

Model:	LF22K	Version:	A
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Product Specification

Prismatic Aluminum Lithium-Ion Battery

Model: LF22K

Compiled by:	Product Design Approval:	Quality Approval:	Sales Approval:	Approval:
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Hubei EVE Power Co., LTD



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Change history

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Technical Definitions

Term	Definition
Product	The "Product" in this specification refers to the lithium-ion battery produced by Hubei YiZhi Power Technology Co., Ltd. with a capacity of 22Ah.
Client	Refers to the buyer in the "Hubei Yiwei Power Co., Ltd. Product Sales Contract".
Ambient Temperature	The ambient temperature of the battery.
Cell Temperature	The temperature of the cell measured by the temperature sensor connected to the battery.
C-rate (C)	The charge or discharge current divided by the battery's capacity. For example, for a battery with a capacity of 22Ah, when charged or discharged at a current of 22A, the C-rate is 1C.
State of Charge (SOC)	The percentage of the battery's capacity relative to its nominal capacity under specified conditions. For example, if a 22Ah battery has an SOC of 100%, it means it contains 22Ah of charge. SOC of 50% means it has 11Ah of charge, and SOC of 0% means it is fully discharged.
Cycle	One complete charge and discharge process of the battery. The cycle life of the battery refers to the number of cycles the battery can go through before its capacity decreases to a specified level.
Standard Charge	The charging mode described in Section 3.4 of this specification.
Standard Discharge	The discharge mode described in Section 3.5 of this specification.
Open Circuit Voltage (OCV)	The voltage of the battery when it is not connected to any load.
DCR	The resistance calculated by measuring the voltage drop across the battery under a specific current, as described in section 3.7.3 of this specification.
Module	A unit consisting of multiple battery cells packaged together for use in products.
Battery Management System (BMS)	A system that monitors and manages the state of the battery, including measuring cell voltages and temperatures, controlling charging and discharging, balancing cells, and protecting against overcharging and over-discharging. It ensures the battery operates within specified limits and safely.
Pulse Current	A temporary current that occurs when the battery is subjected to short bursts of high current, either in the charge or discharge direction. It is different from continuous current.
Compression force	The force applied to the battery module that could affect its safety and performance.
Units of measurement	• V (Volt): Voltage unit • A (Ampere): Current unit • Ah (Ampere-Hour): Capacity unit • Wh (Watt-Hour): Energy unit



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	• Ω (Ohm), unit of electrical resistance • $m\Omega$ (MilliOhm), unit of electrical resistance • $^{\circ}\text{C}$ (degree Celsius), unit of temperature • mm (millimeter), unit of length • s (second), unit of time • Hz (Hertz), unit of frequency		

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1. Fundamental information:

1.1. Scope of Application

This product specification applies to the prismatic lithium-ion battery produced by Hubei YiZhi Power Technology Co., Ltd.

1.2. Product Type

Prismatic lithium-ion battery

1.3. Product Model

LF22K

2. Battery Specifications

2.1. Fundamental Battery Specifications

Item		Standard	Remarks
Minimum Capacity		22 Ah	1C, 25±2°C, 2.5-3.7V
Minimum Energy		70.84 Wh	1C, 25±2°C, 2.5-3.7V
Initial Internal Resistance		<0.5 mΩ	AC, 1kHz, 30% SOC
Nominal Voltage		3.22 V	1C, 2.5-3.7V
Battery Weight		618±20g	
Maximum Charge Voltage (Umax)		3.7 V	
Discharge Cut-off Voltage (Umin)		2.50V (≥0°C) 2.00V (-40°C≤T≤0°C)	
Operating temperature	Charge Temperature	-25~60°C	
	Disch. Temperature	-40~65°C	
	3 Months	0~45°C	
	1 Month	0~60°C	

2.2. Product Specifications

2.2.1. Dimensions and Weight Specifications

No.	Item		Standard	Test Method
1	Size	Height (H1)	131.8±0.4 mm	3.6.1
		Height (H2)	128.7±0.4 mm	
		Width (L1)	148.2±0.4 mm	
		Width (L2)	148.7±0.4 mm	
		Thickness (T)	17.7±0.3 mm	

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2	Weight	including blue film, top patch	618±20g	3.6.2

2.2.2. Electrical performance

No.	Item		Standard	Test Methods
1	Capacity	1C capacity	≥22.0Ah	3.6.3.1
		3C capacity	≥21.5Ah	3.6.3.2
2	Energy	1C energy	≥70.8Wh	3.6.3.1
		3C energy	≥68.0Wh	3.6.3.2
3	Discharge performance	-25°C capacity retention rate	≥80%	3.6.3.3
		0°C capacity retention rate	≥95%	3.6.3.4
		25°C capacity retention rate	100%	/
		35°C capacity retention rate	≥98%	3.6.3.5
4	DCR	25°C, 50%SOC, 1C, 30 sec	≤3.0mΩ	3.6.3.6
5	Cycle	25°C cycle	4000 weeks, capacity retention rate ≥80 %	3.6.3.7
		35°C cycle	2000 weeks, capacity retention rate ≥80 %	3.6.3.9
		-25°C cycle (0%-50%DOD)	500 weeks, capacity retention rate ≥80 %	3.6.3.8
6	Change retention and capacity recovery	35 °C, 42 days	Capacity retention rate ≥95 %	3.6.3.10
			Capacity retention rate ≥ 97 %	

2.2.3. Safety performance

No.	Item	Standard	Test Methods
1	Overdischarge	No fire or explosion	3.7.4.1
2	Overcharge	No fire or explosion	3.7.4.2
3	External short circuit	No fire or explosion	3.7.4.3
4	Heating	No fire or explosion	3.7.4.4
5	Temperature cycle	No fire or explosion	3.7.4.5
6	Extrusion	No fire or explosion	3.7.4.6

2.3. LF22K battery cell drawing

Attachment 1 (page 14)

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2.4. Appearance

The battery should not have obvious damage, cracks, corrosion, rust, discoloration, or electrolyte leakage that affects its value for practical use.

3. Testing Conditions

3.1. Environmental Conditions

Unless otherwise specified, testing should be conducted at a temperature of $25\pm 2^{\circ}\text{C}$, relative humidity of 15%-90% RH, and atmospheric pressure of 86 kPa-106 kPa. The temperature of the normal storage environment is set at $25\pm 2^{\circ}\text{C}$.

3.2. Measurement Precision

The precision of measurements should meet the following requirements:

- Voltage measurement accuracy: $\pm 0.1\%$
- Current measurement accuracy: $\pm 0.1\%$
- Temperature measurement accuracy: $\pm 0.5^{\circ}\text{C}$
- Dimensional measurement accuracy: $\pm 0.01\text{mm}$
- Weight measurement accuracy: $\pm 0.1\text{g}$

3.3. Installation of Test Board

Single battery pack test board (material: copper, thickness: 8mm) support; the board needs to cover the entire surface of the battery. The board is fixed with 4 M8 bolts between the plates, each bolt with a torque of $1.5\text{N}\cdot\text{m}$.

As shown:



3.4. Standard Charging Method

The standard charge is conducted under environmental conditions of $25\pm 2^{\circ}\text{C}$. The battery is charged at a constant current of 22.0A until the battery voltage reaches 3.70V, then continues with a constant voltage charge at 3.70V until the current drops to 1.1A. The charging process should not exceed 30 minutes.

3.5. Standard Discharge Method

The standard discharge is conducted under environmental conditions of $25\pm 2^{\circ}\text{C}$. The battery is discharged at a constant current of 22.0A until the voltage drops to 2.5V. The discharge process should not exceed 30 minutes.

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3.6. Capacity Determination and Energy Calibration

Capacity determination is conducted under environmental conditions of $25\pm 2^{\circ}\text{C}$. The battery is first charged using the standard charge method (3.4), then discharged using the standard discharge method (3.5). This cycle is repeated 3 times, and the average discharge capacity from the last three cycles is recorded as C_0 , which is considered the rated capacity of the battery. The average discharge energy from these three cycles is recorded as E_0 , which is considered the rated energy of the battery.

3.7. Test Methods

3.7.1. Dimensions

- Measurement Tools: Calipers (Length/Width/Height); Plate Thickness Gauge (Thickness)
- Test Method:
- Use calipers to measure the length, width, and height of the battery.
- Use a plate thickness gauge to measure the battery thickness, applying a pressure of 150kgf for 10 seconds.
- Note: The battery temperature should be recorded, and the thickness measurement should be taken promptly to avoid the effects of prolonged pressure on thickness increase.

3.7.2. Weight

Test Equipment: Electronic scale; Test Method: Use an electronic scale to measure the battery's weight.

3.7.3. Electrical Performance

3.7.3.1. 1C Discharge Capacity and Energy (Standard Discharge)

Under environmental conditions of $25\pm 2^{\circ}\text{C}$, after charging the battery using the standard charge method (3.3), discharge the battery with a constant current of 22.0A until the voltage drops to 2.5V. The total capacity and energy released are recorded. This cycle is repeated 3 times, and the average discharge capacity and energy from the last three cycles are recorded as the 1C discharge capacity and 1C discharge energy, respectively.

3.7.3.2. 3C Discharge Capacity and Energy

Under environmental conditions of $25\pm 2^{\circ}\text{C}$, after charging the battery using the standard charge method (3.3), discharge the battery with a constant current of 66.0A until the voltage drops to 2.5V. The total capacity and energy released are recorded. This cycle is repeated 3 times, and the average discharge capacity and energy from the last three cycles are recorded as the 3C discharge capacity and 3C discharge energy, respectively.

3.7.3.3. -25°C Capacity Retention Rate

Under the ambient temperature of $25\pm 2^{\circ}\text{C}$, the battery is calibrated according to the method in 3.5. Under the ambient temperature of $25\pm 2^{\circ}\text{C}$, the battery is fully charged according to the standard charging method (3.3), and then left for 8 hours at $-25\pm 2^{\circ}\text{C}$. At $-25\pm 2^{\circ}\text{C}$, it is discharged to 2.0V with a constant current of 22.0A, and the discharge capacity C_1 is recorded. C_1/C_0 is the -25°C capacity retention rate.

3.7.3.4. 0°C Capacity Retention Rate

Under environmental conditions of $25\pm 2^{\circ}\text{C}$, after charging the battery using the standard charge method (3.5) to capacity, store the battery at $45\pm 2^{\circ}\text{C}$ for 8 hours. Discharge the battery with a constant current of 22.0A at $45\pm 2^{\circ}\text{C}$ until the voltage drops to 2.0V. The total capacity released is recorded as $C_{45^{\circ}\text{C}}$, and the capacity retention rate at 45°C is calculated.

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3.7.3.5. 35°C High-Temperature Storage

Under standard temperature and humidity conditions ($25\pm 2^{\circ}\text{C}$, $60\pm 20\%$ RH), conduct capacity tests on cells 3.5 after storing at $35\pm 2^{\circ}\text{C}$ for 90 days. At standard temperature and humidity, charge the cell with 0.5C to 4.2V, then discharge it to 2.5V with a 22.0A constant current. Record the capacity C1, C2, C3 at 25°C before storage, and after storage at 35°C .

3.7.3.6. Internal Resistance

a) Under standard temperature and humidity conditions ($25\pm 2^{\circ}\text{C}$), test the AC internal resistance of cells at 1kHz.
b) At standard temperature and humidity, fully charge the cell 3.5 according to the standard charging method (3.3). Discharge the cell at 1C, rest for 30 minutes, then discharge to 2.5V at 0.2C. After resting for 30 minutes, record the open-circuit voltage V1, then discharge with a 22.0A constant current for 5 seconds, and record the open-circuit voltage V2. Calculate DCR as $(V1-V2) * 1000/22.0 \text{ m}\Omega$.

3.7.3.7. 35°C Thermal Cycling

a) After storing at $30\pm 5\%$ SOC, test the capacity of cells 3.3 according to the standard method.
b) Store the cell at $35\pm 2^{\circ}\text{C}$ for 90 days, then discharge with a 22.0A constant current to 2.5V, rest for 10 minutes, then charge according to the standard method (3.3) to record capacity C100.
c) Cycle the cell between $45\pm 2^{\circ}\text{C}$ and $-25\pm 2^{\circ}\text{C}$:

Charge to 4.2V with a 0.5C current, discharge to 2.5V, and rest for 30 minutes.

Conduct 500 cycles, test capacity every 50 cycles. Record the capacity after the final cycle C100, ensuring $C100 \geq 80\%$ of the initial capacity.

3.7.3.8. 45°C Thermal Cycling

a) After storing at $30\pm 5\%$ SOC, test the capacity of cells 3.3 according to the standard method.
b) Store the cell at $45\pm 2^{\circ}\text{C}$ for 90 days, then discharge with a 22.0A constant current to 2.5V, rest for 10 minutes, then charge according to the standard method (3.3) to record capacity C100.
c) Cycle the cell between $45\pm 2^{\circ}\text{C}$ and $-25\pm 2^{\circ}\text{C}$:

Charge to 4.2V with a 0.5C current, discharge to 2.5V, and rest for 30 minutes.

Conduct 500 cycles, test capacity every 50 cycles. Record the capacity after the final cycle C100, ensuring $C100 \geq 80\%$ of the initial capacity.

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3.7.3.9. 35 °C Cycle

At 30% SOC, install the test fixture (clamp pretightening force 1.5N.m).

Energy/capacity test before cycling: At an ambient temperature of $25\pm 2^{\circ}\text{C}$, discharge the battery at a constant current of 22.0A to 2.5V, leave it for 30min, then:
fully charge it according to the standard charging method (3.5), then discharge it according to the standard discharge method (3.6), and record the discharge capacity C_{00}

Cycling test: ambient temperature $35\pm 2^{\circ}\text{C}$;

- Charge the battery at a constant current of 66A (3C) to 3.70V, then switch to constant voltage charging to 1.1A (0.05C) and cut off;
- Leave it for 30min;
- Discharge at a constant current of 66A (3C) to 2.5V;
- Leave it for 30min
- Repeat a)-d) for 2500 cycles.

Post-cycle capacity/energy test: At an ambient temperature of $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$, discharge the battery at a constant current of 22.0A to 2.5V, leave it for 30 minutes, then fully charge it according to the standard charging method (3.4), and then discharge it according to the standard discharge method (3.5), record the discharge capacity C_x , capacity retention rate = $C_s/C_0\times 100\%$

3.7.3.10. 35°C storage

Under the environmental conditions of $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$, install the test fixture (tightening torque 1.5N.m), then conduct the capacity measurement for the battery (3.5 capacity measurement and energy standard). Then, charge the battery according to the standard charging method (3.3), adjust the SOC to 80% using 1C, and then store it under $35^{\circ}\text{C}\pm 2^{\circ}\text{C}$ conditions for 42 days. Afterward, move it back to $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ conditions for 5 days, allow the battery to rest at $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ for 4 hours, and then discharge it using the 3.4 standard method. Record the capacity as C_{reained} , cycle the battery 5 times according to the 3.5 method, take the average of the three middle discharge capacities, and record it as C_{restored} . The reversible capacity loss rate should be $100*(1-(C_{\text{reained}}/(C_{\text{initial}}-C_{\text{disch}}))) (\leq 5\%)$; the irreversible capacity loss rate should be $100*(1-(C_{\text{restored}}/C_{\text{initial}})) (\leq 3\%)$.

3.7.4. Security performance

3.7.4.1. Over-discharge

Under the condition of ambient temperature $25\pm 2^{\circ}\text{C}$, the battery is fully charged according to the standard charging method (3.3), and then the test fixture is installed (the fixture preload is 1.5N.m). The battery is discharged at a constant current of 22.0A for 90min at the safety test ambient temperature of $25\pm 5^{\circ}\text{C}$. Observe for 1h. (Refer to GB38031-2020 Electric vehicles traction battery safety requirements)

3.7.4.2. Overcharging

Under the condition of ambient temperature $25\pm 2^{\circ}\text{C}$, fully charge the battery according to the standard charging method (3.3), and then install the test fixture (fixture preload 1.5N.m). After the battery is charged to 4.015V or 115%SOC at a constant current of 22.0A at a safety test ambient temperature of $25\pm 5^{\circ}\text{C}$, stop charging. Observe for 1h. (Refer to GB 38031-2020 Electric vehicles traction battery safety requirements)

3.7.4.3. External short circuit

Under the condition of ambient temperature $25\pm 2^{\circ}\text{C}$, fully charge the battery according to the standard charging method (3.3), and then install the test fixture (fixture preload 1.5N.m). Under the safety test ambient temperature of $25\pm 5^{\circ}\text{C}$, short-circuit the positive and negative electrodes of the battery for 10min, and the external line resistance value should be less than 5m Ω . Observe 1h. (Refer to GB 38031-2020 Electric vehicles traction battery safety requirements)

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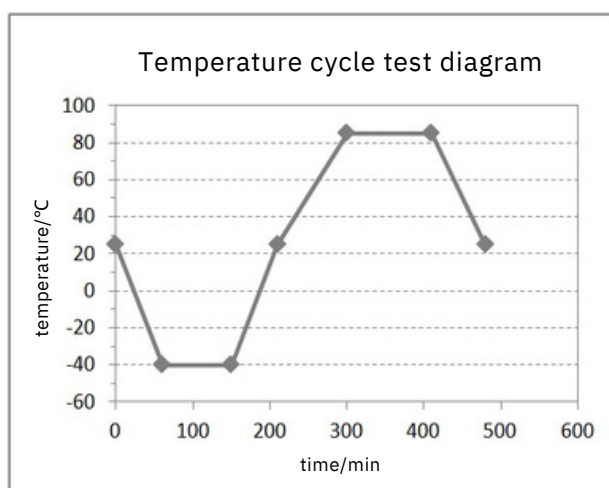
3.7.4.4. Heating (130°C)

Under the condition of ambient temperature $25\pm 2^{\circ}\text{C}$, fully charge the battery according to the standard charging method (3.3), and then install the test fixture (fixture preload 1.5N.m). Place the battery in the temperature box, and heat the temperature box from room temperature to $130^{\circ}\text{C}\pm 2^{\circ}\text{C}$ at a rate of $5^{\circ}\text{C}/\text{min}$, and keep this temperature for 30min before stopping heating. Observe for 1h. (Refer to GB 38031-2020 Safety Requirements for Batteries for Electric Vehicles)

3.7.4.5. Temperature cycling

Under the condition of ambient temperature $25\pm 2^{\circ}\text{C}$, fully charge the battery according to the standard charging method (3.3), and then install the test fixture (fixture preload 1.5N.m). Place the battery in the temperature box, and adjust the temperature box according to the following table and figure, and cycle 5 times. (Refer to GB 38031-2020 Safety requirements for batteries for electric vehicles)

Temperature ($^{\circ}\text{C}$)	Time increment (min)	Accumulated time (min)	Temp. change rate ($^{\circ}\text{C}/\text{min}$)
25	0	0	0
-40	60	60	13/12
-40	90	150	0
25	60	210	13/12
85	90	300	2/3
85	110	410	0
25	70	480	6/7

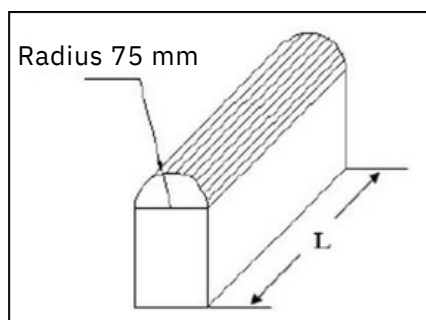


3.7.4.6. Extrusion

Under the condition of ambient temperature $25\pm 2^{\circ}\text{C}$, fully charge the battery according to the standard charging method (2.4.3). Test under the following conditions at the safety test ambient temperature $25\pm 5^{\circ}\text{C}$:

- Extrusion direction: apply pressure perpendicular to the direction of the battery cell plate, or in the same direction as the battery cell is most susceptible to extrusion in the vehicle layout;
- Extrusion plate form: semi-cylinder with a radius of 75mm, the length of the semi-cylinder (L) is greater than the size of the extruded battery cell (see the figure below);
- Extrusion speed: not more than 2mm/s;

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4. Charge and discharge parameters

4.1. Charging mode

Parameter	Product specifications	Condition
Standard charging current	1C	25°C±2°C
Max. charging sustainable current	4C	25°C±2°C
Standard charging voltage	Single battery≤3.70V	/
Standard charging mode	1CC/1CD	
Standard charging temper.	25°C±2°C	
Absolute charging temperature (cell temper.)	0~65°C	No matter what charging mode the battery is in, once the cell temperature exceeds the absolute charging temperature range, charging will stop.
Absolute charging voltage	Maximum 3.70V	No matter what charging mode the battery is in, once the cell temperature exceeds the absolute charging temperature range, charging will stop.

4.2. Other charging modes (unit: C-rate)

Battery temper./C	-25	-20	-15	-10	-5	0	10	25	35	45	55	60	65
SOC 0%~10%	0.2	0.2	0.4	0.5	0.8	1	1.5	3	3	3	1	0.5	0
SOC 10%-50%	0.2	0.2	0.4	0.5	0.6	0.8	1.5	3	3	3	1	0.5	0
SOC 50%-80%	0.1	0.15	0.25	0.4	0.4	0.6	1	3	3	3	1	0.5	0
SOC 80%-90%	0.1	0.15	0.2	0.3	0.2	0.4	0.5	3	3	3	1	0.5	0
SOC 90%-100%	0.1	0.15	0.2	0.25	0.2	0.3	0.3	3	3	3	0.8	0.5	0

4.3. Discharge mode

Parameter	Product specifications	Condition
Standard discharge current	1C	25°C±2°C
Max. discharge sustainable current	4C	25°C±2°C

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Discharge cutt-off voltage	2.5V 2.0V	Temperature T>0℃ Temperature T≤0℃	
Standard discharge mode			
Standard discharge temp.	25℃±2℃		
Absolute discharge temperature (cell temperature)	-35~65℃	No matter what charging mode the battery is in, once the cell temperature exceeds the absolute charging temperature range, charging will stop.	
Absolute discharge voltage	1.75V	No matter what charging mode the battery is in, once the cell temperature exceeds the absolute charging temperature range, charging will stop.	

4.4. Pulse mode

4.4.1. Pulse discharge mode (C-rate)

10s pulse discharge rate/C										
SOC\T	-30	-25	-20	-10	0	10	25	40	50	60
100%	10	10	15	20	20	20	20	20	20	20
80%	6	10	12	20	20	15	20	20	20	20
70%	6	10	12	20	20	15	20	20	20	20
60%	6	6	12	20	20	12	20	20	20	20
50%	3	6	10	15	20	12	20	20	20	20
40%	3	6	10	12	20	10	15	15	15	15
30%	2	3	6	10	15	6	12	12	12	12
20%	1.5	3	3	6	12	6	10	10	10	10
0%	/	/	/	/	/	/	/	/	/	/

4.4.2. Pulse feedback mode (C-rate)

10s pulse discharge rate/C										
SOC\T	-30	-25	-20	-10	0	10	25	40	50	60
100%	/	/	/	/	/	/	/	/	/	/
80%	0.1	0.2	0.5	0.5	1	2	5	5	5	5
70%	0.2	0.2	0.5	1	2	3	5	5	5	10
60%	0.3	0.3	0.5	1	3	3	5	10	10	10
50%	0.3	0.5	0.5	1	3	3	5	10	10	10
40%	0.3	0.5	1	2	3	5	5	10	10	12
30%	0.3	0.5	1	2	3	5	10	10	10	12
20%	0.3	0.5	1	2	3	5	10	10	12	12
0%	0.5	1	2	3	5	10	12	12	12	12

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5. Security restrictions

5.1. Voltage Limitation

Project	Category	Parameter	Protective action
Charging voltage	Charging terminated		Terminate charging when the battery voltage reaches 3.70V
	First level overcharge protection	3.8V	
	Second level overcharge protection	3.9V	
Discharge voltage	Discharge termination	2.5V	>0°C
	First level over-discharge protection	2.0V	
	First level over-discharge protection	1.5V	

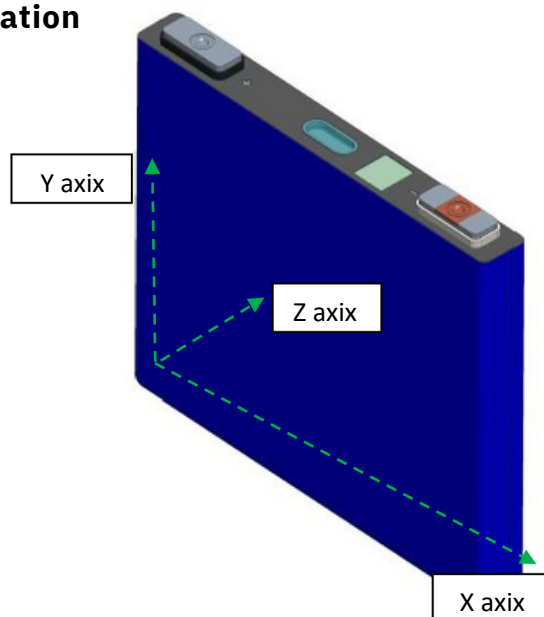
5.2. Temperature limits

Project	Numerical value	Remark
Recommended operating temperature range	-25~45°C	Recommended temperature range for battery use.
Maximum operating temperature	55°C	If the battery operating temperature exceeds the maximum operating temperature, the power needs to be reduced to 0.
Minimum operating temperature	-40°C	If the battery operating temperature exceeds the minimum operating temperature, the power needs to be reduced to 0.
Maximum safe temperature	60°C	If the battery operating temperature exceeds the maximum safe temperature, it will cause irreversible and permanent damage to the battery. Users must not use it higher than the maximum safe temperature.
Minimum safe temperature	-45°C	If the battery operating temperature exceeds the maximum safe temperature, it will cause irreversible and permanent damage to the battery. Users must not use it higher than the maximum safe temperature.

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6. Module Design Parameter Recommendations

6.1. Battery Orientation



6.2. Battery Compression Force

When the module is assembled, the battery can withstand compression forces up to a safety limit.

Testing Conditions:

- Compression area: 148.3mm x 128.2mm (LxH)
- Compression speed: 0.02mm/sec
- Compression direction: Y axis
- Battery SOC: 100%

Phenomenon	Compression Force
Internal Tab Deformation	12kN
Leakage	>100kN

Based on the above data, the compression force that the battery can withstand must not exceed 30kN, otherwise it may cause battery damage.

6.3. Battery Discharge Force

6.3.1. Testing Conditions:

The test will be conducted with the battery at 30% SOC as a reference. The actual installation status will be tested accordingly.

Discharge Conditions:

- Charging: Charge at a constant current of 22.0A until the voltage reaches 3.70V.
- Load current: 1.1A (0.05C), for a duration of 30 minutes.

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6.3.2. Test results:

Expansion force	BOL	2200N
	EOL	<6000N

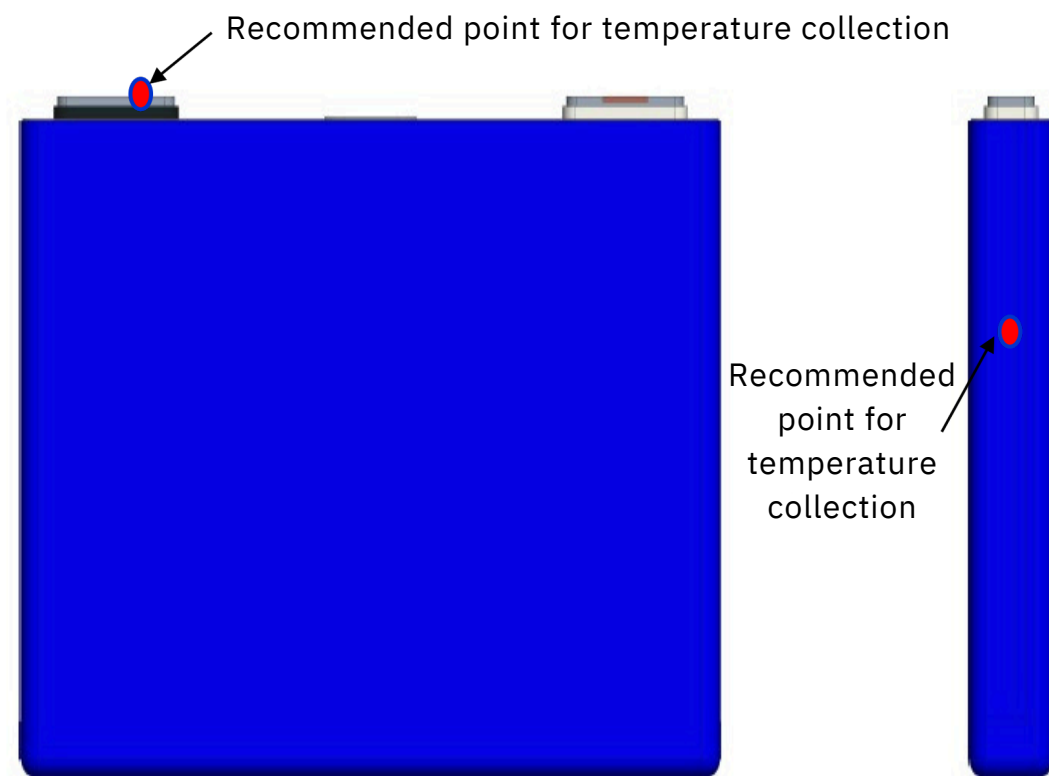
6.4. Thermodynamic parameters

Test method: Reference standard: GB/T10295-2008, ASTM E1269-2011

Thermal conductivity mean		
	X/Z direction	Y direction
	25~26W/mK	5~7 W/mK
Mean heat capacity	Heat capacity (kJ/(kg·K))	
	0.9~1.3kJ/(kg·K)	

6.5. Recommended temperature collection points (battery temperature field distribution)

When collecting temperature on the battery surface, it is recommended that the temperature collection points be arranged at the positive pole and the center of the large surface, as shown in the figure below.



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7. Battery operating instructions and precautions

7.1. Product end-of-life management

During the battery usage period, customers should establish an effective tracking system to record the battery's usage environment and cycle. Internally and externally visible abnormalities and functional decline should be timely reported to the battery supplier. During the initial usage, the battery capacity should be charged and discharged three times from 150% SOC to 80% (0.2C) to activate the battery. When not in use for a long time, the battery should be charged and discharged once every six months to a range of 30% to 50% SOC to maintain its activity. The customer should bear the responsibility for any damage to the battery product caused by its improper use, handling, and maintenance.

7.2. Storage

When the battery is not in use, it should be stored in a dry, ventilated, and clean environment away from direct sunlight. If storage is needed, the battery should be stored under the following conditions. Recommended storage conditions are: 30%±10% SOC, 0~25°C, <60% RH.

7.3. Transportation

Products should be transported under packaging conditions where the SOC does not exceed 30%. During transportation, violent vibration, impact, and extrusion should be avoided, as well as exposure to direct sunlight, rain, and snow. Suitable transportation methods include cars, ships, and aircraft.

7.4. Operating instructions

- Do not immerse the battery in water; keep it dry and store it in a ventilated environment when not in use.
- Do not use or store the battery near heat sources, such as fire or heaters.
- Use only the specified charger for charging.
- Do not reverse the positive and negative terminals.
- Do not connect the battery directly to a wall outlet or car cigarette lighter socket.
- Do not short-circuit the battery by connecting the positive and negative terminals with metal objects.
- Do not transport or store the battery together with metal objects such as hairpins or necklaces.
- Do not strike, throw, or subject the battery to severe physical impact.
- Do not pierce the battery housing with a nail or other sharp object, or hit the battery with a hammer.
- Do not directly solder the battery terminals.
- Do not disassemble the battery under any circumstances.
- Do not use the battery in severe electrostatic or magnetic environments.
- Use the battery only within the specified temperature range: 0°C to 60°C for charging, -20°C to 60°C for discharging.
- If electrolyte leakage comes into contact with the skin or eyes, rinse immediately with clean water and seek medical attention.
- If the battery emits an unusual odor, heat, discolors, deforms, or behaves abnormally during use, charging, or storage, stop using it immediately and remove it from the device or charger.

7.5. Disclaimer

If the battery is used beyond the usage conditions stated in the manual, it may cause overheating, fire, or explosion. Shenzhen Alpha Electronic Technology Co., Ltd. shall not be responsible for any accidents caused by the failure to operate the product according to the manual. Based on customer requirements, Shenzhen Alpha Electronic Technology Co., Ltd. may provide applicable battery solutions and design suitable battery products for specific applications.

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7.6. Others

Any matters not mentioned in this specification must be determined through negotiation between both parties.

8. Contact information

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9. Attachment 1: LF22K battery cell drawing

