Model	LF100LA	Specification No.	RD-LF100LA-S01-LF	Version	B

Product Specification

Prismatic LFP Li-ion Battery

Model: LF100LA

Model	LF100LA	Specification No.	RD-LF100LA-S01-LF	Version	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.

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Change History

Version	Date	Contents	Checked By
A	2022.05.20	First issue	
B	2022.09.20	1. Capacity calibration, the current is adjusted from 0.5C to 0.2C； 2. The calibration capacity is adjusted from the minimum 100Ah to 102Ah	

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Term Definition

Product:

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

Customer :

Refers to the buyer in EVE Power Sales Contract.

Environment Temperature:

Surrounding environmental temperature where the battery is located.

Battery Temperature:

Temperature measure by the temperature sensor installed at the center of battery surface.

Rate :

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.

State of Charge:

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.

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Cycle:

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

Standard Charge:

The charging mode is described in 3.5 of this specification.

Standard Discharge:

The discharge mode is described in 3.6 of this specification.

Open Circuit Voltage:

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.

DC Resistance:

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.

Pulse Current:

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.

Compression Force：

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

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Units：Refer to following table

Table 1 Unit of measurement

No.	Unit	Abbreviation	Type
1	Volt	V	Voltage
2	Ampere	A	Current
3	Ampere-Hour -	Ah	Capacity
4	Watt-Hour -	Wh	Energy
5	Ohm	Ω	Resistance
6	MilliOhm	mΩ	Resistance
7	Degree Celsius	℃	Temperature
8	Millimeter	mm	Length
9	Second	s	Time
10	Hertz	Hz	Frequency

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1. Basic Information

1.1. Scope

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

1.2. Product Type

Prismatic LFP Battery with aluminum shell

1.3. Model

LF100LA

2. Battery Specification

2.1. Basic Parameters

Table 2 Basic parameters of battery

Items		Parameters	Remarks
Rated Capacity		102Ah	0.2C，25℃±2℃，2.5-3.65V
Rated Energy		326.4Wh	0.2C，25℃±2℃，2.5-3.65V
ACR		≤0.5mΩ	AC，1kHz，25%SOC
Nominal Voltage		3.2V	0.2C，25℃±2℃，2.5-3.65V
Weight		1985±100 g	/
Charging Cut-off Voltage		3.65V	/
Discharging Cut-off Voltage		2.5 (0℃<T≤65℃) 2.0 (-20℃<T≤0℃)	/
Charging/ Discharging	Standard Charging/Discharging Current	0.2C/0.2C	25℃±2℃

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	Maximum charging current	1C	25℃±2℃
Cycling Performance	25℃ Standard Cycle	5000 Cycles，0.5C/0.5C	Capacity Retention≥80%.
	35℃ Standard Cycle	3500 Cycles，0.5C/0.5C	
	45℃ Standard Cycle	2000 Cycles，0.5C/0.5C	
Operation Temperature	Charging Temperature	0~65℃	/
	Discharging Temperature	-20~65℃	/
Storage Temperature	>1 month, ＞1	0~35℃	Delivery SOC State (20~40%)
	≤1 month, ≤1	-20~45℃	

2.2. Product Parameters

2.2.1. Dimension and Weight

Table 3 Battery size and weight index

No.	Items		Parameters	Testing Methods
1	Dimension	Terminal Height	118.5±0.5mm	3.7.1
		Shoulder Height (h)	115.7±0.5mm	
		Width (L)	160.0±0.8mm	
		Thickness (T)	50.1±0.5mm (200kgf，Delivery SOC)	
2	Weight	/	1985±100g	3.7.2

2.2.2. Electrical Performance Index

Table 4 Battery electrical performance index

No.	Items	Parameters	Testing Methods

Model	LF100LA	Specification No.	RD-LF100LA-S01-LF	Version	B

1	Capacity	0.2C Capacity	≥102Ah	3.7.3.1
2	Temperature Discharge Performance	-20℃ Capacity Retention	≥55%	3.7.3.2
		0℃ Capacity Retention	≥80%	
		10℃ Capacity Retention	≥85%	
		55℃ Capacity Retention	≥99%	
3	Rate Discharge Performance	25℃, 0.5C Capacity Retention	≥100%	3.7.3.3
		25℃, 1C Capacity Retention	=100%	
		25℃, 2C Capacity Retention	≥98%	
		25℃, 2.5C Capacity Retention	≥95%	
4	DCR	25℃_0.2C_30s & 1C_5s @50%SOC	≤1.5mΩ	3.7.3.4
5	Energy Efficiency	25℃, Energy Efficiency	η≥93%	3.7.3.5
6	Floating Charge	25℃ 15 Years	≥70%	3.7.3.6
7	Cycling Performance	25℃ 0.5C/0.5C, 5000 Cycles	Capacity Retention ≥80%	3.7.3.7
		35℃ 0.5C/0.5C, 3500 Cycles		
		45℃ 0.5C/0.5C, 2000 Cycles		
8	Storage Performance	100%SOC, 25℃, 28 days	Capacity Recovery ≥96%	3.7.3.8
		100%SOC, 45℃, 28 days	Capacity Recovery ≥90%	

2.2.3. Safety Performance Index

Table 5 Battery safety performance index

No.	Items	Standard	Testing Methods

Model	LF100LA	Specification No.	RD-LF100LA-S01-LF	Version	B

1	Overcharge	No fire, No explosion	3.7.4.1
2	Overdischarge	No fire, No explosion	3.7.4.2
3	External Short Circuit	No fire, No explosion	3.7.4.3
4	Extrusion	No fire, No explosion	3.7.4.4
5	Drop	No fire, No explosion	3.7.4.5
6	Low Pressure	No fire, No explosion, No liquid leakage	3.7.4.6

2.2.4. Pole welding parameters

Table 6 Pole welding parameters

No.	Items	Parameters	Remarks
1	Pole material	A1 1060	/
2	Laser Welding Penetration Depth	⩽2.0mm	/
3	Maximum pressure of pole	500N	The pole column bears the maximum vertical pressure without deformation
4	Maximum torque of pole	4N·M	The pole bears the maximum torque without loosening
5	Maximum temperature of pole	130℃	The pole bears the maximum temperature, and the plastic pad is not deformed
6	Pole center distance	97mm	/

2.3. Battery Drawing

See Figure 5.

2.4. Appearance

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.

3. Testing Conditions

3.1. Environmental Conditions

Unless otherwise specified, the test should be carried out in an environment with a temperature of 25°C ± 2°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℃±2℃.

3.2. Measurement Instrument

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

1) Voltage measuring device : ±0.1%;
2) Current measuring device : ±0.1%;
3) Temperature measuring device : ±0.5℃;
4) Dimension measuring device : ±0.01mm;
5) Weight measuring device : ±0.1g.

3.3. Testing Clamp Preparation

The single battery needs to be clamped with steel splints (thickness:≥10 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:

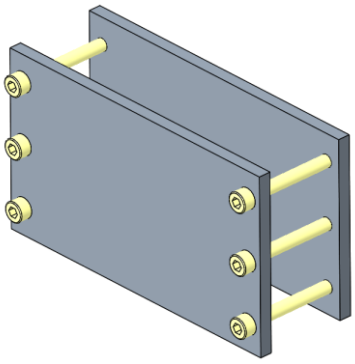

Fig. 1 Schematic diagram of battery clamp

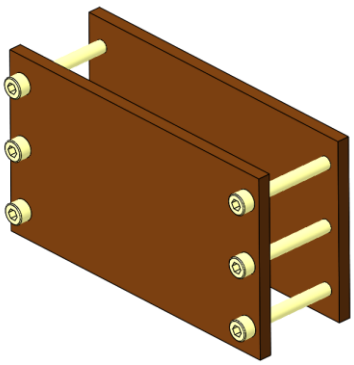

Fig. 2 Insulation film of battery clamp

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3.4. Testing Clamp Installation

Place the battery covered with blue film and top film in the middle of the clamp, and the initial compression force is (200±20) kgf.

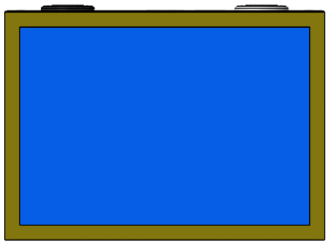

Fig. 3 Schematic diagram of battery coating

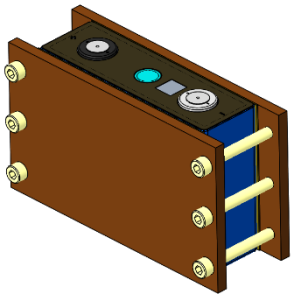

Fig. 4 Side view of battery shaft

3.5. Standard Charge

The battery is charged at a constant current of 0.2C to 3.65V under the condition of an ambient temperature of 25℃±2℃, 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.

3.6. Standard Discharge

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

3.7. Testing Methods

3.7.1. Dimension

Testing Instrument ：

CMM Measuring Instrument CMM

Testing Method ：

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

*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).

3.7.2. Weight

Test Instrument :

Electronic Scale

Test Method :

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

3.7.3. Electrical Performance

3.7.3.1. 0.2C Discharge Capacity 0.2C

Under the condition of an ambient temperature of 25℃±2℃, 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 0.2C, the final discharge capacity C_0 are 0.2C capacity. When the capacity of the first lap does not meet the specification, it is allowed to retest for 3 times. When the capacity of the first lap does not meet the specification, it is allowed to retest for 3 times.

3.7.3.2. Temperature Discharge Performance

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 ℃ 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 ℃ 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 ℃ correspond to 2.0, 2.0, 2.5 and 2.5V, respectively.

3.7.3.3. Rate Discharge Performance

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℃ for 4h and then discharged to 2.5V at a current of XC, the discharge capacity is recorded as C_2, C_2/1C dischage 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) 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 $(V_{0.2c}-V_{1c})/(I_{1c}-I_{0.2c})$.

3.7.3.5. Energy Efficiency

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 η for 3 times after the cycle as the judgment basis.

3.7.3.6. Floating Charge

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℃ 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.

3.7.3.7. Cycling Performance

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℃/35±2℃/45±2℃ 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 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.

3.7.3.8. Storage Performance

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_5, 5) The batteries are stored in the temperatures of 25/45℃ for 28/ 28 days, respectively, 6) The battery is put aside for 4 hours at an ambient temperature of 25℃±2℃, 7) The battery is discharged to 2.5V at a current of 0.2C and rests for 30min, record the discharge capacity as C_6, 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_7, Capacity retention rate=$C_6/C_5\times100\%$, capacity recovery rate=$C_7/C_5\times100\%$.

3.7.4. Safety Performance

3.7.4.1. Overcharge

Under the condition of an ambient temperature of 25℃±2℃, 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).

3.7.4.2. Over-discharge

Under the condition of an ambient temperature of 25℃±2℃, 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).

3.7.4.3. External Short Circuit

Under the condition of an ambient temperature of 25℃±2℃, 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 mΩ. Observe for 1 h.

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

3.7.4.4. Extrusion

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). Test under the following conditions at a safety test environment temperature of 25±5°C:

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±1)mm/s;

4) Termination condition: stop extruding after the voltage reaches 0V or the deformation reaches 30% or the extruding force reaches 13±0.78kN;

5) Observe for 1h.

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

3.7.4.5. Drop

Under the condition of an ambient temperature of 25°C±2°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).

3.7.4.6. Low Pressure

Under the condition of an ambient temperature of 25°C±2°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).

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4. Charge and Discharge Parameters

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.

4.1. Charge Mode

4.1.1. Charge Mode Parameter

Table 6 Charging mode parameter table

Items	Specification	Condition
Standard charging current	0.2C	25℃±2℃
Maximum charging current	1.0C	
Standard charging voltage	Single battery ≤ 3.65 V	
Standard charging mode	Refer to section 3.5	
Standard charging temperature	25℃±2℃	
Absolute charging temperature (battery temperature)	0℃~65℃	No matter what charging mode the battery is in, once the battery temperature exceeds the absolute charging temperature range, charging will stop
Absolute charging voltage	3.65V	No matter what charging mode the battery is in, once the battery voltage exceeds the absolute charging voltage, the charging will stop

4.1.2. Other Charge Mode

/℃	0	(0~10)	(10~20)	(20~25)	(25~45)	(45~55)	(55~60)	65

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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

4.2.1. Discharge Mode Parameter

Table 7 Discharge mode parameters

Items	Specification	Condition
Standard discharge current	0.2C	25℃±2℃
Maximum discharge current	1.0C	25℃±2℃
Discharge cut-off voltage	2.5 V	T>0℃
	2.0 V	T≤0℃
Standard discharge mode	Refer to section 3.6	
Standard discharge temperature	25℃±2℃	
Absolute discharge temperature (battery temperature)	-20℃~65℃	No matter what discharge mode the battery is in, once the battery temperature exceeds the absolute discharge temperature range, the discharge will stop
Absolute discharge voltage	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

4.2.2. Other Discharge Mode

/℃		-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

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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. Pulse Mode

4.3.1. Pulse Charge Mode

30s Pulse Charge rate table														
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
60%	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
50%	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
40%	0	0.4	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	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	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	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	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	0.5	0.5	0

4.3.2. Pulse Discharge Mode

30s Pulse Discharge rate table																				
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

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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

5.1. Voltage Limits

Table 8 Safety limit voltage parameters

Item	Category	Parameters	Protection Action
Voltage	First Over-Charging Protection	3.70 V	Decrease current or power
	Second Over-Charging Protection	3.80 V	Stop charging
	First Over-Discharging Protection	1.90V	Decrease current or power
	Second Over-Discharging Protection	1.80V	Stop discharging

5.2. Temperature Limits

Table 9 Safety limit temperature parameters

Item	Specification	Remark
Recommended Operating Temperature Range	10℃~45℃	Recommended battery usage temperature range.

Maximum operating temperature	65℃	If the battery temperature exceeds the maximum operating temperature, the current needs to be reduced to 0.
Minimum operating temperature	-20℃	If the battery temperature exceeds the minimum operating temperature, the current needs to be reduced to 0.
Maximum safe temperature	65℃	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.
Minimum safe temperature	-20℃	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.

6. Battery Operation Instruction and Precautions

6.1. Product End-life Management

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.

6.2. Long-term Storage

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℃~35℃, relative humidity ≤60%.

6.3. Transportation

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.

6.4. Operation Precautions

- 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.
- 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.

6.5. Disclaimer

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.

6.6. Other

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

7. Contact Information

7.1. Warning Declaration

Warning

- **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.**

7.2. Types of Dangerous

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

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.

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

3) When operating batteries and selecting personal protective equipment, customers and their employees must take these potential risks into account to prevent accidental short circuits, arcing, explosions or thermal runaway.

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9. LF100LA Drawing

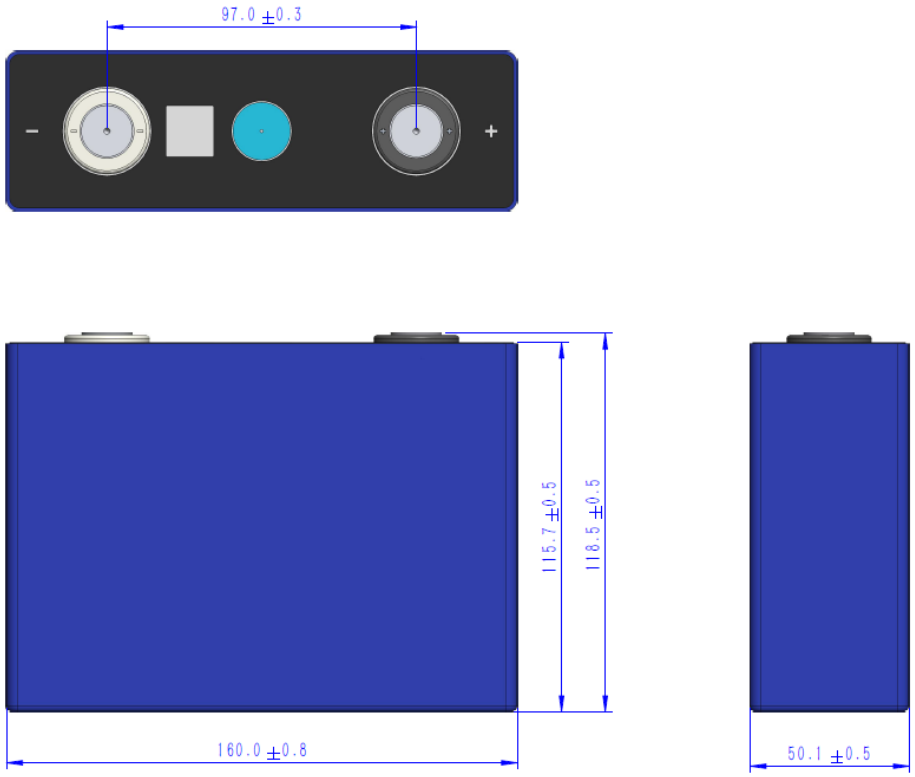

Fig.5 LF100LA Battery Drawing