，试验应在温度为  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ，相对湿度 15%-90% RH，大气压力为 86 kPa~106 kPa 的环境中进行。本规格书所提到的室温，是指  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 。

### 3.2. Measurement Instrument 测量设备

The accuracy of measuring instruments and meters should meet the following requirements:

测量仪器、仪表准确度应满足以下要求：

- 1) Voltage measuring device 电压测量装置:  $\pm 0.1\%$ ;
- 2) Current measuring device 电流测量装置:  $\pm 0.1\%$ ;
- 3) Temperature measuring device 温度测量装置:  $\pm 0.5^{\circ}\text{C}$ ;

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

4) Dimension measuring device 尺寸测量装置:  $\pm 0.01\text{mm}$ ;

5) Weight measuring device 重量测量装置:  $\pm 0.1\text{g}$ .

### 3.3. Testing Clamp Preparation 测试夹具准备

The single battery needs to be clamped with steel splints (thickness:  $\geq 10\text{ mm}$ ). The splints need to cover the large surface of the battery. The splints are fixed with 6 M10 bolts. All sides of the splints need to be covered with insulating film, as follows:

单体电池需采用钢夹板 (厚度:  $\geq 10\text{ mm}$ )固定, 夹板需要覆盖住电池大面, 夹板之间采用 6 个 M10 螺栓固定, 且夹板各个面均需用绝缘膜包覆, 夹具工装如下图所示:

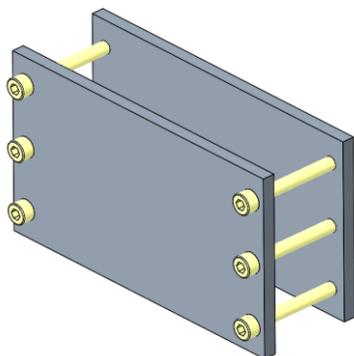


Fig. 1 Schematic diagram of battery clamp  
图 1 电池夹具示意图

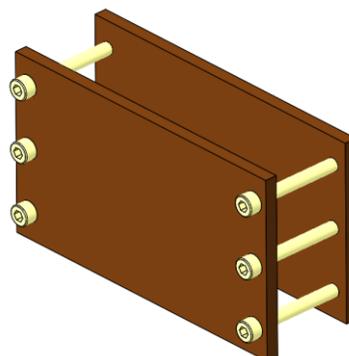


Fig. 2 Insulation film of battery clamp  
图 2 电池夹具包绝缘膜图

### 3.4. Testing Clamp Installation 测试夹具安装

Place the battery covered with blue film and top film in the middle of the clamp, and the initial compression force is  $(200\pm 20)\text{ kgf}$ .

将包覆有蓝膜和顶贴片的电池置于夹具中间, 初始预紧力为  $(200\pm 20)\text{kgf}$ 。

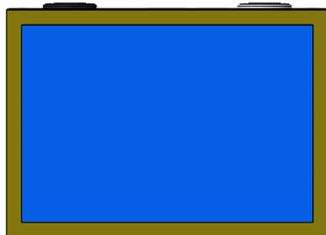


Fig. 3 Schematic diagram of battery coating  
图 3 电池包膜示意图

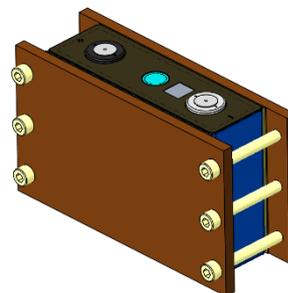


Fig. 4 Side view of battery shaft  
图 4 电池轴测图

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

### 3.5. Standard Charge 标准充电方式

The battery is charged at a constant current of 0.2C to 3.65V under the condition of an ambient temperature of 25°C±2°C, and then transfers to constant voltage charging at 3.65V until the charging current is less than or equal to 0.05C, and rest for 30min.

标准充电是在环境温度 25°C±2°C的条件下，对电池以 0.2C 的电流恒流充电至 3.65V，然后在 3.65V 下转恒压充电，直至充电电流小于等于 0.05C，搁置 30min。

### 3.6. Standard Discharge 标准放电方式

The battery is discharged at 0.2C constant current until the voltage reaches 2.5V cutoff under an ambient temperature of 25°C ± 2°C, and rest for 30min.

标准放电是在环境温度 25°C±2°C的条件下，电池以 0.2C 的电流恒流放电，放电至电压达到 2.5V 截止，搁置 30min。

### 3.7. Testing Methods 测试方法

#### 3.7.1. Dimension 尺寸

Testing Instrument 试验设备:

CMM Measuring Instrument CMM 测量仪

Testing Method 试验方法:

Use CMM Measuring instrument to measure the width, height, and thickness (200kgf) of the battery.

使用 CMM 测量仪测量电池宽度、高度和厚度(200kgf 下)。

\*The thickness of the battery will increase as the SOC increases, and it will increase along with usage. The thickness in this specification indicates the thickness of the battery at the time of shipment (20%~40% SOC).

\*电池厚度随着 SOC 增加会有所增加，随着使用时间增加会有所增加，此处厚度指出货时电池的厚度(出货时 20%~40%SOC)。

#### 3.7.2. Weight 重量

Test Instrument 实验设备:

Electronic Scale 电子秤

Test Method 试验方法:

Use an electronic scale to measure the weight of the battery.

使用电子秤测量电池的重量

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

### 3.7.3. Electrical Performance 电性能

#### 3.7.3.1. 0.5C Discharge Capacity 0.5C 放电容量

Under the condition of an ambient temperature of  $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ , the battery is discharged to 2.5V and rests for 30min, then charged to 3.65V by standard charge mode (3.5) and then discharged to 2.5V a current of 0.5C, the final discharge capacity  $C_0$  are 0.5C capacity.

在环境温度  $25\pm 2^{\circ}\text{C}$  的条件下, 1) 电池以 0.2C 恒流放电至 2.5V, 静置 30min; 2) 电池按照 (3.5) 进行标准充电; 3) 再以 0.5C 恒流放电至截止电压 2.5V, 记录 0.5C 容量为  $C_0$ 。

#### 3.7.3.2. Temperature Discharge Performance 高低温放电性能

1) The battery is discharged to 2.5V by standard discharge mode (3.6), 2) The battery is charged to 3.65V by standard charge mode (3.5), 3) The battery stands at X °C for 4h and then discharged to the corresponding cutoff voltages, rests for 30min, record the discharge capacity  $C_1$ ,  $C_1/C_0$  is the capacity retention rate, 4) The battery stands at 25 °C for 4h and then 5) repeats the steps 2-4 to obtain the discharge capacity and capacity retention rate at different temperatures.

Note: the cut-off voltages of x = - 20, 0, 10 and 55 °C correspond to 2.0, 2.0, 2.5 and 2.5V, respectively.

1) 电池按照 (3.6) 进行标准放电; 2) 电池按照 (3.5) 进行标准充电; 3) 电池在 X °C 环境下搁置 4 小时, 然后以 0.5C 的电流恒流放电至放电截止电压, 静置 30min, 记录放电容量  $C_1$ ,  $C_1/C_0$  即为容量保持率; 4) 将温度调整至 25°C, 静置 4h; 5) 重复 2~4 工步, 得到不同温度的放电容量及容量保持率。

备注: 温度 X=-20, 0, 10 和 55°C 对应的截止电压分别为 2.0、2.0、2.5 和 2.5V。

#### 3.7.3.3. Rate Discharge Performance 倍率性能

1) The battery is discharged to 2.5V by standard discharge mode (3.6), 2) The battery is charged to 3.65V by standard charge mode (3.5), 3) The battery stands at 25°C for 4h and then discharged to 2.5V at a current of XC, the discharge capacity is recorded as  $C_2$ ,  $C_2/1C$  discharge capacity is the capacity retention rate, and then 4) repeats the steps 2-3 to obtain the discharge capacity and capacity retention rate at different rate. (X=0.5, 1, 2 and 2.5C)

1) 电池按照 (3.6) 进行标准放电; 2) 电池按照 (3.5) 进行标准充电; 3) 电池在 25°C 下搁置 4h, 再以 XC 恒流放电至截止电压 2.5V, 其中放电容量记为  $C_2$ ,  $C_2/1C$  放电容量即为容量保持率; 4) 重复 2~3 工步, 得到不同倍率的放电容量与容量保持率。(X=0.5、1、2 和 2.5C)

#### 3.7.3.4. DCR 直流内阻

1) The battery is discharged to 2.5V by standard discharge mode (3.6), 2) The battery is charged to 3.65V by standard charge mode (3.5), 3) The battery is discharged at 0.5C for 1h, rests for 30min (adjust the SOC to 50%), 4) The battery is discharged at a constant current of 0.2C for 30s, the voltage after discharge is recorded as  $V_{0.2c}$ , then further discharged with a constant current of 1C for 5s, the voltage after discharge is recorded as  $V_{1c}$ , 5) The DCR is calculated by  $(V_{0.2c}-V_{1c})/(I_{1c}-I_{0.2c})$ .

1) 电池按照 (3.6) 进行标准放电; 2) 电池按照 (3.5) 进行标准充电; 3) 电池以 0.2C 放 2.5h (恒流放电

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

50%DOD), 搁置 30min; 4) 电池以 0.2C 恒流放电 30 秒, 接着以 1C 恒流放电 5 秒, 两个倍率恒流放电之间无搁置, 分别记录 0.2C 与 1C 放电结束时电压为  $V_{0.2c}$  与  $V_{1c}$ , 5) 0.2C 放电与 1C 放电结束时的电压差除以对应电流差值的比  $(V_{0.2c}-V_{1c})/(I_{1c}-I_{0.2c})$  即为该 SOC 下的 DCR。

### 3.7.3.5. Energy Efficiency 能量效率

The battery is discharged to 2.5V by standard discharge mode (3.6), 2) The battery is charged to 3.65V by standard charge mode (3.5), 3) The battery is discharged to 2.5V by standard discharge mode (3.6), 4) The battery is discharged to 2.0V at a current of 1C and rests for 60min, 5) The battery is charged to 3.65V at a constant current of 0.5C, rests for 60min, record the charge energy  $E_0$ , 6) The battery is discharged to 2.5V at a constant current of 0.5C and rests for 60min, record the discharge energy  $E_1$ , 7) Repeat steps from 5 to 6 for 4 times, energy efficiency  $\eta=E_1/ E_0$ . Take the average value of  $\eta$  for 3 times after the cycle as the judgment basis.

1) 电池按照 (3.6) 进行标准放电; 2) 电池按照 (3.5) 进行标准充电; 3) 电池按照 (3.6) 进行标准放电; 4) 电池在 25°C 下以 1C 恒流放电至 2.0V, 静置 60min; 5) 电池以 0.5C 的电流恒流充电至 3.65V, 搁置 60min, 记录充电能量  $E_0$ ; 6) 电池以 0.5C 恒流放电至 2.5V, 静置 60min, 记录放电能量为  $E_1$ , 7) 7) 循环 5)~6) 4 次, 能量效率  $\eta=E_1/E_0$ 。取循环后 3 次  $\eta$  平均值作为判定依据。

### 3.7.3.6. Floating Charge 浮充性能

1) The battery is discharged to 2.5V at a current of 0.2C and rests for 30min; 2) The battery is charged to 3.65V at a constant current of 0.2C, and then switched to constant voltage charging at 3.65V, until the charging current is less than or equal to 0.05C, rests for 30min; 3) The battery is discharged to 2.5V at a current of 0.2C and rests for 30min, record the discharge capacity as  $C_3$ ; 4) The battery is charged to 3.4V at a constant current of 0.2C, and then switched to constant voltage charging at 3.4V, until the charging current is less than or equal to 0.05C, rests for 30min, 3) the battery is charged at a constant voltage of 3.4V at 25°C for 15 years(The battery is charged and discharged by standard mode once a month), then the battery is discharged by standard discharge mode(3.6), record the discharge capacity as  $C_4$ , the capacity retention can be calculated as  $C_4/C_3$ .

1) 电池在 25°C 下以 0.2C 恒流放电至 2.5V, 静置 30min; 2) 电池在 25°C 下以 0.2C 恒流恒压电至 3.65V, 截止电流 0.05C, 静置 30min; 3) 电池在 25°C 下以 0.2C 恒流放电至 2.5V, 静置 30min; 记录放电容量  $C_3$ ; 4) 电池以 0.2C 的电流恒流充电至 3.4V, 然后在 3.4V 下转恒压充电, 直至充电电流小于等于 0.05C, 静置 30min; 5) 电池在 25°C 下恒压充电至 3.4V 持续 15 年(每月进行一次标准充放电), 15 年后电池进行标准放电, 记录放电容量为  $C_4$ , 容量保持率为  $C_4/C_3$ 。

### 3.7.3.7. Cycling Performance 循环性能

1) The battery is discharged to 2.5V at a current of 0.2C and rests for 30min, 2) The battery is placed in 25±2°C/35±2°C/45±2°C for 4 hours, 3) The battery is charged to 3.65V at a constant current of 0.5C, and then switched to constant voltage charging at 3.65V, until the charging current is less than or equal to 0.05C, rests for 30min, 4) The battery

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

is discharged to 2.5V at 0.5C constant current then rests for 30min, 5) Repeat steps from 3 to 4 until the discharge capacity of step 4 < 80% of the rated capacity, record the number of cycles.

1) 电池在 25°C下以 0.2C 恒流放电至 2.5V，静置 30min；2) 电池置于 25±2°C/35±2°C/45±2°C的环境中，搁置 4h；3) 电池以 0.5C 的电流恒流充电至 3.65V，然后在 3.65V 下转恒压充电，直至充电电流小于等于 0.05C，搁置 30min；4) 电池以 0.5C 恒流放电至 2.5V，搁置 30min；5) 循环第 3-4 步，直至第 4 步放电容量<80%额定容量为终止，记录充放电圈数。

### 3.7.3.8. Storage Performance 存储性能

1) The battery is discharged to 2.5V at a current of 0.2C and rests for 30min, 2) The battery is charged to 3.65V at a constant current of 0.2C, and then switched to constant voltage charging at 3.65V, until the charging current is less than or equal to 0.05C, rests for 30min, 3) The battery is discharged to 2.5V at a current of 0.2C and rests for 30min, 4) The battery is charged to 3.65V at a constant current of 0.2C, and then switched to constant voltage charging at 3.65V, until the charging current is less than or equal to 0.05C, rests for 30min, record the discharge capacity as C<sub>5</sub>, 5) The batteries are stored in the temperatures of 25/45°C for 28/ 28 days, respectively, 6) The battery is put aside for 4 hours at an ambient temperature of 25°C±2°C, 7) The battery is discharged to 2.5V at a current of 0.2C and rests for 30min, record the discharge capacity as C<sub>6</sub>, 8) Repeat the step 2, 9) The battery is discharged to 2.5V at a current of 0.2C and rests for 30min, record the discharge capacity as C<sub>7</sub>, Capacity retention rate=C<sub>6</sub>/C<sub>5</sub>×100%, capacity recovery rate=C<sub>7</sub>/C<sub>5</sub>×100%.

1) 电池在 25°C下以 0.2C 恒流放电至 2.5V，静置 30min；2) 电池在 25°C下以 0.2C 恒流恒压充电至 3.65V/0.05C 截止，静置 30min；3) 电池在 25°C下以 0.2C 恒流放电至 2.5V，静置 30min；4) 电池在 25°C下以 0.2C 恒流恒压充电至 3.65V/0.05C 截止，静置 30min；记录放电容量 C<sub>5</sub>；5) 电池在 25/45°C环境下存储 28d/28d；6) 电池存储后取出后在 25°C下搁置 4 小时；7) 电池在 25°C下以 0.2C 恒流放电至 2.5V，静置 30min，取放电容量 C<sub>6</sub>；8) 重复步骤 2；9) 电池在 25°C下以 0.2C 恒流放电至 2.5V，静置 30min，记录容量 C<sub>7</sub>，容量保持率=C<sub>6</sub>/C<sub>5</sub>，容量恢复率=C<sub>7</sub>/C<sub>5</sub>。

### 3.7.4. Safety Performance 安全性能

#### 3.7.4.1. Overcharge 过充电

Under the condition of an ambient temperature of 25°C±2°C, the battery is charged to 3.65V by standard charge mode (3.5), and then install the test fixture according to 3.4. After the battery is charged to 1.5 times the termination voltage or the charge time of 1h with a constant current of 1C at the ambient temperature for the safety test, stop charging and observe for 1h.

(Refer to GB/T 36276-2018 Lithium ion batteries for electric energy storage).

在环境温度 25°C±2°C的条件下，电池按照 (3.5) 进行标准充电，然后按照 3.4 的方法安装测试夹具。在安全试验环境温度下，电池以 1C 恒流充电至终止电压的 1.5 倍或时间达到 1h 后，停止充电，观察 1h。

(参考 GB/T 36276-2018 《电力储能用锂离子电池》)。

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

#### 3.7.4.2. Over-discharge 过放电

Under the condition of an ambient temperature of  $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ , the battery is charged to 3.65V by standard charge mode (3.5). The battery is discharged at a constant current of 1C for 90 min or the voltage reaches 0V at the ambient temperature of the safety test. Observe for 1 h.

(Refer to GB/T 36276-2018 Lithium ion batteries for electric energy storage).

在环境温度  $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$  的条件下，电池按照 (3.5) 进行标准充电，在安全试验环境温度下，电池以 1C 恒流放电 90 min 或电压达到 0V，观察 1 h。

(参考 GB 36276-2018 《电力储能用锂离子电池》)。

#### 3.7.4.3. External Short Circuit 外部短路

Under the condition of an ambient temperature of  $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ , the battery is charged to 3.65V by standard charge mode (3.5), and then install the test fixture according to 3.4. The positive and negative terminals of the battery are short-circuited externally for 10 minutes under the environmental temperature of the safety test, and the resistance of the external circuit should be less than 5 m $\Omega$ . Observe for 1 h.

(Refer to GB/T 36276-2018 Lithium ion batteries for electric energy storage).

在环境温度  $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$  的条件下，电池按照 (3.5) 进行标准充电，然后按照 3.4 的方法安装测试夹具。在安全试验环境温度下，将电池正、负极经外部短路 10 min，外部线路电阻值应小于 5 m $\Omega$ 。观察 1h。

(参考 GB 36276-2018 《电力储能用锂离子电池》)。

#### 3.7.4.4. Extrusion 挤压

Under the condition of an ambient temperature of  $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ , the battery is charged to 3.65V by standard charge mode (3.5). Test under the following conditions at a safety test environment temperature of  $25\pm 5^{\circ}\text{C}$ :

在环境温度  $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$  的条件下，电池按照 (3.5) 进行标准充电。在安全试验环境温度  $25\pm 5^{\circ}\text{C}$  下，按照如下条件进行试验：

- 1) Extrusion direction: apply pressure perpendicular to the direction of the battery cell plate;
- 2) The form of the extruded plate: a semi-cylinder with a radius of 75mm, the length (L) of the semi-cylinder is greater than the size of the cell being extruded (refer to the figure below);
- 3) Extrusion speed:  $(5\pm 1)\text{mm/s}$ ;
- 4) Termination condition: stop extruding after the voltage reaches 0V or the deformation reaches 30% or the extruding force reaches  $13\pm 0.78\text{kN}$ ;
- 5) Observe for 1h.

(Refer to GB/T 36276-2018 Lithium ion batteries for electric energy storage).

- 1) 挤压方向：垂直于电池单体极板方向施压；
- 2) 挤压板形式：半径 75mm 的半圆柱体，半圆柱体的长度 (L) 大于被挤压电池单体的尺寸；
- 3) 挤压速度： $(5\pm 1)\text{mm/s}$ ；

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

4) 终止条件：电压达到 0V 或变形量达到 30%或挤压力达到  $13 \pm 0.78\text{kN}$  后停止挤压；

5) 观察 1h。

(参考 GB 36276-2018 《电力储能用锂离子电池》)。

#### 3.7.4.5. Drop 跌落

Under the condition of an ambient temperature of  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , the battery is discharged by a standard mode (3.6), then the battery is charged by a standard mode (3.5). The positive and negative terminals of the cell are freely dropped from a height of 1.5m to the cement floor, observe for 1h.

(Refer to GB/T 36276-2018 Lithium ion batteries for electric energy storage).

在环境温度  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$  的条件下，电池按照 (3.6) 进行标准放电，再按照 (3.5) 进行标准充电，电池正负极端子向下从 1.5m 高度处自由跌落到水泥地面上；观察 1h。

(参考 GB 36276-2018 《电力储能用锂离子电池》)。

#### 3.7.4.6. Low Pressure 低气压

Under the condition of an ambient temperature of  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , the battery is discharged by a standard mode (3.6), then the battery is charged by a standard mode (3.5). The batteries are placed in a low-pressure box, the air pressure in the test box was adjusted to 11.6KPa, the temperature is room temperature, rest for 6 hours, observed for 1 h.

(Refer to GB/T 36276-2018 Lithium ion batteries for electric energy storage).

在环境温度  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$  的条件下，电池按照 (3.6) 进行标准放电，再按照 (3.5) 进行标准充电，电池放入低气压箱中，调节试验箱体中气压为 11.6KPa，温度为室温，静置 6h；观察 1h。

(参考 GB 36276-2018 《电力储能用锂离子电池》)。

## 4. Charge and Discharge Parameters 充放电参数

The following data is the reference performance data of LF100LA battery. Actual use is subject to the use mode and conditions agreed by both parties.

以下数据为 LF100LA 电池参考性能数据，实际使用以双方约定的使用方式和条件为准。

### 4.1. Charge Mode 充电模式

#### 4.1.1. 充电模式参数

Table 6 Charging mode parameter table

表 6 充电模式参数表

Items 项目	Specification 规格	Condition 条件
Standard charging current 标准充电电流	0.5C	$25^{\circ}\text{C} \pm 2^{\circ}\text{C}$
Maximum charging current	1.0C	

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
最大充电电流					
Standard charging voltage 标准充电电压	Single battery 单体电池 ≤ 3.65 V				
Standard charging mode 标准充电模式	Refer to section 3.5 参考 3.5 节				
Standard charging temperature 标准充电温度	25°C±2°C				
Absolute charging temperature (battery temperature) 绝对充电温度 (电池温度)	0°C~65°C		No matter what charging mode the battery is in, once the battery temperature exceeds the absolute charging temperature range, charging will stop 无论电池处于何种充电模式，电池温度一旦超过绝对充电温度范围，即停止充电		
Absolute charging voltage 绝对充电电压	3.65V		No matter what charging mode the battery is in, once the battery voltage exceeds the absolute charging voltage, the charging will stop 无论电池处于何种充电模式，电池电压一旦超过绝对充电电压，即停止充电		

#### 4.1.2. 其它充电模式

电芯温度/°C		0	(0~10 )	(10~20 )	(20~25 )	(25~45 )	(45~55 )	(55~60 )	65
SOC	0%~60%	0	0.1	0.2	0.5	1.0	0.5	0.2	0
SOC	60%~70%	0	0.1	0.2	0.5	1.0	0.5	0.2	0
SOC	70%~80%	0	0.1	0.2	0.5	1.0	0.5	0.2	0
SOC	80%~90%	0	0.1	0.2	0.5	0.8	0.5	0.2	0
SOC	90%~95%	0	0.1	0.1	0.3	0.5	0.3	0.2	0
SOC	95%~100%	0	0	0.1	0.1	0.1	0.1	0.1	0

#### 4.2. Discharge Mode 放电模式

##### 4.2.1. 放电模式参数

Table 7 Discharge mode parameters

表 7 放电模式参数

Items 项目	Specification 规格	Condition 条件
Standard discharge current 标准放电电流	0.5C	25°C±2°C
Maximum discharge current 最大放电电流	1.0C	25°C±2°C
Discharge cut-off voltage	2.5 V	T>0°C

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
放电截止电压	2.0 V		T≤0°C		
Standard discharge mode 标准放电模式	Refer to section 3.6 参考 3.6				
Standard discharge temperature 标准放电温度	25°C±2°C				
Absolute discharge temperature (battery temperature) 绝对放电温度 (电池温度)	-20°C~65°C		No matter what discharge mode the battery is in, once the battery temperature exceeds the absolute discharge temperature range, the discharge will stop 无论电池处于何种放电模式，电池温度一旦超出绝对放电温度范围，即停止放电		
Absolute discharge voltage 绝对放电电压	2.0V		No matter what kind of discharge mode the battery is in, once the battery voltage is less than the absolute discharge voltage, it stops discharging 无论电池处于何种放电模式，电池电压一旦小于绝对放电电压，即停止放电		

#### 4.2.2. 其它放电模式

电芯温度/°C		-20	-10	0	10	20	25	30	35	40	45	50	55	60	65
SOC	60%~100%	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0
SOC	50%-60%	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0
SOC	40%-50%	0.3	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0
SOC	30%-40%	0.3	0.3	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0
SOC	20%-30%	0	0.3	0.3	0.5	0.5	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0
SOC	10%-20%	0	0	0.3	0.3	0.5	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0
SOC	0%-10%	0	0	0	0.3	0.5	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0

#### 4.3. 脉冲模式

##### 4.3.1. 脉冲充电模式

30s 脉冲充电倍率/C															
SOC\T	0	5	10	15	20	25	30	35	40	45	50	55	60	65	
100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
95%	0	0.3	0.3	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0	
90%	0	0.4	0.4	0.4	0.5	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0	
80%	0	0.4	0.4	0.4	0.5	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0	
70%	0	0.4	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0	



-EVE Power CO., LTD Confidential Proprietary-

Model		LF100LA		Specification No. 规格书编号				RD-LF100LA-S01-LF					Version 版本		B
60%	0	0.4	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0
50%	0	0.4	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0
40%	0	0.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0
30%	0	0.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0
20%	0	0.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0
10%	0	0.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0
5%	0	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0
0%	0	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0

### 4.3.2. 脉冲放电模式

30s 脉冲放电倍率/C																				
SOC\T	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65
100%	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
95%	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
90%	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
80%	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
70%	0.5	0.5	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
60%	0.5	0.5	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
50%	0.5	0.5	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
40%	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
30%	0.2	0.3	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
20%	0	0.2	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
10%	0	0	0.2	0.3	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	0
5%	0	0	0	0.2	0.3	0.3	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0
0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

## 5. Safety Limits 安全限制

### 5.1. Voltage Limits 电压限制

Table 8 Safety limit voltage parameters

表 8 安全限制电压参数

Item 项目	Category 类别	Parameters 参数	Protection Action 保护动作
Voltage 电压	First Over-Charging Protection 第一级过充保护	3.70 V	Decrease current or power 降流或降功率
	Second Over-Charging Protection	3.80 V	Stop charging

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
	第二级过充保护			停止充电	
	First Over-Discharging Protection 第一级过放保护	1.90V		Decrease current or power 降流或降功率	
	Second Over-Discharging Protection 第二级过放保护	1.80V		Stop discharging 停止放电	

5.2. Temperature Limits 温度限制

Table 9 Safety limit temperature parameters  
表 9 安全限制温度参数

Item 项目	Specification 规格	Remark 备注
Recommended Operating Temperature Range 推荐使用温度范围	10°C~45°C	Recommended battery usage temperature range. 推荐使用电池的温度范围
Maximum operating temperature 最高使用温度	65°C	If the battery temperature exceeds the maximum operating temperature, the current needs to be reduced to 0. 如果电池使用温度超过最高操作温度，电流需要降为 0
Minimum operating temperature 最低使用温度	-20°C	If the battery temperature exceeds the minimum operating temperature, the current needs to be reduced to 0. 如果电池使用温度超过最低操作温度，电流需要降为 0
Maximum safe temperature 最高安全温度	65°C	If the battery temperature exceeds the maximum safe temperature, it will cause irreversible and permanent damage to the battery, and the user should not use it higher than the maximum safe temperature. 如果电池使用温度超过最高安全温度，将会造成电池不可逆的永久性损坏，用户使用不得高于最高安全温度
Minimum safe temperature 最低安全温度	-20°C	If the battery temperature exceeds the minimum safe temperature, it will cause irreversible and permanent damage to the battery, and the user should not lower the minimum safe temperature when using it. 如果电池使用温度超过最低安全温度，将会造成电池不可逆的永久性损坏，用户使用不得低于最低安全温度

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

## 6. Battery Operation Instruction and Precautions 电池操作说明及注意事项

### 6.1. Product End-life Management 产品寿命终止管理

The battery life is limited. Customers should establish an effective tracking system to monitor and record the internal resistance and capacity of each battery during its life. The measurement method and calculation method of internal resistance and capacity need to be discussed and agreed between the customer and EVE Power Co., Ltd. When the internal resistance of the battery in use exceeds 150% of the initial internal resistance of the battery or the capacity is less than 70% of the nominal capacity, the battery should not to operate. Violation of this requirement will exempt EVE Power Co., Ltd. from its responsibility for product quality assurance in accordance with the product sales agreement and this specification.

电池使用期限是有限的，客户应建立有效的跟踪系统监测并记录每个使用期限内电池的内阻和容量。内阻及容量的测量方法和计算方法需要客户和湖北亿纬动力有限公司共同讨论和双方同意。当使用中电池的内阻超过这个电池最初内阻的 150%或容量小于标称容量的 70%，应停止使用电池。违反该项要求，将免除湖北亿纬动力有限公司依据产品销售协议以及本规格书所应承担的产品质量保证责任。

### 6.2. Long-term Storage 长期存储

After the battery is charged, it should be used as soon as possible to avoid loss of usable capacity due to self-discharge. If storage is required, the battery needs to be stored in a low SOC state. The recommended storage conditions are: 20%~40% SOC, 0°C~35°C, relative humidity ≤60%.

电池进行充电后，需尽快使用，以免因自放电而造成可用容量损失。若需要存储，则电池需要在低 SOC 态下进行存储。推荐的存储条件为：20%~40% SOC，0°C~35°C，相对湿度≤60%。

### 6.3. Transportation 运输

Battery for shipping should be packed in boxes with the SOC of 20%~40%. The severe vibration, impact, extrusion, sun and rain should be prevented during shipping. Applicable methods of transportation include truck, train, ship, airplane, etc.

产品的运输应在 20%~40% SOC 下包装成箱进行。在运输过程中应防止剧烈振动、冲击或挤压、避免日晒雨淋。适用于汽车、火车、轮船、飞机等交通工具运输。

### 6.4. Operation Precautions 操作说明

- It is strictly forbidden to immerse the battery in water. When it is not in use, it should be placed in a cool and dry environment.
- It is forbidden to use and leave the battery next to heat and high temperature sources, such as fire, heater, etc.
- Please use a special charger for lithium-ion batteries when charging.
- During usage, it is strictly prohibited to reverse the positive and negative terminals of the battery.
- Do not throw the battery in the fire or heater.

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

- It is forbidden to use metal to directly connect the positive and negative terminals of the battery to short-circuit.
- It is forbidden to transport or store the battery with metal, such as hairpins, necklaces, etc.
- It is forbidden to knock or throw, step on, or bend the battery.
- It is forbidden to directly weld the battery or pierce the battery with nails or other sharp objects.
- It is forbidden to use or place the battery under high temperature (under hot sunlight), otherwise it may cause the battery to overheat or fail to function and shorten its life.
- It is forbidden to use it in places with strong static electricity and strong magnetic fields; otherwise it will easily damage the battery safety protection device and bring hidden dangers of safety.
- If the battery leaks and the electrolyte splashes on the skin or clothes, immediately wash the affected area with running water. If the battery leaks and the electrolyte enters the open parts of the human body such as the eyes, mouth, nose, etc., immediately rinse the eyes with a large amount of water and send to a doctor for treatment immediately, otherwise it will cause serious harm to the human body.
- If the battery emits peculiar smell, heat, discoloration, deformation, or any abnormality during use, storage, or charging, immediately remove the battery from the device or charger and stop using it.
- 严禁将电池浸入水中，保存不用时，应放置于阴凉干燥的环境中
- 禁止将电池放在热高温源旁，如火、加热器等旁边使用和留置
- 充电时请选用锂离子电池专用充电器
- 在使用过程中，严禁将电池正负极颠倒
- 禁止将电池丢于火或加热器中
- 禁止用金属直接连接电池正负极
- 禁止将电池与金属，如发夹、项链等一起运输或贮存
- 禁止敲击、抛掷、踩踏或者弯折电池等
- 禁止直接焊接电池以及用钉子或其它利器刺穿电池
- 禁止在高温下 (炙热的阳光下)使用或放置电池，否则可能会引起电池过热或功能失效、寿命减短
- 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
- 如果电池漏液，电解液溅到皮肤或衣服上，应立即用流动的水清洗受影响区域。如果电池发生泄露，电解液进入眼睛、口、鼻等人体开放部位，应立即用大量清水冲洗眼睛，并马上送医治疗，否则会对人体造成严重伤害
- 如果电池发出异味、发热、变色、变形或电池在使用、贮存、充电过程中出现任何异常，应立即将电池从装置或充电器中移离并停用

#### 6.5. Disclaimer 免责声明

If the product demanding party does not use the provisions in this manual, which causes social impact and affects the reputation of EVE Power Co., Ltd., EVE Power will pursue the responsibility of the product demanding party. According to the degree of impact on EVE Power, the product demand party must provide compensation to EVE Power.

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

如果由于产品需求单位不按本说明书中的规定进行使用，造成社会性影响，并对湖北亿纬动力有限公司的名誉造成影响的，湖北亿纬动力有限公司将会追究产品需求单位的责任。根据对湖北亿纬动力有限公司造成的影响程度，产品需求单位需向湖北亿纬动力有限公司提供赔偿。

### 6.6. Other 其它

Any matters not mentioned in this specification must be negotiated and determined by both parties.

任何本规格书中未提及的事项，须经双方协商确定。

## 7. Contact Information 联系方式

### 7.1. Warning Declaration 警示声明

**Warning 警告**

- **The battery has potential hazards, and take proper precautions when operating and maintaining the battery!**
- **The battery must be operated with proper tools and protective equipment.**
- **Battery maintenance must be performed by professional with battery expertise and safety training.**
- **Failure to comply with these warnings could result in multiple disasters.**
- **电池存在潜在的危險，在操作和维护时必须采取适当的防护措施！**
- **必须使用正确的工具和防护装备操作电池。**
- **电池的维护必须由具有电池专业知识并经过安全培训的人士执行。**
- **不遵守上述警告可能造成多种灾难。**

### 7.2. Types of Dangerous 危險类型

The customer is aware of the following potential hazards in the use and operation of batteries:

客户知悉在电芯使用和操作过程中存在以下潜在的危險：

1) The operator may be injured by chemicals, electric shocks, or electric arcs during operation. Although the human body reacts differently to direct current and alternating current, DC voltage higher than 50 V is just as serious as alternating current. Therefore, the customer must adopt a conservative posture during operation to avoid the injury of current.

1) 操作者在操作时可能会受到化学品、电击或者电弧的伤害。尽管人体对遭受直流电与交流电的反应不同，但是高于 50 V 的直流电压与交流电对人体的伤害是同样严重的，因此客户必须在操作中采取保守的姿势以避免电流的伤害。

2) There is a chemical risk from the electrolyte in the battery.

2) 存在来自电池中的电解液的化学风险。

3) When operating batteries and selecting personal protective equipment, customers and their employees must take

Model	LF100LA	Specification No. 规格书编号	RD-LF100LA-S01-LF	Version 版本	B
-------	---------	----------------------------	-------------------	---------------	---

these potential risks into account to prevent accidental short circuits, arcing, explosions or thermal runaway.

3) 在操作电池和选择个人防护装备时，客户及其雇员必须考虑到以上潜在的风险，防止发生意外短路，造成电弧、爆炸或热失控。

### 8. LF100LA Drawing 电池图纸

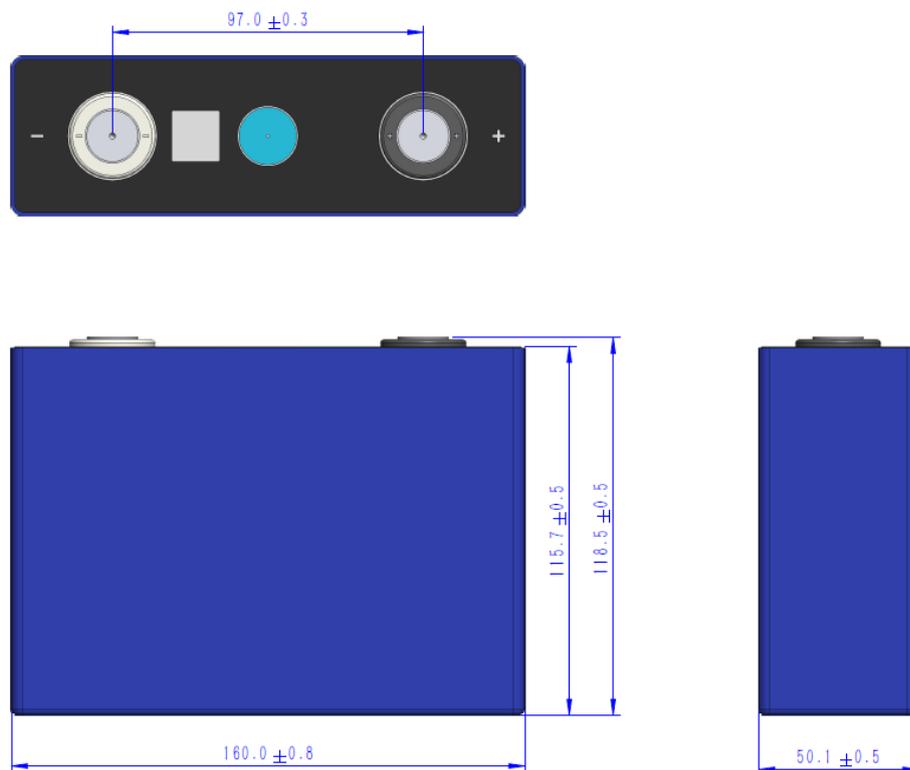


Fig.5 LF100LA Battery Drawing

图 5 LF100LA 电池图纸