



# EVE Energy Co., Ltd

## Product Specification

File No: LF230-54174

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|                |                   |
|----------------|-------------------|
| Product:       | LFP Power Battery |
| Model:         | LF230             |
| Specification: | 3.2V/230Ah        |
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## Specification Revision History

[illegible]

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## 1 Scope

This specification is applied to Rechargeable LFP Power Battery with aluminum shell manufactured by EVE Energy Co., Ltd., in which the description and model, main performance, test conditions and precautions of the product are included.

The product can be applied for Vehicle power supply, Storage system, etc.

## 2 Description and Model

**2.1 Description:** LFP Li-ion Power Battery with aluminum shell.

**2.2 Model:** LF230.

## 3 General Technical Parameter

| No. | Item                            |                                       | Parameter      | Remark                                                  |
|-----|---------------------------------|---------------------------------------|----------------|---------------------------------------------------------|
| 1   | Typical Capacity                |                                       | 230Ah          | (25±2) °C , Standard charge and discharge               |
| 2   | Typical Voltage                 |                                       | 3.2V           |                                                         |
| 3   | AC Impedance Resistance         |                                       | ≤0.30mΩ        |                                                         |
| 4   | Standard charge and discharge   | Charge/Discharge Current              | 0.5C/0.5C      | (25±2) °C                                               |
|     |                                 | Charge/Discharge Cut-off Voltage      | 3.65V/2.5V     |                                                         |
| 5   | Max Charge/Discharge Current    | Continuous Charge/Discharge Current   | 1C/1C          | Reference Continuous/Pulse Charge/Discharge Current Map |
|     |                                 | Pulse Charge/Discharge Ccurrent (30s) | 2C/2C          |                                                         |
| 6   | Recommended SOC window          |                                       | 10%~90%        | N.A.                                                    |
| 7   | Charging Working Temperature    |                                       | 0 °C ~ 60 °C   | Reference Continuous/Pulse Charge/Discharge Current Map |
| 8   | Discharging Working Temperature |                                       | -30 °C ~ 60 °C |                                                         |
| 9   | Storage Temperature             | Short Term(Within a Month)            | -20 °C ~ 45 °C | N.A.                                                    |

|    |                             |                              |              |                                      |
|----|-----------------------------|------------------------------|--------------|--------------------------------------|
|    |                             | Long Term(Within a Year)     | 0°C ~ 35°C   |                                      |
| 10 | Storage Humidity            |                              | <95%         |                                      |
| 11 | Monthly Self-discharge Rate |                              | ≤3%/M        | (25±2)°C , Storage SOC<br>30%~50%SOC |
| 12 | Dimension                   | Width                        | 173.93±0.5mm | Reference Appendix I                 |
| 13 |                             | Thickness(300±20kgf, 40%SOC) | 53.85±0.4mm  |                                      |
| 14 |                             | High(total)                  | 207.3±0.5mm  |                                      |
| 15 |                             | High(subject)                | 204.6±0.5mm  |                                      |
| 16 |                             | Tab Distance                 | 123.0±0.3mm  |                                      |
| 17 | Weight                      |                              | 4.11 ± 0.1kg |                                      |

## 4 Test Conditions

### 4.1 Test Environmental conditions

Temperature: (25±2)°C

Relative Humidity: 45%~85%

Atmospheric Pressure: 86KPa~106KPa

### 4.2 Standard Charge

The standard charge means charging the cell with charge current 0.5CA and constant voltage 3.65V at (25±2)°C, 0.05C cut off.

### 4.3 Standard Discharge

The standard discharge means discharging the cell with discharge current 0.5CA and cutoff voltage 2.5V at (25±2) °C. If required, the battery can be discharged at 1.0CA constant current to a cutoff voltage of 2.5V.

## 5 Main Performance

### 5.1 Electrical performance

| No. | Item                                                     | Requipments                                                                                                               | Measuring Procedure                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | C-Rate<br>DisCharge<br>Performance at<br>25℃             | Discharge Capacity/ Typical<br>Capacity $\times 100\%$ A )<br>0.5C(A) $\geq 100\%$ B ) 1.0C(A)<br>$\geq 100\%$            | After standard charge and 1h rest,<br>discharge to 2.5V cutoff with the current of<br>0.33C(A), 0.5C(A), 1C(A) respectively.<br>Repeating 3 times, if the capacity is not<br>qualified.                                                                                                                                                                                                                                             |
| 2   | Discharge<br>performance at<br>different<br>temperatures | Discharge Capacity/ Typical<br>Capacity $\times 100\%$<br>A) 55℃时 $\geq 95\%$<br>B) -20℃时 $\geq 70\%$                     | A) After standard charge and 5h rest at 55<br>$\pm 2^\circ\text{C}$ , discharge to 2.5V cutoff with the<br>current of 1.0C(A);<br>B) After standard charge and 24h rest at<br>$-20 \pm 2^\circ\text{C}$ , discharge to 2.0V cutoff with the<br>current of 1.0C(A);                                                                                                                                                                  |
| 3   | Charge<br>Retention and<br>Recovery at<br>25℃            | Remaining Capacity $\geq$<br>Typical Capacity $\times 95\%$<br>Recovery Capacity $\geq$ Typical<br>Capacity $\times 97\%$ | After standard charge and open the circuit<br>for 28 days at 25℃, discharge to 2.5V<br>cutoff with the current of 1.0C(A),<br>recorded as remaining capacity ; After<br>standard charged and 30mins rest,<br>discharge current 1.0CA with 2.5V cut-off<br>at $(25 \pm 2)^\circ\text{C}$ , recorded as Recovery<br>Capacity.                                                                                                         |
| 4   | Cycle Life at<br>25℃                                     | $\geq 3500$ cycles @1C/1C                                                                                                 | At $25 \pm 2^\circ\text{C}$ , the battery under 300kgf<br>fixture : charging the cell with charge<br>current 1.0C(A) and constant voltage<br>3.65V,0.05C cut off,rest for<br>30min,discharge to 2.5V cut off with the<br>current of 1.0C(A),rest for 30min,and then<br>start the next cycle,end with the capacity<br>decrease to 80% of the initial capacity.The<br>number of cycles is defined as the cycle life<br>of the battery |
| 5   | Cycle Life at<br>45℃                                     | $\geq 1800$ cycles @1C/1C                                                                                                 | At $45 \pm 2^\circ\text{C}$ , the battery under 300kgf<br>fixture : charging the cell with charge<br>current 1.0C(A) and constant voltage<br>3.65V,0.05C cut off,rest for<br>30min,discharge to 2.5V cut off with the<br>current of 1.0C(A),rest for 30min,and then<br>start the next cycle,end with the capacity                                                                                                                   |

|   |                        |                                |                                                                                                           |
|---|------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------|
|   |                        |                                | decrease to 80% of the initial capacity. The number of cycles is defined as the cycle life of the battery |
| 6 | End of Life Management | Capacity/Typical Capacity <70% | During the use of the battery, when the end of life is exceeded, should stop use the battery.             |

### 5.2 Safety performance

| No. | Item                | Requirements                      | Measuring Procedure                                                                                         |
|-----|---------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------|
| 1   | Over Discharging    | No explosion, No fire, No leakage | Reference: GB/T 31485-2015< 《Safety requirements and test methods for traction battery of electric vehicle》 |
| 2   | Over charging       | No explosion, No fire             |                                                                                                             |
| 3   | Short circuit Test  | No explosion, No fire             |                                                                                                             |
| 4   | Drop Test           | No explosion, No fire, No leakage |                                                                                                             |
| 5   | Heating             | No explosion, No fire             |                                                                                                             |
| 6   | Extrusion Test      | No explosion, No fire             |                                                                                                             |
| 7   | Seawater immersion  | No explosion, No fire             |                                                                                                             |
| 8   | Temperature cycling | No explosion, No fire, No leakage |                                                                                                             |
| 9   | Low pressure        | No explosion, No fire, No leakage |                                                                                                             |
| 10  | Thermal runaway     | No explosion, No fire             | Reference: 《Technical specifications for electric bus safety》                                               |

## 6 Transportation

Battery for shipping should be packed in boxes with the condition of half charged (30%~50%SOC). The Violent vibration, impact extrusion, sun and rain should be prevented during

shipping. The battery is suitable for cars, trains, ships, aircraft and other transportation vehicles.

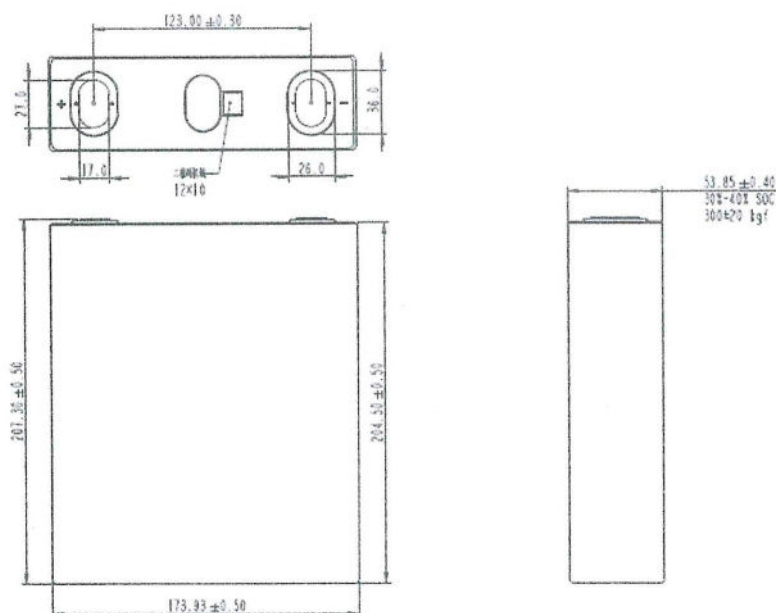
## 7 Storage

Batteries should be stored (more than 1 month) indoor with a dry and clean environment at 0℃ ~35℃. Avoiding contact with corrosive substances and staying away from fire and heat source. The battery should be charged and discharged every 6 months. The storage SOC is between 30 ~ 50% .

## 8 Precautions

- 1、 When charging and discharging the battery, ensure that the battery voltage, current and temperature are monitored and protected.
- 2 、 Keep the battery away from heat sources, fire sources, and other corrosive environments such as heat and strong acids and alkalis.
- 3、 Do not short the battery or install it with incorrect polarity at any time
- 4、 Do not mix batteries of different models or different manufacturers.
- 5、 Do not use external force to drop, impact or puncture the battery, do not disassemble the battery or change the external structure
- 6、 When the battery is not used for a long time, please keep the battery charge at 30% ~ 50% SOC, and avoid direct sunlight or high temperature and high humidity environment.
- 7、 When operating the battery, you need to wear protective equipment such as rubber gloves
- 8、 If the battery leaks, smokes or is damaged, please stop using it immediately and contact us.

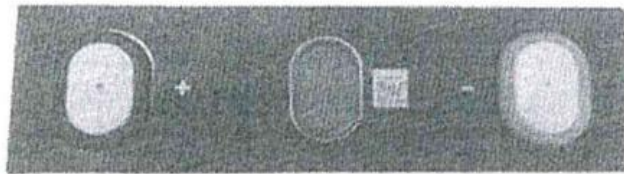
## Appendix I: 2D battery diagram





**Appendix II: Battery appearance picture**

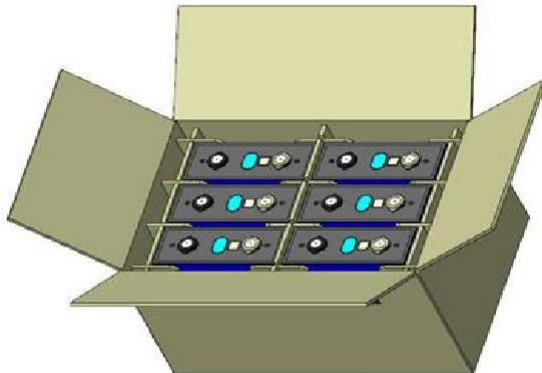
Stick the bottom insulation sheet according to the customer's requirements, the total height increases by 0.3mm



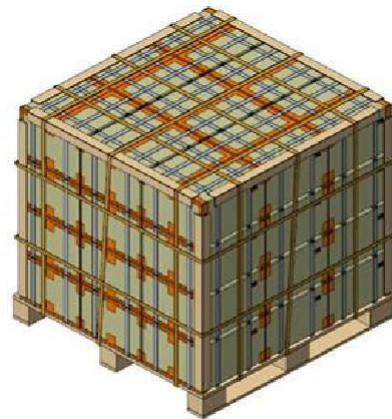
## Appendix II: Battery coding rules



### Appendix III: Battery Packing Diagram



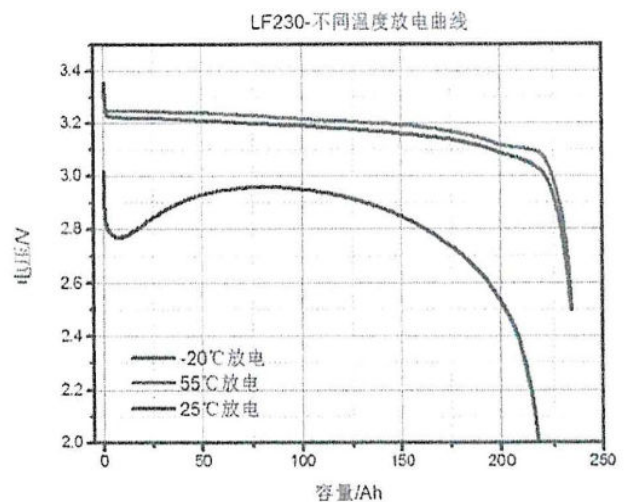
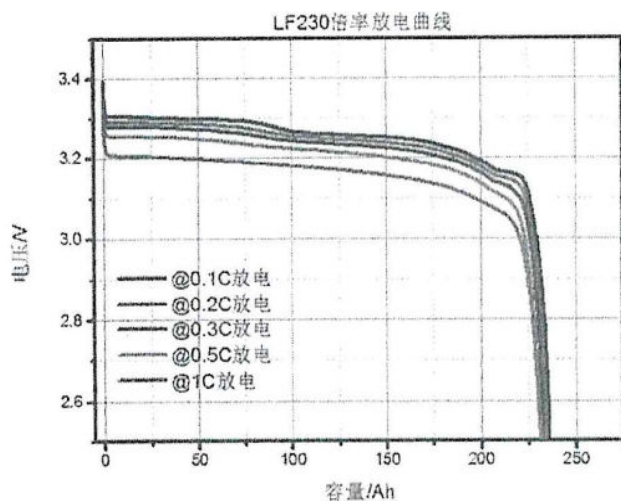
L×W×H: 426×302×245mm



L×W×H: 1300×1100×1140mm

### Appendix IV: Battery performance graph

- 1、C-Rate Discharge Performance at 25°C    2、Discharge performance at different temperatures e



- 3、Cycle curve(1C/1C 3.65V-2.5V)

