Product Specification

Model: LFP50160119LE1-102Ah-N

Nominal Capacity: 102Ah

Catalog

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1. Modified List

Product Modified Record List				
Edition	Modified content	Registered	Approved by	Effective date
A/0	Original Release			2025.05.30

2. Terms & Definition

Terms	Definition
Room Temperature	25±2℃
Cell	A basic unit for converting chemical energy to electrical energy, usually consisting of electrode, separator, electrolyte, housing, and terminal, and designed to be rechargeable.
Cell Temperature	The surface temperature of the cell.
Rated Capacity	It's the capacity when cells are discharged to end of voltage with 1/5C at 25℃±2℃.
Room temperature Discharge capacity	Perform standard charge, rest for 30 minutes, perform standard discharge, then rest for 30 minutes, repeat the cycle five times, and take the average capacity of the last three cycles.
Charge Rate (C-Rate)	The ratio of charging current to the capacity of batteries measured repeatedly by the battery management system. For example, when the battery capacity is 100Ah and the charging current is 50A, the charging rate is 0.5C; when the battery capacity is attenuated to 80Ah and the charging current is 40A, the charging rate is 0.5C.
Cycle Life	During the repeated charging and discharging process of a secondary battery, its capacity will gradually decline. When the capacity drops to 80% of the rated capacity, the number of charge-discharge cycles is called the cycle life
Open Circuit Voltage(OCV)	Open-circuit voltage is the difference of electrical potential between two terminals of a device when disconnected from any circuit.
Operating Voltage	

	Operating voltage, also known as the discharge voltage or load voltage, it is defined as the potential difference between the cell terminals when the current transmits through the external circuit. Working voltage is always lower than the open circuit voltage, because when the current transmits through the cell internal, the polarization resistance and ohmic resistance must be overcome.
Restore Capacity	After storage, the capacity tested according to the standard charge and discharge conditions listed in section 5.2.1 and 5.3.1, the average value of 3 measured values were selected as restore capacity.
Charge Retention Capability	The percentage of the discharge capacity and rated capacity after the cell stored in a certain time and under normal temperature condition.
Capacity Recovery Capability	The percentage of the discharge capacity and rated capacity with recharging after the cell stored in a certain time and under normal temperature.
Standard Charging	Charge mode described in section 5.2.1.
Standard Discharging	Discharge mode described in section 5.3.1.
State of Charge (SOC)	The percentage of remaining energy. Only with estimating the cell SOC accurately can improve the utilization efficiency of the cell,and ensure the cell life and safety.
Units of Measurement	“V” (Volt), Unit of voltage
	“A” (Ampere), Unit of current
	“Ah” (Ampere-Hour), Unit of electric charge
	“Wh” (Watt-Hour), Unit of energy
	“mΩ” (MilliOhm), Unit of resistance

	“℃” (degree Celsius), Unit of temperature
	“mm” (millimeter), Unit of length
	“s” (second), Unit of time
	“Hz” (Hertz), Unit of frequency

3. Scope

This product specification describes the performance indicators of model LFP50160119LE1-102Ah-N.

4. Product Type

4.1 Type

Rechargeable Lithium-ion Cell

4.2 Model:

Model: LFP50160119LE1 -102Ah-N

4.3 Dimensions

Item	Description	Dimensions
T	Thickness	50.1± 0.5mm （200±20Kgf）
W	Width	160.0 ± 0.8 mm
H-1	Height 1	115.6± 0.5 mm
H-2	Height 2	118.5 ± 0.5 mm

D	Center distance	97.0 ± 0.3 mm

The cell should have none of obvious scratches, cracks, rust stains, discoloration, or electrolyte leakage, which have any defects that affect the commercial value of the cell.

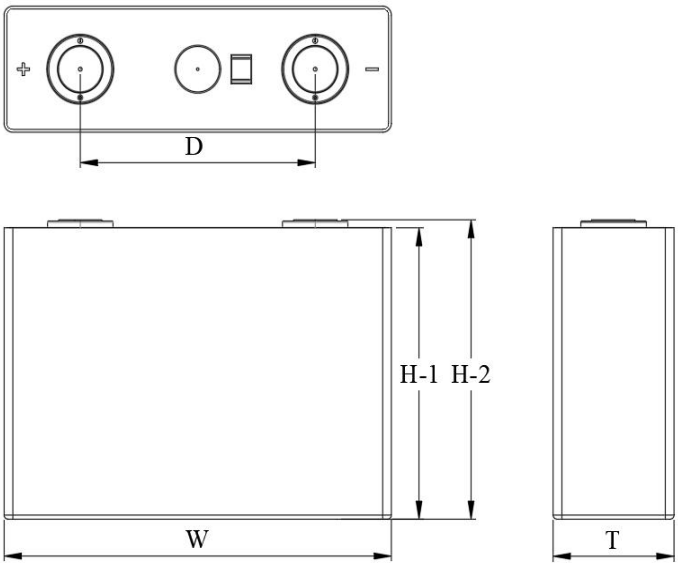


Fig.1 Diagram of cell size

5. Specification

5.1 Technical Parameters

No.	Item	Specification Requirements
1	Nominal Capacity	102Ah RT@1/5C Discharge
2	Standard Voltage	3.20V RT@1/5C Discharge
3	Standard Charge	1/5C CC to 3.65V, 3.65V CV to 0.05C
4	Standard Discharge	1/5C CC to 2.5V
5	Charging Cut-off Voltage	3.65V
6	Discharging Cut-off Voltage	2.5V T＞0℃ 2.0V T≤0℃
7	Max Charge Continuous Current	1.0C（≤80%SOC）
8	Max Discharge Continuous Current	1C
9	Internal Resistance	≤0.4mΩ
10	Weight	1.91±0.10kg
11	Energy Density	≥170Wh/kg, ≥350Wh/L 25℃，1/5C Discharge
12	Operating Temperature	Charge:-10℃~ 65℃
		Discharge:-20℃~ 65℃
13	Operating Altitude	＜5000m
14	Storage Requirements	Temperature:0℃~ 35℃(>1 month)
		Temperature:-20℃~ 45℃(≤1 month)
		Storage ambient humidity < 85%RH, No condensation

5.2 Charging Model

NO.	Parameter	Values	Remarks
5.2.1	Standard Charging Model	1/5C	At 25℃±2℃，charged to 3.65V at a constant current of 1/5C, and then, changed continuously with constant voltage of 3.65V until the current to 0.05C.
5.2.2	Standard Charging Temperature	25℃±2℃	Cell Temperature
5.2.3	Absolute Charging Temperature	-10℃ ~ 65℃	No matter what the charging model is, once the temperature of the cell is above the absolute charging temperature, charging should be stopped.
5.2.4	Absolute Charging Voltage	Maximum 3.65V	No matter what the charging model is, including pulse charging, once the voltage of the cell is above the absolute charging voltage, charging should be stopped.

5.2.5 C-Rate Other charge Condition (C-Rate)

Cell Temperature/℃		-10-0℃	0-5℃	5-10℃	10-15℃	15-20℃	20-25℃	25-55℃	55-60℃	65℃
SOC	0%-60%	0.05	0.1C	0.2C	0.4C	0.5C	0.6C	1.0C	0.5C	0
SOC	60%-70%	0.05	0.1C	0.2C	0.4C	0.5C	0.6C	1.0C	0.5C	0
SOC	70%-80%	0.05	0.1C	0.2C	0.4C	0.5C	0.6C	1.0C	0.5C	0
SOC	80%-90%	0.02	0.05C	0.2C	0.2C	0.3C	0.6C	0.8C	0.5C	0
SOC	90%-95%	0.01	0.05C	0.1C	0.1C	0.1C	0.6C	0.6C	0.5C	0
SOC	95%-100%	0.01	0.05C	0.1C	0.1C	0.1C	0.2C	0.2C	0.2C	0

5.3 Discharging Model

NO.	Parameter	Values	Remarks
5.3.1	Standard Discharging Model	1/5C	At room temperature, discharged to 2.5V at a constant current of 1/5C.
5.3.2	Maximum Pulse Discharging Current	3C	The maximum discharge time can last 30s with cell temperature below 60℃
5.3.3	Standard Discharging Temperature	25℃±2℃	Cell Temperature.
5.3.4	Absolute Discharging Temperature	-20℃~65℃	No matter what the discharging model is, once the temperature of the cell is above the absolute discharging temperature, discharging should be stopped.

5.3.5 Other Discharge model (D-Rate)

Cell Temperature		-20℃	-10℃	0℃	10℃	20-30℃	35-45℃	50-60℃	65℃
SOC	100%-60%	1.0C	1.0C	1.0C	1.0C	1.0C	1.0C	0.5C	0
SOC	60%-50%	1.0C	1.0C	1.0C	1.0C	1.0C	1.0C	0.5C	0
SOC	50%-40%	1.0C	1.0C	1.0C	1.0C	1.0C	1.0C	0.5C	0
SOC	40%-30%	0.5C	0.5C	0.5C	1.0C	1.0C	1.0C	0.5C	0
SOC	30%-20%	0.2C	0.3C	0.3C	1.0C	1.0C	1.0C	0.5C	0
SOC	20%-10%	0.1C	0.2C	0.3C	1.0C	1.0C	1.0C	0.5C	0
SOC	10%-0%	0.1C	0.1C	0.1C	0.5C	1.0C	0.5C	0.5C	0

6. General Performance

No.	Item	Test Method	Decision Criteria

1	Cycle Life	80%。 At an ambient temperature of 25° C ± 2° C, charge with a constant current of 0.5C to 3.65V, then continue charging at a constant voltage of 3.65V until the current drops to 0.05C. Let it stand for 30 minutes, then discharge with a current of 0.5C to 2.5V; let it stand for another 30 minutes. Repeat the above steps until the discharge capacity reaches 80% of the rated capacity.	⩾6000Cycles
1	Cycle Life	At an ambient temperature of 25°C ± 2°C, perform step charging in the manner described in 5.2.3, then let it rest for 30 minutes. Discharge it with a 1C current until the voltage drops to 2.5V; let it rest for another 30 minutes. Repeat the above steps until the discharge capacity reaches 80% of the rated capacity.	⩾4000Cycles
2	Cycle Life	At an ambient temperature of 45°C ± 2°C, charge with a constant current of 0.5C to 3.65V, then continue charging at a constant voltage of 3.65V until the current drops to 0.05C. Let it stand for 30 minutes, then discharge with a current of 0.5C to 2.5V; let it stand for another 30 minutes. Repeat the above steps until the discharge capacity reaches 80% of the rated capacit	⩾2000Cycles
3	Low Temperature Discharge	Under conditions of 25℃±2℃, fully charge the battery using the method specified in 5.2.1, then rest it at -20℃±2℃ for 8 hours or more, and discharge at a constant current of 1/2C until the voltage reaches 2.0V.	⩾65% Discharge capacity/nominal capacity⩾65%
4	High Temperature	Under conditions of 25℃±2℃, fully charge the battery using	⩾98% Discharge

	Discharge	the method specified in 5.2.1, then rest it at 55℃±2℃ for 5 hours or more, and discharge at a constant current of 1/2C until the voltage reaches 2.5V.	capacity/nominal capacity≥98%
5	Multiplying Discharge	Under conditions of 25℃±2℃, fully charge the battery using the method specified in 5.2.1, rest it for 30 minutes, then discharge at a constant current of 1C until the voltage reaches 2.5V.	≥98% Discharge capacity/nominal capacity≥98%

7. Storage Performance

No.	Item	Test Method	Decision criteria
1	Room Temperature Storage	At an ambient temperature of 25℃±2℃, fully charge the cell in the manner described in 5.2.1, let the cell stand for 28 days, then discharge it at 0.5C (1/2C) to 2.5V and record the discharge capacity as C1. Next, fully charge the cell again in the manner described in 5.2.1, let it stand for 30 minutes, then discharge it at 0.5C (1/2C) to 2.5V and record the discharge capacity as C2.	Charge Retention Capability ≥96%; Capacity Recovery Capability≥98%
2	High Temperature Storage	At an ambient temperature of 25℃±2℃, fully charge the cell in the manner described in 5.2.1, place it in a constant temperature chamber at 55℃±2℃ and let it stand for 7 days. After removing the cell, let it stand at room temperature for 5 hours, then discharge it at 1/2C to 2.5V and record the discharge capacity as C1. Next, fully charge the cell again in the manner described in 5.2.1, let it stand for 30 minutes, then discharge it at 1/2C to 2.5V and record the discharge capacity	Charge Retention Capability ≥95%; Capacity Recovery Capability≥96%

		as C2.	

8. Safety Performance

No.	Item	Test Method	Decision Criteria
1	Over Charge	At 25℃±2℃, fully charge in the manner described in 5.2.1, then charge at a current of 1C until reaching 1.5 times the specified charge cut-off voltage or until the charging time reaches 1 hour, then cease charging; observe for 1 hour.	No explosion，no fire
2	Over Discharge	At 25℃±2℃, fully charge in the manner described in 5.2.1, then discharge at a current of 1C for 90 minutes or until the voltage reaches 0V. Observe for 1 hour at 25℃±2℃.	No explosion，no fire
3	Short Circuit	After the cell is fully charged, the positive and negative electrodes are externally short-circuited for 10 minutes with an external circuit resistance < 5mΩ; observe for 1 hour.	No explosion，no fire
4	Heating	After fully charging the cell, place it in a temperature chamber. The chamber is heated at a rate of 5℃ per minute from room temperature to 130℃, maintained at 130℃ for 30 minutes, then heating is stopped; observe for 1 hour.	No explosion，no fire
5	Crushing	After fully charging the battery using the method specified in	No explosion，no fire

		5.2.1: Extrusion Direction: Perpendicular to the cell surface. Extrusion Plate Form: A semi-cylindrical rod with a radius of 75mm. Extrusion Speed: （5±1）mm/s. Extrusion Degree: Stop extrusion when the cell deformation reaches 30%, the applied force reaches 13±0.78KN, or the voltage drops to 0V. Maintain the extrusion state for 10 minutes, then observe for 1 hour.	
6	Temperature Cycle	The cell was charged as per section 5.2.1, put the cell in the thermostat, according to the following temperature: 1. Reduce the ambient temperature to -40℃±2℃ with 13/12℃/min rate in 60min, then store the cell for 90min; 2. Heating the ambient temperature to 25℃±2℃ with 13/12℃/min speed in 60min; 3. Heating the ambient temperature to 85℃±2℃ with 2/3℃/min speed in 90min, then store the cell for 110min; 4. Reduce the ambient temperature to 25℃±2℃with 6/7℃/min speed in 70min; Repeat above steps for five cycles. After the test, observe for 1 hour.	No explosion，no fire
7	Low Pressure Test	A fully charged battery is placed in a low-pressure chamber, and the chamber is evacuated to 11.6 kPa and maintained for 6 hours.	No liquid leakage，No Fire, No Explosion
8	Seawater Immersion Test	Charge the battery using the standard charging method, then immerse the battery in brine (3.5% mass concentration NaCl aqueous solution) with the brine completely submerging the battery, and the experiment shall last for 2 hours.	No explosion，no fire
9	Fall Test		No liquid leakage，No Fire, No Explosion

		After charging the battery, let it free fall from a height of 1.5 meters to a concrete floor with its positive and negative terminals facing down, and observe for 1 hour.	

9. Standard Test Conditions

9.1 Testing Instruments

- Voltmeter measuring device: accuracy is not less than 0.5 grade;
- Current measuring device: accuracy is not less than 0.5 grade;
- Temperature measuring device: accuracy is ±0.5℃；
- Time measuring device: accuracy is ±0.1%;
- Size measuring device： accuracy is ±0.1%;
- Weight measuring device: accuracy is ± 0.1%.

Unless otherwise specified, all tests shall be conducted in an environment with a temperature of 25℃±2℃, relative humidity from 15% to 90%, and atmospheric pressure from 86 kPa to 106 kPa.

Cells for tested must be newly delivered cells, delivered by one month at the latest, unless otherwise specified.

9.4 Test Clamp Preparation and Installation

9.4.1 Ordinary Steel Clamp

The single battery shall be fixed with a steel fixture (thickness: ≥10mm). The fixture needs to cover the large surfaces of the battery. Four M10 bolts shall be used to fix the clamping plates, and the surfaces of the clamping plates in contact with the battery shall be insulated, as shown in the figure below.

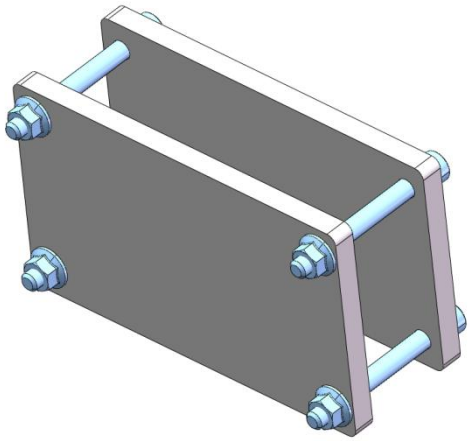


Fig. 2 Diagram of the clamp

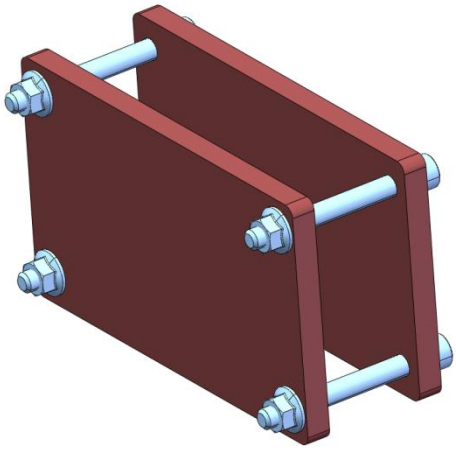


Fig. 3 Diagram of the clamp covered with insulation film

After preparing the battery covered with blue film (material: PET, thickness: 0.1mm) and patches (recommended epoxy plate: thickness: 0.3mm) at 15%~30% SOC, place it in the middle of the fixture. Fix the steel fixture with four M10 bolts to ensure the battery is subjected to an initial preload of 200 kgf ± 20 kgf from the fixture. Measure the thickness of the battery with clamping plates at the upper, middle, and lower positions using a micrometer, and the thickness variation shall be ≤ 0.3 mm.



Fig. 4 Diagram of the patches

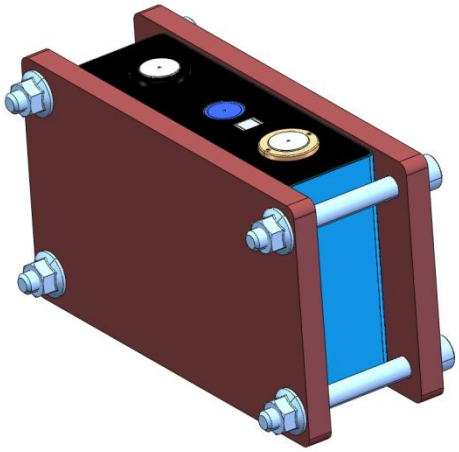


Fig. 5 Diagram of the cell with clamp

9.4.2 Swelling Force Clamp

After preparing the battery covered with blue film (material: PET, thickness: 0.1mm) and patches (recommended epoxy

plate: thickness: 0.3mm) at 100% SOC, place it in the middle of the fixture. Adjust the preload device of the expansion force fixture so that the preload force sensor display shows a compressive force of 200 kgf ± 20 kgf. Measure the thickness of the battery with clamping plates at the upper, middle, and lower positions using a micrometer, and the thickness variation shall be≤0.3 mm.

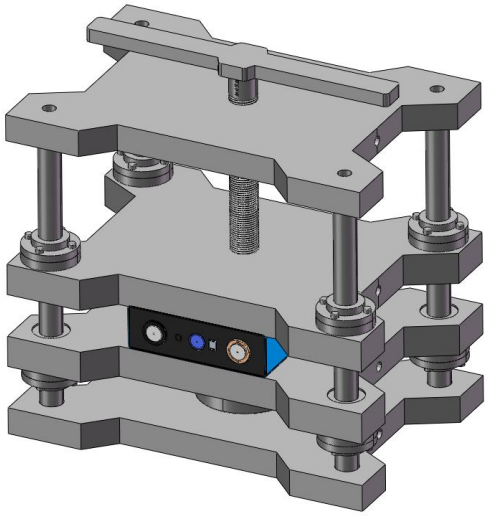


Fig. 6 Diagram of cell with swelling force fixture

10. Application Conditions

The customer shall ensure strict compliance with the following battery-related application conditions:

Each Product shall be used under the strict monitor, control and protection by the BMS.

The BMS needs to meet the following basic testing and control requirements

NO.	Parameter	Specification	Action
10.2.1	Stop charging	3.65V	Stop charging when cell voltage reaches 3.65 V
10.2.2	First overcharge protection	≥3.70V	Stop charging when cell voltage reaches 3.69 V
10.2.3	Second overcharge protection	≥3.8V	When the battery voltage reaches 3.8V, the BMS is forced to terminate charging, and the BMS should be locked until technicians solve the problem

10.2.4	Stop discharge	Minimum 2.5V(＞0℃) Minimum 2.0V(≤0℃)	Minimize the discharging current when cell voltage reaches 2.5 V(＞0℃) or 2.0V(≤0℃).
10.2.5	First over discharge protection	Minimum 2.3V Minimum 1.8V	Stop discharging when cell voltage reaches 2.3V(＞0℃) or 1.8V(≤0℃)
10.2.6	Second over discharge protection	Minimum1.8V(＞0℃) Minimum 1.6V(≤0℃)	When the battery voltage is less than 1.8V(＞0℃) or 1.6V(≤0℃), the BMS should be charged back to 50%SOC at 0.1C in time, and the BMS should be locked until technicians solve the problem.
10.2.7	Short circuit protection	No short circuit allowed	When a short circuit occurs, the battery is disconnected by the over current protection device.
10.2.8	Over current protection	See paragraph 5.2&5.3	Control discharge current by BMS to values within specification
10.2.9	Over temperature protection	See paragraph 5.2&5.3	Stop charging and discharging when temperature exceeds specification

10.3 Recommendations for Module Welding Parameters

Items		Specification	Remarks
Welding Parameter of Al Busbar	Material of Positive Terminal	AL1060	/
	Material of Negative Terminal	AL1060+Cu T2	/
	Laser Welding Depth	≤2mm	/
	Max Pressure on Poles	500N	The maximum force on the poles in vertical direction with no deformation.
	Max Torque on Poles	5 N·m	The maximum torsion on the poles with no loosen.
	Max Temperature of Poles	120℃	The maximum temperature that the poles bear before the plastic pad deforms.

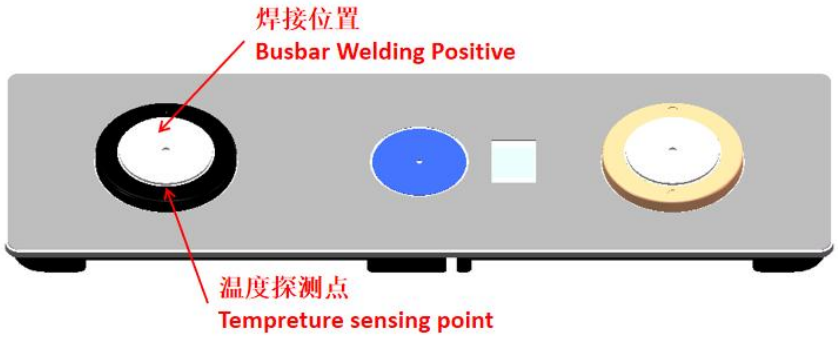


Fig. 7 Schematic Diagram of temperature Boundary in Welding Process

10.4 Cell Compressive Force and Swelling Force

Items	Compressive/Swelling Force
Recommended compression force	2000N±1000N
Instantaneous maximum compression force	≤8000N
Swelling Force（80%SOH）	≤15000N
EOL Swelling Force（70%SOH）	≤25000N

10.5 Cell Thermal Parameters

Items		Parameter
Thermal Conductivity	Direction	13.346 W/(m·K)
	Direction	2.25 W/(m·K)
	Direction	13.346 W/(m·K)
Specific Heat Capacity		0.983 KJ/(kg • K)
Cell Mass		1.91kg
Cell Volume		0.927L
Cell Density		2.06kg/L

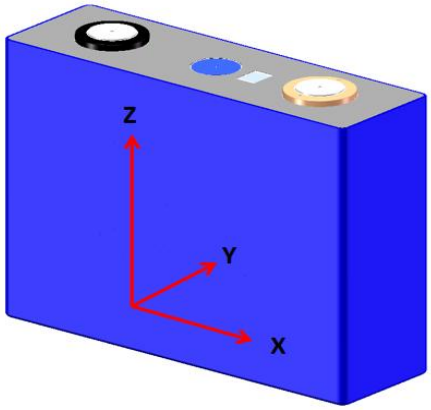


Fig. 8 Definition of coordinate system

11. Product End-life Management

The service life of the battery is limited. Customers shall establish an effective tracking system to monitor and record the internal resistance and capacity of each battery within its service life. The measurement and calculation methods for internal resistance and capacity shall be jointly discussed and mutually agreed upon by the customer and the manufacturer. When the internal resistance of an in-use battery exceeds 150% of its original internal resistance or its capacity is less than 70% of the rated capacity, the battery shall be ceased from use. Non-compliance with this requirement will exempt the manufacturer from the product quality guarantee liability stipulated in the product sales agreement and this specification.

12. Transport

The state of charge of cell transportation is 20%~40% （cell voltage is 3.23~3.31V). Cells are packed in boxes for transportation. Violent vibration, shock or extrusion should be prevented during transportation, sunshine and rain should not be inverted.

In the process of loading and unloading, the products should be handled lightly by handled lightly. Throwing, rolling and heavy pressure should be strictly prevented.

13. Storage Conditions

Storage charge status of cells is 20%~40%（cell voltage is 3.23~3.31V). Storage environment temperature of cells should be at - 20℃~45℃（0℃~35℃ recommended，relative humidity≤60%RH，No condensation). Clean, dry and ventilated rooms should avoid contact with corrosive substances, should not be exposed to direct sunlight, and should be far away from fire and heat sources.

14. Warnings and Precautions for Cell Use

In order to avoid the dangers of leakage, heated, combustion and explosion of cells, please pay attention to:

- It is strictly forbidden to immerse cells in liquids. When not in use, cells should be stored in a cool and dry environment;
- It is forbidden to place cells near high-temperature heat sources, such as fires, heaters, etc.
- When charging, please choose a special charger for lithium-ion cells;
- It is strictly forbidden to use cells by reversing the positive and negative electrodes;
- It is forbidden to connect the positive and negative electrodes of cells directly with metals to make them short-circuit;
- Striking or throwing, trampling and bending cells are prohibited;
- It is forbidden to pierce the cell with nails or other sharp tools;
- Cells are prohibited at high temperatures;
- It is forbidden to use cells in places with strong static and magnetic fields;
- If the cell leaks and the electrolyte enter the eyes, please don't rub it. Rinse your eyes with clean water and send to the hospital immediately;
- If there is any abnormality in the process of odor, heat，discoloration, deformation or use, storage and charging, remove the cell from the device or charger immediately and stop using it;

To prevent short circuit in cell packaging, there should be enough insulation between lead and cell to ensure absolute safety. No short circuit shall occur in the enclosure to prevent smoke or fire;

- Disassembly of cells is strictly prohibited. Replacement of cells should be completed by cell suppliers or equipment suppliers. Users are not allowed to replace cells by themselves;
- Using damaged cells is prohibited;
- It is forbidden to mix cells of different models and brands;
- It is forbidden to mix old and new cells with cells of different materials.

15. Product Liability

Please read the product specifications carefully before using the cells, and use the cells in strict accordance with the product specifications and the attached terms of attention. The manufacturer will not be liable for any accidents caused by the failure to operate in accordance with this specification.

16. Amendment Statement

Due to the need for continuous improvement of product quality and characteristics, the manufacturer reserves the right to revise product specifications and maintenance characteristics without prior notice to users.

17. Other

The matters not mentioned in this specification shall be determined through consultation by both parties. The manufacturer reserves the right of final interpretation of the contents mentioned in this specification.